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# Northern Michigan FruitNet 2009
## *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

**June 2, 2009**

**GROWING DEGREE DAY ACCUMULATIONS THROUHG JUNE 1st AT THE NWMHRS**

| Year | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 19yr. Avg. |
|---|---|---|---|---|---|---|---|
| GDD42 | 590 | 553 | 796 | 820 | 663 | 561 | 639.7 |
| GDD50 | 270 | 257 | 428 | 436 | 318 | 252 | 322.3 |

**Growth Stages at NWMHRS (6/1/09- 5:00 p.m.)**
**Apple**: McIntosh – 8 mm fruit
Yellow Delicious – 8 mm fruit
Gala – 8 mm fruit
Red Delicious – 9 mm fruit
**Pear**: Bartlett: 9 mm fruit
**Sweet Cherry**: Hedelfingen: 12 mm fruit
Napoleon: 12 mm fruit
Gold: 12 mm fruit
**Tart Cherry**: 9 mm fruit
**Balaton**: 8 mm fruit
**Apricot:** 20 mm fruit
**Plum**: 7 mm fruit

**Weather**
Temperatures remain cool in the north, and the degree accumulations have slowed in the last week. We have accumulated 590GDD base 42, which is about 40 GDD behind this time last year. At base 50, we have accumulated 270 GDD, and our 19-year average is 322 GDD. We have received some rain in the past two weeks: 0.51" on May 16, 0.7" on May 27, and 0.63" on May 28. Overall, the rainfall totals for May were 2.16", but the evaporation totals were 6.10". We also kicked off June with another 0.3" of rain. We have had some overnight cold temperatures with lower areas reporting frost. Conditions have also been windy this spring.

**Crop Report**
Pears are starting to size – 9 mm-11 mm. Apples are in the 8-9 mm range, and growers are looking to start thinning and are hoping for warm temperatures. Apogee sprays have been going on last week and into this week; these applications are more wide spread than in years past. Tart cherries are in the 8-9 mm range while sweets are larger at 12 mm. Fruit set has been interesting in sweet cherry – growers are finding a lighter set than originally anticipated. Pollination may be the reason for this variability due to windy and cool conditions that limit pollinator activity. The tart crop appears to be plentiful at this time. Grapes are moving along with 4-8" shoot length. Strawberries are blooming, and growers frost protected over the weekend.

**Pest Report**
In **apples**, spotted **tentiform leafminer** numbers are down with catches averaging 8 adults per trap, compared with 50 per trap last week. **Eastern tent caterpillar** webbing is still visible throughout the region at higher levels than commonly seen. Caterpillars are moving out of nests and looking for places to pupate. We caught our first **codling moth** last week, but did not catch any this week, we have no reports of sustained catch in the region. **Oriental fruit moth** catch is averaging 3 moths per trap. High levels of **European red mites** eggs have resulted in pre-bloom miticide applications.

Between Tuesday May 26 and Friday May 29, the regional weather stations recorded a 68 hour wetting period that triggered a heavy primary **scab** infection despite the cool temperatures. The model estimates 90% ascospore maturity and 60% dispersal as of this morning. Based on forecast data, there is a possibility that primary scab could end on Tuesday June 9th with 100% ascospore discharge forecasted. With cool temperatures, the **fire blight** model accumulated EIP values of over 100 only once or twice during apple bloom with no significant accumulations predicted in the 7 day forecast.

In **cherries**, **American plum borer** numbers are down this week with an average of 6 moths per trap compared to 37 moths per trap last week. As fruit develops, growers are aware of potential damage from **plum curculio** despite the cool

temperatures. Warm temperatures will likely result in a major oviposition period. One plum curculio sting was reported in tart cherry in Benzie County this week, and oviposition scars have been reported in sweet cherry blocks in Leelanau County. We have also been hearing reports of higher than normal levels of **two-spotted spider mites** before last week's wetting event. Lastly, the wetting event that started last Tuesday resulted in a high infection potential for cherry leaf spot.

In **grapes,** we have caught our first lonely **potato leafhopper** on Old Mission. Last week, we also caught our first two **grape berry moths** in a Leelanau vineyard with a history of high pressure. For an updated version of the pest report during the week, call (231) 947-3063.

**PRE-HARVEST INTERVAL (PHI) REMINDERS**
N.L. Rothwell, District Horticulturist, MSU-E

All pesticide chemistries have pre-harvest intervals (PHI's), which are the minimum number of days from the last pesticide application to harvest. This reminder is intended to give growers a heads' up as we approach harvest for different crops. We will be running this reminder on a regular basis throughout the season to help growers accurately time different pesticides. However, growers should be sure to check the label before applying any pesticide.

**EBDC's**: These fungicides have a long PHI for apples and pears (77days) and grapes (66 days).

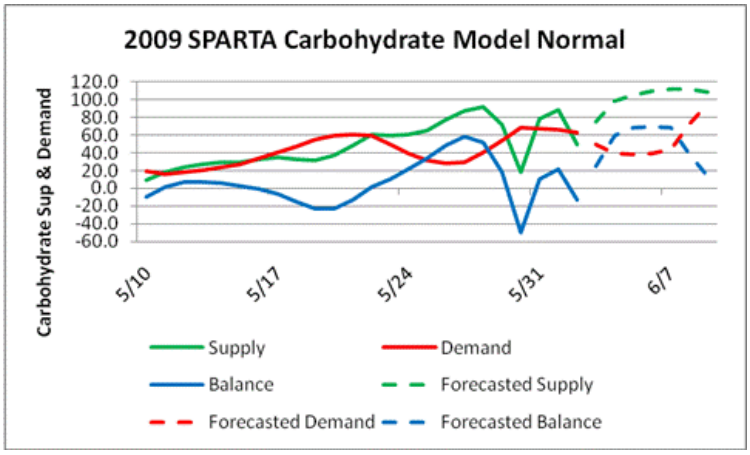
**Centaur**: 60 day PHI for apples, pears, and peaches.

**Nexter**: This miticide is restricted to post-harvest use in cherries and apricots (300 day PHI), but in apples the PHI is 25 days. In pears, peaches, plums, and grapes, the PHI is only 7 days.

**Platinum**: This insecticide has a 50 day PHI in strawberries, so this product cannot be used at this time (1 June). It also has a 60 day PHI in grapes.

**THINNING CAUTION**
P. Schwallier and N. Rothwell, District Horticulturists, MSU-E

This year we have had heavy bloom in apple throughout the region. Most growers observed that when we have a heavy bloom, many blossoms fall off during and around petal fall. Often a 'snowball' bloom is weak due to the considerable amount of energy needed to produce the bloom. However, even if a lot of bloom falls off in the coming days, we often have enough blossoms left to set a full crop. In Phil's experiences, snowball bloom is easy to thin, so growers should be cautious during the thinning window. Unfortunately, the weather forecast does not appear to be conducive for optimal thinning as the high temperature in the coming days are forecasted to be in the mid-60's and the lows in the 40's. Thinning may be challenging this season, but from what we hear from growers, thinning is always a challenge.




**EUROPEAN BROWN ROT OBSERVED**
Nikki Rothwell, District Horticulturist, MSU-E

The cool, wet weather and cherry bloom is the combination required for European brown rot (EBR) to infect tart cherries. Although this pathogen (*Monilinia laxa*) rarely infects Montmorency, it can be a problem in years under the right conditions. Based on our recent observations, the 2009 season appears to have provided all the right conditions for infection. Montmorency trees infected with the European brown rot fungus are visible throughout the northwest area. Some orchards appear to be more problematic than others, particularly low areas of the orchard or along hedgerows--locations that do not dry off quickly. On the other hand, most Balaton blocks have some level of EBR infection, which is to be expected as cultivars like Meteor, English Morello, and Balaton are highly susceptible to EBR.

To control this disease, two fungicide sprays should be applied; the first spray is at the popcorn stage, followed by a second spray seven days later. We have had reports of infection even following these recommendations. Therefore, if growers see the symptoms of EBR in the orchard, tree phenology will dictate the next steps: 1) if cherries are coming out of the shuck, nothing further can be done to prevent EBR infection, or 2) blossoms are still visible on the tree, another shot of Indar at 2oz is recommended.

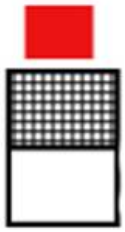
**APPLE SCAB FUNGICIDE SENSITIVITY SCREENING 2009**
Erin Lizotte, District IFP/IPM Educator

The NWMHRS, in collaboration with the Michigan State University Tree Fruit Pathology lab, will be screening apple scab samples from northwest Michigan for sterol inhibitor and strobilurin sensitivity. We are looking to screen 30-50 sites and need to collect 50 leaves with active, brown scab lesions. If you have a site with active scab infections, we can collect the sample or you can bring the sample to the Research Station or the next IPM Update in your area. To collect a sample yourself, collect 50 leaves from as many trees as possible and store in a paper bag in the refrigerator until you can deliver them. Leaves may be stored together in one bag. A brief history of the use of sterol inhibitors and strobilurins for the orchard along with your contact information is greatly appreciated. For more information, please contact Erin Lizotte at (231) 946-1510.

**RESISTANCE MANAGEMENT INSECTICIDE COMPATIBILITY CHART**
David Mota-Sanchez and John Wise, MSU Department of Entomology

To use the Resistance Management Insecticide Compatibility chart, find the cell that intersects the row and column from two compounds of interest. The shaded code in the intersecting cell represents the compatibility of the two compounds for

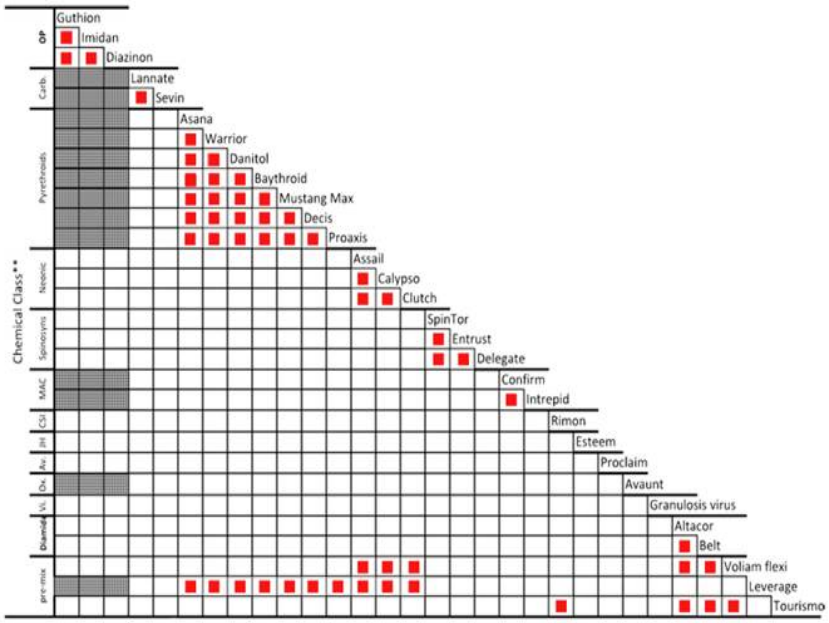
generational rotation.* The following codes are relevant for lepidopteran pests of fruit crops, including codling moth, Oriental fruit moth, and obliquebanded leafroller:



The black square represents insecticide chemistries with the same mode of action, thus should NOT be used in a preceding or subsequent pest generation.

The shaded square represents insecticide chemistries with known cross-resistance, thus should NOT be used in a preceding or subsequent pest generation.

The white square represents insecticide chemistries that are known to be good rotation partners for a preceding or subsequent pest generation.




* Recommendations are based on current published resistance studies from Michigan pest populations.
** Insecticides within a given chemical class have the same or similar mode-of-action (MOA).

**Key to names of insecticide classes and associated MOA:**

OP - Organophosphates (Acetycholinesterace inhibitors)
Carb - Carbamates (Acetycholinesterace inhibitors)
Pyrethroids - (Sodium Channel Modulator)
Neonic - Neonicotinoids (nicotinic acetylcholine receptor agonist/antagonist)
Spinosyns - (nicotinic acetylcholine receptor agonist)
MAC - Molt Accelerating Compounds (ecdysone agonist molting disruptors)
CSI - Chitin Snthesis Inhibitors (benzoylurea and buprofezin)
JH - Juvenile Hormone Mimic
Av - Avermectins (chloride channel activators)
Ox - Oxidiazines (sodium channel blockers)
Vi - Granulosis virus (viral infection)
Diamides - (rianodine receptor modulators)
Pre-mix: products that are formulated with two or more active ingrediants of different MOA
-Voliam flexi contains the neonicotinoid thiamethoxam and diamide chlorantraniliprole
-Leverage contains the neonicotinoid imidacloprid and pyrethroid cyfluthrin
-Tourismo contains the CSI buprofezin and diamide flubendiamide

**MITES ALREADY?**

Nikki Rothwell, NWMHRS
John Wise, TNRC

Last season, we reported high levels of two-spotted spider mites (TSSM) and European red mites (ERM) in cherry and apple orchards around the state. Because of their late appearance, we predicted that these mites would not cause economic injury *last* season. However, our main concern was how those late-season mite populations would impact the 2009 production season.

ERM adults laid eggs on spur shoots and limb crotches last fall, and these eggs will serve as the starting point for this year's spring mite population. Growers that did not apply a 2008 miticide in orchards with high ERM populations should have conducted apple pre-bloom monitoring for mites this season, and if ERM eggs numbers were high, a pre-bloom miticide application should have been made. If scouting reports indicate a high level of mite eggs and no miticides were applied earlier this spring, growers will likely battle ERM on apple fruitlets as nymphs can build to high numbers and feed extensively.

Late season populations of two-spotted spider mite (TSSM) provided a slightly different situation. In cherries, post-harvest management of TSSM is common, particularly with the old miticides and their limited PHI's. Control of TSSM is important to maintaining healthy foliage into the fall, important for sustainable fruit production the following year. Overwintering adults and immatures move to rough areas of tree bark or in leaf litter on the ground in early to mid-September and once this overwintering migration begins, control actions are no longer warranted. Orchards with high TSSM populations in August should have been marked for scouting this May or June, which is much earlier than would be necessary under typical conditions. We have seen high populations of TSSM in both sweet and tart cherry this spring, and these orchards will likely require a pre-harvest miticide application. Most TSSM mites have been observed on cherry leaves on the inner canopy. As the tree grows and foliage expands, these mites will move out into the canopy. Growers should be sure to investigate many leaves on many trees as TSSM mite numbers look extremely high in spring when limited cherry foliage is present.

Additionally, we want to remind growers about rotating miticide compounds. Mites can develop resistance to commonly used miticides, so growers should choose their products based on rotation as well as price. Because of costs of miticides, the most economical option is appealing, but growers should keep in mind that overuse of a particular compound will likely lead to resistance issues. Also, miticide availability has been in question, so call in advance if applying a miticide in the coming weeks. We are fortunate to have a number of miticide products available for tree fruit, and a list is provided in Table 1 below.

We also recommend that scouts/growers document the levels of predacious mites in orchards this spring. If healthy populations of mite predators exist, they will continue to feed on ERM eggs and nymphs. To report on predacious mites, scouts/growers should collect a 100-leaf sample and count the numbers of each of the predator mite species. The three most important predaceous mites are *Amblyseius fallacis* (Phytoseiidae), *Agistemus fleschneri* (Stigmaeidae), and *Zetzellia mali* (Stigmaeidae) (see "A Pocket Guide for IPM Scouting in Michigan Apples" – E-2720 for pictures). Predaceous mites are smaller than adult ERM, but they can be seen with a hand lens and typically move very quickly across leaf surfaces.

| Compound Trade Name*** | Mode of Action | Life-stage Activity | Mite Species Controlled** | Residual Activity |
|---|---|---|---|---|
| Savey, Onager, Apollo, Zeal | Mite growth inhibitors | egg/larvae | TSSM, ERM | 8-10 weeks |
| Nexter, Portal | Electron transport Inhibitors (METI I) | motiles* | TSSM, ERM, PNM | 6-8 weeks |
| Acramite | unknown | motiles* | TSSM, ERM | 6-8 weeks |
| Kanemite | Electron transport Inhibitors (METI III) | motiles* | TSSM, ERM | 6-8 weeks |
| Agri-mek | Chloride channel activator | motiles* | TSSM, ERM | 8-12 weeks |
| Envidor | Lipid synthesis inhibitor | eggs, motiles* | TSSM, ERM, PNM | 8-10 weeks |
| Vendex | ATP synthesis inhibitor | motiles* | TSSM, ERM | 4-8 weeks |

* Motile forms include mite larvae, nymph and adult stages.
** TSSM - two spotted spider mite, ERM – European red mite, PNM – plum nursery mite.
*** Check the label to determine the specific fruit crops that each compound is labeled for use.

**RUP PRODUCTS**
Eric McCumber, MDA Pesticide Specialist

We've had a number of inquiries from different agencies regarding private certification recently. Most of the inquiries seem to be agriculturally related questions, but we also are receiving some non-agricultural certification questions. I'll attempt to address some of those issues with this memorandum.

First, for clarification, we often hear people refer to their "license", when what they're really talking about is their certification credential. For this memorandum, please understand that when I refer to a license I am referring to the Pesticide Application Business License, which is required for anyone who holds themselves out as being in the business of applying pesticides (i.e., a for-hire applicator like Orkin or TruGreen or Hamilton Farm Bureau or a Wilbur-Ellis).

Secondly, again for clarification, the ONLY situation in which someone can "work under another person's certification credential" is for a private agricultural situation. A person who is working for a firm that is required to be licensed MUST always have their own commercial certification or registration credential to apply any pesticide, even if it is general-use ready-to-use pesticide.

A person who is required to be a commercially certified or commercially registered applicator MUST have their own personal credential. Generally speaking, a person applying pesticides at work, such as a golf course or applying pesticides to a right-of-way area or applying weed-and-feed to a school's athletic field would need to be a commercially certified or registered applicator. However, if the product is a general-use ready-to-use pesticide (i.e., used from its original container

consistent with label directions) AND the applicator is not holding themselves out as being in the business of applying pesticides, then the applicator would generally NOT need to be certified or registered. An example would be a person who applies RTU Roundup to control weeds in a sidewalk area at a grocery store where they work. They would not need to be certified or registered. If more information is needed, contact Eric McCumber at the MDA office in Traverse City, 231-922-5210 or Rob Sirrine, Leelanau MSU-E office, 231-256-9888.

## WEBSITES OF INTEREST

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

**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://www.maes.msu.edu/nwmihort/faxnet.htm

ACTUAL AND PREDICTED DEGREE-DAY
ACCUMULATIONS SINCE MARCH 1, 2009

**Please send any comments or suggestions regarding this site to:**
Bill Klein, kleinw@msu.edu

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**June 9, 2009**

**GROWING DEGREE DAY ACCUMULATIONS AS OF June 8th AT THE NWMHRS**

| Year | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 19yr. Avg. |
|---|---|---|---|---|---|---|---|
| GDD42 | 662 | 723 | 950 | 977 | 862 | 711 | 777.5 |
| GDD50 | 301 | 371 | 530 | 537 | 462 | 350 | 407.7 |

**Growth Stages at NWMHRS (6/8/09- 4:30 p.m.)**
**Apple**: McIntosh – 10 mm fruit
Yellow Delicious – 11 mm fruit
Gala – 8 mm fruit
Red Delicious – 11 mm fruit
**Pear**: Bartlett: 11 mm fruit
**Sweet Cherry**: Hedelfingen: 13 mm fruit
Napoleon: 13 mm fruit
Gold: 13 mm fruit
**Tart Cherry**: 12 mm fruit
**Balaton**: 13 mm fruit
**Apricot:** 26 mm fruit
**Plum**: 8 mm fruit
**Grapes**: 4-8" shoots

**Weather**
The weather continues to be cool in the north, much like other regions of the state. We have accumulated 662 GDD base 42, and our 19-year average is 777.5 GDD. Base 50, we have accumulated 301 GDD, which is ~100 GDD less than our 19-year average. We received significant rainfall so far this month: 0.57 inches on 7 June, 0.36 inches on 8 June, and 0.61 inches on 9 June. Overall rainfall totals for June are 1.84 inches.

**Crop Report**
Crops are moving along slowly with the cool temperatures. Pears at the NWMHRS are 11-13mm in diameter while apricots are at a whopping 26mm. Galas are at 8mm, Macs at 10mm, and Red and Golden Delicious are at 11mm. Cherry are at similar sizes: 12mm in Montmorency, 11mm in Balaton, and 13mm in sweet cherry. Grapes seem to be hanging on at 4-8" shoots, where they have been for over a week. Apple growers have been trying to find a window to thin, which has been difficult with the cool temperatures, but also with the rain. Growers are also thinking about gibberellic acid applications in cherry, but most likely they will wait until next week when we have the recommended 3-5 fully expanded leaves. Strawberry harvest is predicted to start around 19 June.

**Pest Report**
**In apples**, spotted tentiform leafminer numbers are down for the second week in a row with an average of 12 adults per trap. We caught our first codling moth two weeks ago, none last week, and 2 per trap as of this week. We have had no reports of sustained catch in the region. Oriental fruit moth catch has an average of 2 moths per trap. The area has received heavy rains that triggered a light scab infection on Monday, despite the cool temperatures. The severity of the infection forecast has increased as the current wetting event continues with most of the area under a moderate to heavy infection as of Tuesday morning. As of today, the model estimates 100 percent ascospore maturity and 80 percent dispersal. The fire blight model will not accumulate an EIP over 100 in the coming week based on the forecast that temperatures will remain cool.

**In cherries**, American plum borer numbers have rebounded slightly this week with an average of 15 moths per trap, compared to 6 moths per trap last week, and 37 two weeks ago. We also caught our first lesser peach tree borers. As fruit develops, growers should be aware of potential damage from plum curculio, particularly as temperatures warm at the end of the week. Based on a biofix (full bloom date) of May 15, we have accumulated 150 DD50 according to the tart cherry plum curculio model. This model has been commonly used when applying organophosphates. Despite the cool temperatures (averaging 45-50°F), cherry leaf spot infection will occur around the region as the wetting period exceeds 24 hours.

**Small fruit**
We caught a couple more grape berry moths this week both on Old Mission and Leelanau Peninsula. Our first grape berry moths (two to be precise) were caught in a Leelanau vineyard last week. So far only one lone potato leafhopper has been caught on Old Mission. As rain arrives from the south, we could observe potato leafhopper arriving in more significant numbers.
For an updated version of the pest report during the week, call (231) 947-3063.

**APPLE SCAB FUNGICIDE SENSITIVITY SCREENING 2009**
Erin Lizotte, District IFP/IPM Educator

The NWMHRS, in collaboration with the Michigan State University Tree Fruit Pathology lab, will be screening apple scab samples from northwest Michigan for sterol inhibitor and strobilurin sensitivity. We are looking to screen 30-50 sites and need to collect 50 leaves with active, brown scab lesions. If you have a site with symptoms, we can collect the sample or you can bring the sample to the Research Station or the next IPM Update in your area. To collect a sample yourself, collect 50 leaves from as many trees as possible and store in a paper bag in the refrigerator until you can deliver them. They may be stored together in one bag. A brief history of the use of sterol inhibitors and strobilurins for the orchard along with your contact information is greatly appreciated. For more information, please contact Erin Lizotte at (231) 946-1510.

## USING GIBBERELLIC ACID TO ADJUST CROPPING IN CHERRIES

N.L. Rothwell, District Horticulturist, NWMHRS
Jim Nugent, Retired District Horticulturist, NWMHRS

Gibberellic acid (GA) is a plant hormone that promotes growth and elongation of cells. In tart and sweet cherries, GA has been used successfully to reduce flowering during the early years of an orchard's life. The reduced flowering and subsequent reduced fruiting helps young trees increase vegetative growth. In addition, minimizing flowering in early years slows the transmission of pollen-borne viruses in young trees. We have also shown that GA used in mature tart cherry orchards can increase fruiting capacity by stimulating the formation of lateral shoots and spurs. This technique can be particularly advantageous on Balaton blocks where trees have a tendency to produce blind wood (branches without leaves or blossoms).

When GA is applied to cherry trees in late spring, a percentage of the flower buds forming for the following season will be converted to vegetative buds. Therefore, GA application in 2009 influences flowering in 2010. The effectiveness of GA is dependent on rate, timing and temperature. Figures 1 and 2 (below) demonstrates the importance of rate for GA applications. Surfactants have also been shown to influence GA applications. As a rule of thumb, high GA rates are required to keep a young tree from fruiting, whereas much lower rates are used to keep bearing trees in a good balance between vegetative and fruit production. GA applications should be made when daily high temperatures are expected to be above 70° F for two to three days, if possible. We have observed poor results when applications are made when daily high temperatures are below 60° F.

### Non-bearing trees

GA is typically applied to non-bearing cherries with a hand gun, so rates are applied on a dilute basis. The best results are generally achieved with two applications of 50 ppm (20 fl. oz. of 4% formulated product per 100 gallons of water). The first application should occur 3 to 3 ½ weeks after full bloom, followed by a second application 2 ½ to 3 weeks later. An alternative method, though slightly less effective, is to apply a single treatment of 100 ppm (40 fl. oz. per 100) at about 3 to 4 weeks after bloom. GA should not be applied to trees during the year of planting, due to possible phytotoxicity. Vigorously growing trees in their second leaf do not need GA, as these trees naturally produce little fruit the following year. GA application often starts in year three, but may be desirable in year two if trees start off poorly. These high rates should continue until the year prior to first harvest/year of production.

### Early bearing trees

To bring young cherries into bearing following GA treatments with high rates, growers should phase down GA rates rather than discontinuing GA use all at once. A sudden drop of GA from high rates to nothing will result in oversetting of fruit and potential tree stunting. Trees that have been kept vegetative with GA use have a tremendous capacity to set (overset) fruit. The year prior to when growers first desire fruiting, they should apply GA at 30 to 40 ppm if spraying dilute (12-16 fl oz./100 gal.) or 20-24 fl. oz./acre if applied at a concentrated rate. This rate per acre for concentrate spraying already takes into account the average tree size of this age tree, therefore do not reduce the rate further based on tree row volume. The next year, decrease this rate to 15 to 20 ppm applied dilute (6-8 fl. oz./100 gal.) or 10-12 fl. oz./acre concentrate. The following year, 10 ppm is optional but often not required. In orchards where growth is weak, growers should continue annual GA applications at 10-15 ppm as described for bearing trees.

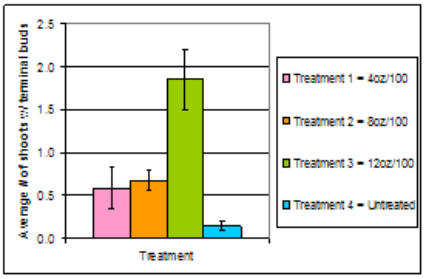
### Bearing trees

Growers should apply GA 3 to 4 weeks after bloom or when trees have 5 to 7 leaves (3 to 5 fully expanded) on terminal growth. GA should be used at rates of 10 to 20 ppm or 4 to 8 oz/100 gallons of ProGibb 4% (or equivalent) when applied dilute. For concentrate application to full-sized tart cherries, use 6 oz/acre of product to achieve a 10 ppm response or 12 oz/a for a 20 ppm response. Lower rates are typically used on more vigorous orchards or those with previous successful use of GA. Adding surfactants has caused varied responses—everything from increased phytotoxicity to no GA-related effects. Therefore, adding a surfactant is not suggested unless a grower has enough experience with a product to have confidence in the response.

**GA Use on Balaton**
Balaton appears to have less need for GA during non-bearing years to maintain good tree growth, but as it matures, the variety produces a lot of blind wood. Therefore, using GA is strongly encouraged on bearing Balaton trees. Figure 1 shows the successful use of GA to increase lateral shoots and spurs in a Balaton orchard at the NWMHRS. However, we cannot conclude that GA applications improve Balaton yields based on 2007 and 2008 data (Figures 3 and 4), although GA does appear to help with yield. We will continue this trial this season.

Figure 1. Average number of shoots with terminal buds in a Balaton orchard (2007).

Figure 2. Average number of shoots with terminal buds in a Balaton orchard (2008).



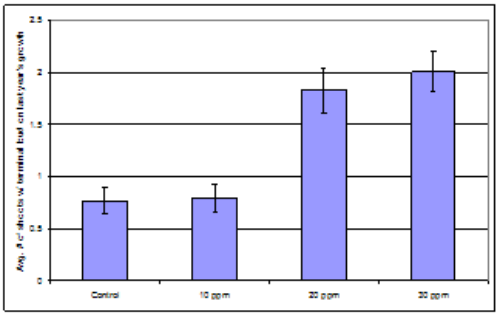
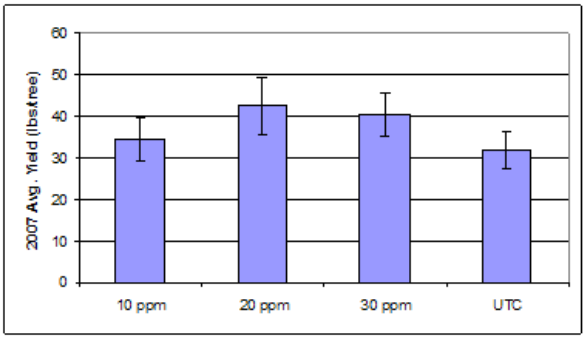
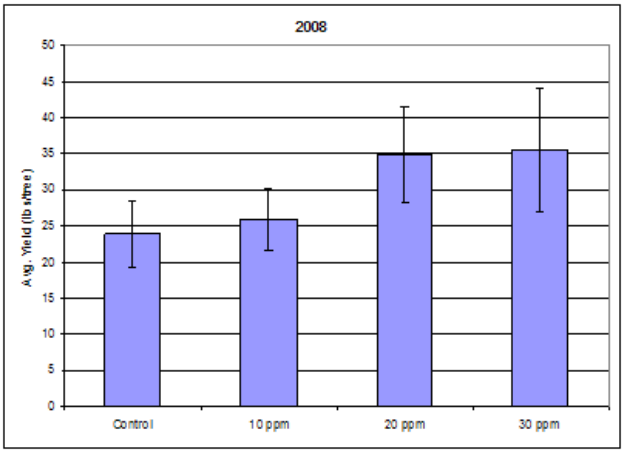



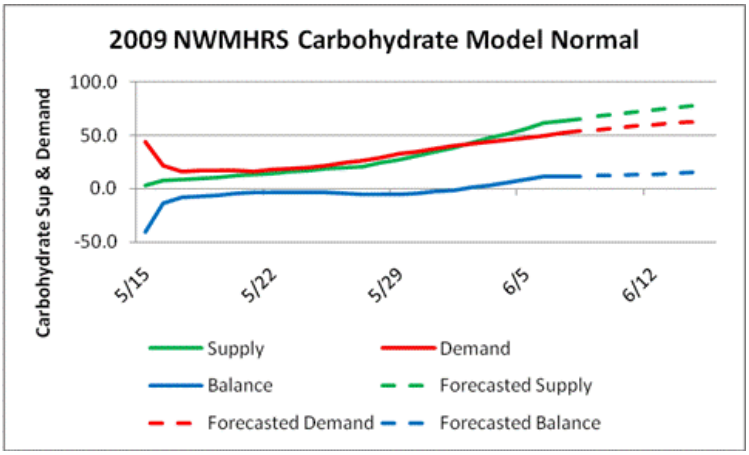
Figure 3. Average yield of Balatons with different rates of GA (2007)

Figure 4. Average yield of Balatons with different rates of GA (2008)




## WEEKLY APPLE THINNING CARBOHYDRATE MODEL




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

ACTUAL AND PREDICTED DEGREE-DAY ACCUMULATIONS SINCE MARCH 1, 2009

## SPECIAL CONSIDERATIONS FOR PRIMARY PEST MANAGMENT IN TART CHERRY

Erin Lizotte, Nikki Rothwell, and John Wise

With all of the new insecticides on the market, growers have a lot to consider for pest control in tart cherry. In order to address the variety of insecticides available, the following table was developed to address our major pests of tart cherry throughout the season: oblique-banded leafroller and green fruit worm early in the season, followed by plum curculio during mid-season, and ending with cherry fruit fly and 2nd generation OBLR and other secondary lepidoptera around harvest. As we target each of these pests, there are multiple considerations depending on the insecticide of choice.

Here is a link to the Table (PDF)

## WEBSITES OF INTEREST

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

**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:**

**Please send any comments or suggestions regarding this site to:**
Bill Klein, kleinw@msu.edu

Last Revised: 6-9-09

District Horticulturist  District Fruit IPM/IFP Agent  Farm Mgr, NWMHRS

Duke Elsner
Agricultural & Regional Viticulture Agent

**June 16, 2009**

**GROWING DEGREE DAY ACCUMULATIONS AS OF June 15th AT THE NWMHRS**

| Year | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 19yr. Avg. |
|---|---|---|---|---|---|---|---|
| GDD42 | 787 | 891 | 1158 | 1091 | 1088 | 867 | 944.3 |
| GDD50 | 372 | 483 | 682 | 599 | 632 | 451 | 519.3 |

**Growth Stages at NWMHRS (6/16/09- 7:30 a.m.)**
**Apple**: McIntosh – 15 mm fruit
Yellow Delicious – 13 mm fruit
Gala – 14 mm fruit
Red Delicious – 17 mm fruit
**Pear**: Bartlett: 13 mm fruit
**Sweet Cherry**: Hedelfingen: 14 mm fruit
Napoleon: 14 mm fruit
Gold: 13 mm fruit
**Tart Cherry**: 12 mm fruit
**Balaton**: 12 mm fruit
**Apricot:** 30 mm fruit
**Plum**: 11 mm fruit
**Grapes**: 10-16" shoots

**Weather Report**
We are finally seeing some warm temperatures in the region. We have had temperatures in the 70's since last Thursday. We have accumulated 787 GDD base 42, which is behind compared to our 19-year average of 944.3. Base 50, we have accumulated 372 GDD, and our 19-year average is 519. The last rainfall was on 8 and 9 June, where we received just less than one inch.

**Crop Report**
Pears are at 13-17mm and apricots are at 30mm. Apples are at 13-17mm, and growers have been thinning since temperatures have warmed up last week. We can still find bloom in apple orchards. Cherries are moving along: sweets are at 13-14mm and Montmorency and Balatons are at 12mm. Growers have been making GA applications late last week and into this week. The tart crop in the northwest appears to be large, and the sweet crop is also sizable. Strawberry harvest is still predicted to start for Father's Day weekend.

**Pest Report**

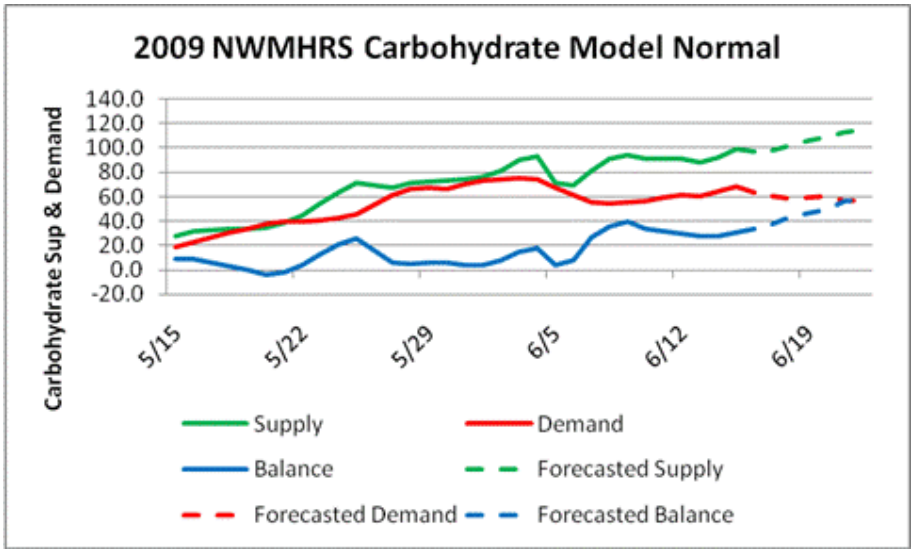
In apples, **spotted tentiform leafminer** numbers are down for the third week in a row with an average of 13 adults per trap. **Codling moth** trap catches over the past 4 weeks are as follows:1-0-2-1. Low trap numbers have made setting a codling moth biofix difficult; however, have received reports of sustained codling moth catch from around the region. **Oriental fruit moth** catch has an average of 6 moths per trap. We caught no **oblique-banded leafroller** this week. As fruit develops and temperatures warm, growers should be aware of potential damage from **plum curculio** which may have delayed ovipositioning until warmer weather. Area growers continue to report higher than normal levels of green fruit worm damage. It looks like primary **scab** season will continue for the foreseeable future with 100% ascospore maturity and 85% dispersal estimated as of 6/15. Growers have begun to report apple scab lesions. We still have tag bloom on some apple varieties at the Research Station and the **fire blight** model is predicting epiphytic infection potentials well over 100. Rain or heavy dew can cause infection under these conditions.

In cherries, **American plum borer** trap catch numbers over the past four weeks are as follows: 37-6-15-7. **Lesser peach tree borers** are emerging in higher numbers with an average of 7 per trap this week (moths are swarming around the lures as traps were checked). As fruit develops and temperatures warm, growers should be aware of potential damage from **plum curculio**. Based on a biofix (full bloom date) of May 15, we have accumulated 203 DD50 according to the tart cherry plum curculio model, commonly utilized when applying organophosphates. According to the model, no cherry leaf spot infection periods have occurred since 6/10, but rain is forecast to begin Tuesday night into Wednesday so leaf tissue should remain protected. The first **cherry leaf spot** lesions have been reported around the area.

**In small fruit, w**e continue to catch few **grape berry moths** on Old Mission or Leelanau Peninsula and have yet to catch any at the Research Station. This week we caught a few more **potato leafhopper** in sticky traps at area vineyards and the Research Station. As rain arrives from the south, we could observe **potato leafhopper** arriving in more significant numbers. We also have observed low levels of **two-spotted spider mites**, **grape berry moth**, **phylloxera**, a couple **grape plume moths**, and some indistinct **lepidoptera** feeding.

For an updated version of the pest report during the week, call (231) 947-3063.

**WEEKLY APPLE THINNING CARBOHYDRATE MODEL**




**PESTICIDE CONTAINER RECYCLING IN LEELANAU COUNTY**

Dan Busby, Groundwater Stewardship Program Coordinator

We have scheduled a Pesticide Container Recycling collection during the last IPM meeting **June 24**. The collection will happen *after* the IPM meeting, which is scheduled from 1:00 – 3:00 at Jim Bardenhagen's farm located at 7881 E. Pertner Rd. in Suttons Bay. All 2.5 gallon containers must be properly rinsed, labels and caps removed, and in a bag supplied to you by Dan or by your agri-chemical dealer.

For more information on the collection or acceptable container recycling, please call Dan Busby at 231.883.9962. Hope to see

you there.

**UNDERSTANDING PRE-MIX PESTICIDE SEASONAL AI RESTRICTIONS**

John Wise, TNRC, Entomology
Nikki Rothwell, NWMHRS
Erin Lizotte, NWMHRS

There are many new pesticide pre-mixes, both insecticides and fungicides, on the market this season. These products offer growers convenience with this multi-pack combination, but they also come with some complexities. Many of these pre-mix products are combinations of active ingredients that growers are already using in their orchards rather than distinctly new active ingredients. Therefore, growers need to keep in mind two criteria when using these products: 1) know the amount of each active ingredient in the blend to be able to properly manage for insect and disease control as well as to minimize resistance issues, and 2) be aware of the total amount of active ingredient allowed per season, whether they are used in a pre-mix or alone.

In the first instance, growers should know the recommended rate to control a particular insect of disease and will need to make sure the rate of the pre-mix will provide an adequate amount of each active ingredient (AI) for a particular application. Secondly, the pre-mixes may be a blend of chemical classes growers are already using, and as usual, pesticide rotation is critical to minimize pesticide resistance. For the total amounts per season, growers should make sure they know the active ingredients and use the total AI per season rather than totals by product name. For example, Voliam flexi is a combination of chlorantraniliprole (same AI as Altacor) and thiamethoxam (same AI as Actara), and in stone fruit, the total amount of product for Actara (thiamethoxam) is 11oz. If a grower makes two full applications of Actara (thiamethoxam) for plum curculio at the high rate, 5.5oz, then he/she cannot apply Voliam flexi during that season or the total amount of Actara (thiamethoxam) will be over the allotted AI per season. Therefore, growers need to look at the active ingredients and amounts in the pre-mixes, particularly if he/she has applied one of the active ingredients in a prior spray. We have tried to summarize these pre-mixes for insecticides, their active ingredients, and the total amount of product allotted per season in the tables below.

**Table 1. Pome Fruit Uses:**

| Compound Trade Name | Active ingredients (AI) | Labeled Rate / acre* | Total product (lbs AI) per season |
|---|---|---|---|
| Altacor 35WG | chlorantraniliprole | 2.5 – 4.5 oz | 9 oz (0.2 lb AI) |
| Actara 25WDG | thiamethoxam | 4.5 - 5.5 oz | 16.5 oz (0.25 lb AI) |
| Voliam flexi 40WDG (pre-mix ratio 1 : 1) | chlorantraniliprole<br>thiamethoxam | 4.0 – 7.0 oz | 16 oz (0.2 lb AI ctpr, 0.25 lb AI thiamethoxam) |
| Provado 1.6F | imidacloprid | 8.0 oz | 40 oz (0.5 lb AI) |
| Baythroid 2E | cyfluthrin | 2.4 – 2.8 oz | 2.8 oz (0.044 lb AI) |
| Leverage 2.7F (pre-mix ratio 1.6 : 1.1) | imidacloprid<br>cyfluthrin | 3.6 – 5.1 | 5.1 oz (.044 lb AI cyfluthrin, 0.064 lb AI imidacloprid) |

| | | | |
|---|---|---|---|
| | cyfluthrin | | |
| Belt 4SC | flubendiamide | 3.0 – 5.0 oz | 15 oz (0.468 lb AI) |
| **Centuar 70WSB | buprofezin | 34.5 oz | 34.5 oz (1.5 lb AI) |
| Tourismo 3.5F (pre-mix ratio 1 : 2) | flubendiamide | 15 – 17 oz | 46 oz (0.42 lb AI flubendiamide, 0.84 lb AI buprofezin) |
| | buprofezin | | |

* rate ranges for key direct pests.
** Centuar rate for pears is 46 oz/acre (2 lb AI)

**Examples of in-season applications that meet total AI limits for pome fruits:**
***Voliam flexi***

- If growers make 1 application of Voliam flexi 40WDG (5 oz/acre), then they can still make 2 applications of Altacor 35WG at the 3 oz/acre rate.
- If growers make 1 application of Voliam flexi 40WDG (5 oz/acre), then they can still make 2 or more applications of Actara 25WDG up to an additional 12.5 oz/acre.

***Leverage***

- Growers can make 1 application of Leverage or 1 application of either Baythroid 2E or Baythroid XL per season.
- If growers make 1 application of Leverage (5.1 oz/acre), then they can still make 4 applications of Provado 1.6F at a 8 oz/acre rate.

***Tourismo***

- Growers can make 1 application of Tourismo 3.5F or 1 application of Centuar per season.
- If growers make 1 application of Tourismo 3.5F (15 oz/acre), then they can still make 2 applications of Belt 4SC at a 5 oz/acre rate.

**Table 2. Stone Fruit Uses:**

| Compound Trade Name | Active ingredients (AI) | Labeled Rate / acre* | Total AI per season |
|---|---|---|---|
| Altacor 35WG | chlorantraniliprole | 3.0 – 4.5 oz | 9 oz (0.2 lb AI) |
| Actara 25WDG | thiamethoxam | 4.5 - 5.5 oz | 11.0 oz (0.172 lb AI) |
| Voliam flexi 40WDG (pre-mix ratio 1 : 1) | chlorantraniliprole | 4.0 – 7.0 oz | 14 oz (0.2 lb AI ctpr, 0.172 lb AI thiamethoxam) |
| | | | |

| | | | |
|---|---|---|---|
| | thiamethoxam | | |
| Provado 1.6F | imidacloprid | 6.0 – 8.0 oz | 24 oz (0.3 lb AI) |
| Baythroid 2E | cyfluthrin | 2.4 – 2.8 oz | 5.6 oz (0.088 lb AI) |
| Leverage 2.7F (pre-mix ratio 1.6 : 1.1) | imidacloprid / cyfluthrin | 4.4 – 5.1 | 10.2 oz (0.044 lb AI cyfluthrin, 0.13 lb AI imidacloprid) |
| Belt 4SC | flubendiamide | 3.0 – 4.0 oz | 12 oz (0.375 lb AI) |
| **Centuar 70WSB | buprofezin | 34.5 – 46.0 oz | 69.0 oz (3.0 lb AI) |
| Tourismo 3.5F (pre-mix ratio 1 : 2) | flubendiamide / buprofezin | 10 – 14 oz | 37 oz (0.34 lb AI flubendiamide, 0.67 lb AI buprofezin) |

* rate ranges for key direct pests.
** Centuar labeled for peaches only.

**Examples of in-season applications that meet total AI limits for stone fruits:**
***Voliam flexi***

- If growers make 1 application of Voliam flexi 40WDG (5 oz/acre), then they can still make 2 applications of Altacor 35WG at a 3 oz/acre rate.
- If growers make 1 application of Voliam flexi 40WDG (5 oz/acre), then they can still make 1 or more applications of Actara 25WDG up to an additional 7.0oz/acre per season.

***Leverage***

- If growers make 1 application of Leverage 2.7F, then they can still make 1 application of either Baythroid 2E or Baythroid XL.
- If growers make 1 application of Leverage 2.7F (5.1 oz/acre rate), then they can still make 2 applications of Provado 1.6F at a 8 oz/acre rate.

***Tourismo***

- If growers make 1 application of Tourismo, then they can still make 1 application of Centuar.
- If growers make 1 application of Tourismo 3.5F (14 oz/acre rate), then they can still make 2 applications of Belt 4SC at a 3 oz/acre rate.

**Table 3. Grape Uses:**

| Compound Trade Name | Active ingredients (AI) | Labeled Rate / acre* | Total product (lbs AI) per season |
|---|---|---|---|
| Altacor 35WG | chlorantraniliprole | 2.5 – 4.5 oz | 9 oz (0.2 lb AI) |
| Actara 25WDG | thiamethoxam | 1.5 - 3.5 oz | 7.0 oz (0.109 lb AI) |
| Voliam flexi 40WDG (pre-mix ratio 1 : 1) | chlorantraniliprole<br>thiamethoxam | 4.5 oz | 9.0 oz (0.2 lb AI ctpr, 0.109 lb AI thiamethoxam) |
| Provado 1.6F | imidacloprid | 3.0 - 4.0 oz | 8.0 oz (0.1 lb AI) |
| Baythroid 2E | cyfluthrin | 2.4 – 3.2 oz | 12.8 oz (0.2 lb AI) |
| Leverage 2.7F (pre-mix ratio 1.6 : 1.1) | imidacloprid<br>cyfluthrin | 5.0 – 8.0 oz | 8.0 oz (0.07 lb AI cyfluthrin, 0.1 lb AI imidacloprid) |
| Belt 4SC | flubendiamide | 3.0 – 4.0 oz | 12 oz (0.375 lb AI) |
| Tourismo 3.5F (pre-mix ratio 1 : 2) | flubendiamide<br>buprofezin | 10 - 14 oz | 37 oz (0.34 lb AI flubendiamide, 0.67 lb AI buprofezin) |

**Examples of in-season applications that meet total AI limits for grapes:**
***Voliam flexi***

- If growers make 1 application of Voliam flexi 40WDG (4.5 oz/acre), then they can still make 1 or more applications of Altacor 35WG up to an additional 4.5 oz/acre.
- If growers make 1 application of Voliam flexi 40WDG (4.5 oz/acre), then they can still make 1 or more applications of Actara 25WDG up to an additional 3.5 oz/acre.

***Leverage***

- Growers can make 1 application of Leverage 2.7F (5.0 oz/acre), then they can still make 2 or more applications of either Baythroid 2E or Baythroid XL, up to an additional 10.2 oz/acre.
- If growers make 1 application of Leverage 2.7F (5.0 oz/acre), then they can still make 1 application of Provado 1.6F at a 3 oz/acre.

***Tourismo***

- If growers make 1 application of Tourismo 3.5F (14 oz/acre), then they can still make 2 applications of Belt 4SC at a 4 oz/acre.

## WEBSITES OF INTEREST

**Insect and disease predictive information is available at:**
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ACTUAL AND PREDICTED DEGREE-DAY
ACCUMULATIONS SINCE MARCH 1, 2009

**Please send any comments or suggestions regarding this site to:**
Bill Klein, kleinw@msu.edu

Last Revised: 6-16-09

MICHIGAN STATE
UNIVERSITY


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# Northern Michigan FruitNet 2009
## *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

**June 23, 2009**

**GROWING DEGREE DAY ACCUMULATIONS AS OF June 22nd AT THE NWMHRS**

| Year | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 19yr. Avg. |
|---|---|---|---|---|---|---|---|
| GDD42 | 984 | 1018 | 1350 | 1293 | 1249 | 1007 | 1114.6 |
| GDD50 | 513 | 554 | 818 | 745 | 736 | 536 | 634.4 |

**Growth Stages at NWMHRS (6/22/09- 3:30 p.m.)**
**Apple**: McIntosh – 21 mm fruit
Yellow Delicious – 19 mm fruit
Gala – 19 mm fruit
Red Delicious – 26 mm fruit
**Pear**: Bartlett: 17 mm fruit
**Sweet Cherry**: Hedelfingen: 16 mm fruit
Napoleon: 15 mm fruit
Gold: 14 mm fruit
**Tart Cherry**: 13 mm fruit
**Balaton**: 13 mm fruit
**Apricot:** 33 mm fruit
**Plum**: 16 mm fruit
**Grapes**: 10-16" shoots

**Weather Report**
It's summertime in the north! Temperatures have been in the 80's since last Tuesday, and yesterday we hit 87°F (6/22). Growing degree day accumulations reflect the recent warm temperatures: 984 base 42 (1114.6 for the 19-yr average) and 513 base 50 (634 for the 19-yr average). The only rainfall we had at the NWMHRS in the past week was 0.04" on 6/20 – not much. Soils are already drying out; the last major rainfall was 1.55 inches on 6/7 and 6/8.

**Crop Report**
Pears are between 17-22 mm in size. Apples are beyond thinning as fruit is in the 19-25 mm range. Many growers feel that they were successful in thinning with the last week's warm temperatures. Cherries also continue to size: Montmorency and Balaton are at 13 mm. Sweet cherries are at 14-16 mm. Grapes are growing quickly and are at 10-16" shoots. Strawberry harvest has begun. In southern Grand Traverse County, they are picking variety Honeoye and variety Wendy in Leelanau. Please see USDA write-up for cherry crop estimates.

**Pest Report**
In apples, spotted tentiform leafminer numbers remain low at just one per trap. Codling moth have finally begun to emerge in significant numbers with seasonal trap catches as follows: 1-0-2-1-7. Region-wide reports of biofix have been reported, and the NWMHRS biofixed on June 9. Oriental fruit moth trap catch is up from 6 last week to 9 this week. We caught our first OBLR adults (10 per trap) and the moths were still alive in the traps. No scab infections have been recorded since June 9th. According to the weather model, we're at 100% maturity but with dry weather last week and forecasted for this week, the last ascospores will hang around and prevent calling the end of primary scab season. Growers are reporting scab lesions from earlier infection periods.

In cherries, American plum borer numbers remain significant with an average of 9 per trap at the Station, with season long catch as follows: 37-6-15-7-9. Lesser peach tree borer continue to emerge with 7/trap last week and 18/trap this week. Greater peachtree borer have also begun to emerge with 4/trap this week. We caught oblique-banded leafroller this week in cherry with an average of 8/trap. Growers are beginning to report plum curculio ovipositioning scars, and we have not caught cherry fruit fly at the NWMHRS. The cherry leaf spot model has not predicted an infection period since the wetting period on June 7. Cherry leaf spot lesions are appearing around the region. Symptoms of bacterial canker are common on sweets and we have also seen bacterial canker on green tart cherries, which gives the fruit a chocolate brown appearance.

In grapes, we continue to catch grape berry moth in high pressure sites. Potato leafhopper are arriving in higher numbers – 3-7/trap. Low numbers of rose chafer have been reported. No reports of powdery or downy mildew as of yet.

**CODLING MOTH MANAGEMENT DECISION-MAKING: TARGETING FIRST GENERATION LARVAE**

Larry Gut, MSU Entomology; David Epstein, MSU IPM Program; Peter McGhee, MSU Entomology; and John Wise, MSU Entomology

In this follow-up to a previous CAT Alert article on early season codling moth (CM) management, we focus on controlling CM larvae. To get the most benefit from a CM control measure, growers should treat a block after moth captures have been recorded and the accumulation of growing degree days (GDD) required for a particular action, as indicated in Table 1, has taken place.

**Table 1. Codling moth GDD model and insecticide timings for larval control**

| GDD base 50 (Post Biofix) | Event | Action |
|---|---|---|
| Pink bud | Development of overwintering larvae | Set traps |
| 0 GDD equals Biofix (~200 GDD after Jan 1) | 1st sustained moth captures | Set GDD equals 0 |
| 250 GDD | Start of 1st generation **egg hatch** | Timing for 1st treatment if over threshold (for larva targeted materials) |
| 350 GDD | 1st generation **egg laying & hatch** | Delayed timing for 1sttreatment if pest pressure is low, or for 2nd treatment if an ovicide was applied at 100 GDD) |
| 500-650 GDD | Peak of 1st generation **egg hatch** | Timing for additional larvacide if monitoring of codling moth activity indicates a treatment is needed |
| 1000 GDD | Expected end of 1st generation activity | |
| 1200-1250 GDD | Start of 2nd generation egg hatch | Timing for treatment if over threshold (for larva targeted materials) |
| 2100 GDD | Expected end of 2nd generation activity | |

**Larval control**

The vast majority of insecticides used for CM control are aimed at killing larvae (Table 2). This is not an easy task, as young larvae feed and enter the fruit within a few hours of hatching. Options for controlling CM larvae include conventional contact poisons, like the organophosphate (OP) compounds, Guthion and Imidan, and a number of pyrethroid insecticides. These materials kill larvae that crawl across or consume the lethal residues. They primarily target newly emerging larvae at CM egg hatch, and thus are typically applied beginning at 250 GDD post biofix. Pyrethroid insecticides appear to be more effective in the spring for first generation CM, than summer and have a broad activity spectrum. Pyrethroids are highly toxic to mite predators and should be used carefully to avoid outbreaks of phytophagous mites. Apple growers should be aware that resistance to the OP compounds has been detected in Michigan orchards throughout the state, most extensively in the Fruit Ridge and Southwest production areas. The levels of resistance detected were high enough in those orchards that sole reliance on OP's for CM control is not likely to provide sufficient control. In addition, populations resistant to OP compounds may also be resistant to pyrethroids.

Several new materials have become available for CM larval control and growers are encouraged to include these new products in their CM management programs. Integrating them into CM management programs will not only improve CM control in orchards experiencing problems, but also will help delay the development of CM resistance to OP's in locations not yet experiencing control failures. The newest options for CM control are three compounds that received their US EPA registration in 2008: Delegate, Altacor and Belt. Delegate and Altacor were commercially available and widely used in 2008, while Belt was registered late in the season and is essentially commercially available for the first time this season.

Delegate (spinetoram) is a new compound in the same insecticide class as SpinTor (spinosad). The active ingredients of both Spinosyn compounds are similar in that they are waste metabolites produced during the growth of bacteria. A major difference between the two AI's however, is that spinetoram is much more lethal to codling moth larvae. In small-plot and on-farm trials, Delegate has provided excellent control of both first and second generation CM. It kills larvae as they hatch and begin feeding, thus should be applied at the larvicidal timings indicated in Table 1. Delegate also has very good activity against obliquebanded leafroller (Table 3). Although also active against apple maggot (AM), results of small-plot trials have been mixed and more research is needed to determine the level of AM control Delegate will provide.

Altacor (rynaxypyr) belongs to a new class of Diamide insecticides that work on the insect by activating ryanodine receptors, thus depleting internal calcium and preventing muscle contraction. In small-plot and on-farm trials, Altacor has provided excellent control of both first and second generation CM. Our research at TNRC has focused on the larvicidal activity of Altacor, however Dr. Jay Brunner and colleagues at Washington State University have found that Altacor has substantial ovicidal activity as well. However, Michigan apple growers should primarily apply this product at the larvicidal

timings. Altacor provides excellent obliquebanded leafroller control (Table 3). It has limited activity on apple maggot, and thus probably has a better fit in Michigan apple IPM programs for first rather than second generation CM control.

Belt (flubendiamide) is a new Diamide compound with the same mode of action as Altacor. Belt has provided excellent control of both first and second generation CM and should be applied at the larvacidal timings indicated in Table 1. Keep in mind however, that **if either Belt or Altacor is used to control the first generation, neither compound should be used for second-generation control.** Belt also provides excellent OBLR and OFM control (TABLE 3) and appears to be relatively safe on most beneficials.

The neonicotinoids, Assail and Calypso, will provide very good control of CM with a residual action of 10-14 days. Proper timing and coverage is required to achieve control. These compounds are primarily larvicidal, but also have some ovicidal activity when applied over the top of the egg. Assail is labeled for CM control at the rate of 6-8 ounces per acre, but the high rate has shown better performance, especially for second generation CM. Application rates near the high end of the label rate are also recommended for Calypso, especially where CM densities are high or for prolonged control. Field trials have indicated that use of Assail in combination with pyrethroids or carbaryl can result in outbreaks of phytophagous mites. Assail and Calypso are fairly broad-spectrum materials. In contrast to the insect growth regulators, the major secondary targets of these neonicotinoids are the sucking insects, specifically aphids and leafhoppers (Table 3). The initial application of Assail or Calypso targeting first generation CM will also provide control of plum curculio (PC), Oriental fruit moth (OFM) and spotted tentiform leafminer (STLM), and for second generation CM they will control apple maggot.

Clutch, another neonicotinoid registered for use in pome fruits, is a broad-spectrum material targeting CM as well as aphids, leafhoppers, PC, STLM, OFM and pear psylla. Research trials have indicated that Clutch is not as effective as Assail or Calypso. The best results have been achieved when it is used against first generation CM larvae applied at the egg hatch timing of 250 GDD and at the high 6-oz/ac rate. Even at the high rate, Clutch has not provided adequate control of second generation CM.

Proclaim is a CM control material in the Avermectin class of insecticides. It has provided good control of first generation CM in trials at the Trevor Nichols Research Complex and in on-farm demonstration trials. Prior to the 2007 season, the label only claimed suppression of CM, but control of first generation larvae is now supported on the label. Proclaim has very good activity against OBLR.

Intrepid is an insect growth regulator that provides good control of CM with a residual action of about 10-14d. This product is an insect growth regulator that primarily affects CM larvae, but also has substantial activity on eggs, and has sublethal effects on adults. The best results have been achieved by taking advantage of the ovicidal and sublethal effects. For example applying an early spray at biofix plus 150-200 GDD or a delayed timing of 350 GDD. At the early timing, Intrepid will also control OBLR larvae that are still present in orchards harboring high numbers of this troublesome pest. The addition of an agricultural adjuvant is recommended to improve initial spray deposition. As a cautionary note, growers should be aware that populations resistant to OP compounds might also be resistant to Intrepid.

There are several new pre-mix insecticides labeled for codling moth control, including Voliam flexi (thiamethoxam + chlorantraniliprole) Tourismo (flubendiamide/buprofezin), and Leverage (imidacloprid + cyfluthrin) that combine two active ingredients as pre-mix formulated compounds. When these are used for codling moth control care must be taken NOT to use a product in the following generation that is in the same insecticide class as either of the pre-mix active ingredients.

**Table 2. Chemical class, activity and timing of insecticides used for CM control.**

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

| | | | | |
|---|---|---|---|---|
| Leverage | Pyrethroid + Neonic. | Eggs, Larvae, Adults | Biofix + 200-250 DD | H |

**Codling moth granulosis virus**
Growers should not overlook including granulosis virus in their CM management program. This is a naturally occurring virus that goes by the scientific name of *Cydia pomonella* granulovirus (CpGV). Both of the two commercially available products, Cyd-X and Carpovirusine, are effective. Optimal use of the virus is against young larvae before they penetrate the fruit. The best way to target young larvae is to have the virus present on the surface of the eggs when they begin to hatch. Hatching CM larvae will ingest the virus as they consume their eggshells.

There are many options for incorporating virus into your CM management program. Deciding how much, when, and how often to apply product can be quite confusing. Keep in mind the following factors when trying to sort things out: 1) CpGV must be ingested by the CM larva and may not kill it immediately, 2) the virus breaks down in the environment, thus a spray may only be effective for a week or so, and 3) the virus is highly lethal, a few OB's are all that are required to cause death. Our overall experience is that frequent application of a low rate of product is the best approach for using this biopesticide.

Growers can opt to use the virus as part of a multi-tactic CM control program. Rotating it with chemical insecticides is a good means of combating resistance. We suggest the following approaches to incorporating CM virus into a management program. If you want to restrict your use to a single generation, target the first generation. Some virus-infected larvae will not die immediately, allowing them to cause fruit damage and even complete larval development. Fortunately, stings or deeper entries in small fruits attacked by first generation larvae often fall off the tree or are removed by thinning. Additionally, research conducted in 2003 revealed that less than 4 percent of the individuals that managed to complete larval development survived to pupate and emerge as summer generation adults. Thus, applications against the first generation can greatly reduce the size of the summer generation that will need to be controlled.

Regardless of the generation targeted, it is best to make at least two applications. If you want to rotate a CpGV product with other controls, try applying a chemical insecticide as the first spray at the start of egg hatch (250 GDD) and the virus as the second spray. This is because more eggs will be present and covered by the virus spray at the later timing. The insecticide and virus could then be rotated again, or the virus could be applied weekly at a low rate for the remainder of the egg hatch period.

**Combined use of an ovicide and larvicide**
Over the past few years, colleagues in Washington State have been evaluating two novel CM programs that take advantage of the ovicidal or larvicidal properties of various compounds. In one program, an ovicidal material is applied at the start of egg laying and a larvicidal material is applied at a delayed timing of 350-400 GDD. The second program is a delayed timing at 350 GDD of a tank mix of an ovicidal insecticide, such as Rimon, and a larvicidal insecticide, such as Delegate. Growers can learn more about these programs at**http://entomology.tfrec.wsu.edu/op-alternative/**.

Taking the lead from our Washington colleagues, we have evaluated the early ovicide followed by a delayed larvicide program using Rimon as the ovicide and either Assail, Calypso, Altacor or Belt as the larvicide. All programs proved highly effective in controlling first generation CM. The delayed larvicidal treatment is possible because the early ovicide treatment kills eggs that would have hatched in the period starting at 250 GDD. Another nice feature of this program is that the delayed application of the larvicide 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.

**Table 3. Relative activity spectrum of compounds against spring and early summer apple pests**

| | Primary pests | | | | | Secondary pests | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Insecticide | CM | OFM | OBLR | PC | AM | STLM | GAA | RAA | WALH | SJS |
| Avaunt | ** | ** | * | *** | * | | | * | * | |
| Intrepid | *** | *** | *** | | | ** | | | | |
| Spintor | ** | ** | *** | | ** | ** | | | | * |
| Delegate | *** | *** | *** | * | ** | ** | | | | * |
| Esteem | ** | * | * | | | ** | | ** | | *** |
| Rimon | *** | *** | *** | | | ** | | | | |
| Altacor | *** | *** | *** | | * | ** | | | | |
| Belt | *** | *** | *** | | | ** | | | | |
| Proclaim | ** | ** | *** | | | *** | | | | |
| Actara | * | * | | *** | *** | *** | *** | *** | *** | ** |
| Calypso Assail | *** | *** | | *** | *** | *** | *** | *** | *** | ** |
| Clutch | ** | ** | | *** | ** | *** | *** | *** | *** | |
| Guthion Imidan | *** | *** | | *** | *** | * | | | | |
| Pyrethroids | ** | ** | ** | ** | ** | ** | * | * | * | ** |

CM-codling moth, OFM-oriental fruitmoth, OBLR-obliquebanded leafroller, PC-Plum curculio, STLM-spotted tentiform leafminer, GAA / RAA -green / rosy apple aphid, WALH-white apple and potato leafhoppers, SJS-San Jose scale, TPB-tarnished plant bug some activity
** better activity, *** best activity relative to other insecticides

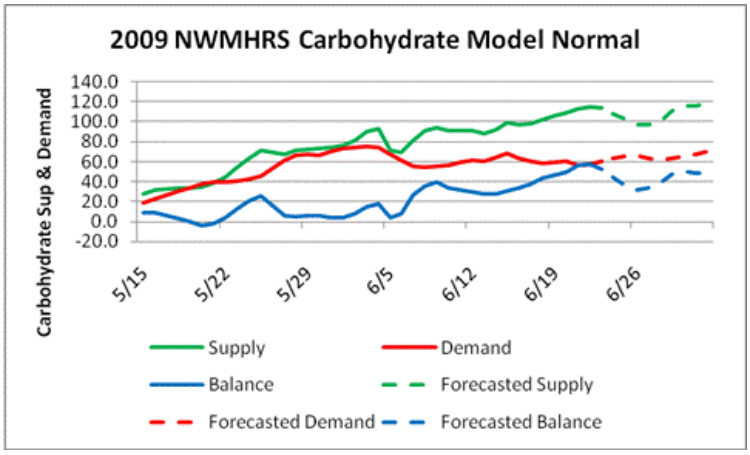
**WEEKLY APPLE THINNING CARBOHYDRATE MODEL**

**CIAB MEETINGS**

| | |
|---|---|
| Tuesday, June 23 p.m. Kewadin | 1:00 - 3:00 Milton Township Hall – |
| Tuesday, June 23 p.m. Res. Station | 7:00 - 9:00 NW Mich. Horticultural |

**USDA Estimates**

The USDA released the estimates of the cherry crop last Thursday. The USDA no longer breaks out the crop estimates by location in the state but rather only provides one estimate for Michigan. The 2009 tart cherry crop estimate is 220 million pounds for Michigan. The crop estimates were also released for the following states: New York (8.4), Oregon (2.7), Pennsylvania (3.7), Utah (23), Washington (17.5), and Wisconsin (8.3). The total U.S. crop estimate is 283.6 million pounds




of tart cherry. The tart cherry crop is up 32% from the 2008 crop and up 12% from the 2007 crop.

The Cherry Industry Administrative Board (CIAB) allocates the 220 million pounds in Michigan to the three main tart cherry growing regions. They allocated 150 million pounds for northwest Michigan, 56 million pounds for west central, and 14 million pounds for southwest. The MFFPA group numbers were similar, and they estimate 160 million pounds will come from northwest Michigan, 60 million pounds from west central, and 14.3 million pounds from southwest.

**Tart Cherries: Total Production by State and United States,**

**2007-2008 and Forecasted 2009**

| State | Total Production | | |
|---|---|---|---|
| | 2007 | 2008 | 2009 |
| | Million Pounds | | |
| MI | 196.0 | 165.0 | 220.0 |
| NY | 11.3 | 9.6 | 8.4 |
| OR | 0.5 | 2.8 | 2.7 |
| PA | 3.5 | 3.9 | 3.7 |
| UT | 20.0 | 20.0 | 23.0 |
| WA | 11.5 | 12.5 | 17.5 |
| WI | 10.4 | 0.6 | 8.3 |
| US | 253.2 | 214.4 | 283.6 |

The USDA sweet cherry crop estimate was also released on Thursday. They estimate that Michigan will produce 28,000 tons, which is up 6% from 2008. The whole U.S. sweet cherry crop is estimated at 374,500 tons. Washington is estimated to produce 200,000 tons, which is up 100% from 2008, and 27% more than the 2007 crop. Many new plantings have come into bearing this season. California production is estimated at 75,000 tons. Oregon production is forecast at 65,000 tons. Idaho is expecting a sweet cherry crop of 4,000 tons, and New York production is forecast at 1,100 tons. Utah production is expected to total 1.40 tons. Overall, the sweet cherry crop in the U.S. is up 52%.

**Sweet Cherries: Total Production by State and United States,**

**2007-2008 and Forecasted 2009**

| State | Total Production | | |
|---|---|---|---|
| | 2007 | 2008 | 2009 |
| | Tons | | |
| CA 1/ | 85,000 | 86,000 | 75,000 |
| ID | 1,500 | 1,900 | 4,000 |
| MI | 27,300 | 26,500 | 28,000 |
| MT 2/ | 2,440 | 1,560 | |
| NY | 1,190 | 1,050 | 1,100 |

| | | | | |
|---|---|---|---|---|
| OR | : | 35,000 | 30,000 | 65,000 |
| UT | : | 1,250 | 50 | 1,400 |
| WA | : | 157,000 | 100,000 | 200,000 |
| | : | | | |
| US | : | 310,680 | 247,060 | 374,500 |

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1/Forecast carried forward from "Crop Production" released June 10, 2009.

2/The first estimate for 2009 sweet cherries in MT will be published in the January 2010 "Noncitrus Fruits and Nuts 2009 Preliminary Summary".

## WEBSITES OF INTEREST

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

**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://www.maes.msu.edu/nwmihort/faxnet.htm

ACTUAL AND PREDICTED DEGREE-DAY
ACCUMULATIONS SINCE MARCH 1, 2009

**Please send any comments or suggestions regarding this site to:**
Bill Klein, kleinw@msu.edu

Last Revised: 6-23-09

District Horticulturist  District Fruit IPM/IFP Agent  Farm Mgr, NWMHRS

Duke Elsner
Agricultural & Regional Viticulture Agent

**June 30, 2009**

**GROWING DEGREE DAY ACCUMULATIONS AS OF June 29th AT THE NWMHRS**

| Year | 2009 | 2008 | 2007 | 2006 | 2005 | 2004 | 19yr. Avg. |
|---|---|---|---|---|---|---|---|
| GDD42 | 1205 | 1201 | 1541 | 1452 | 1484 | 1132 | 1302.4 |
| GDD50 | 676 | 681 | 953 | 848 | 916 | 606 | 766.5 |

**Growth Stages at NWMHRS (6/29/09- 3:30 p.m.)**
**Apple**: McIntosh – 26 mm fruit
Yellow Delicious – 23 mm fruit
Gala – 23 mm fruit
Red Delicious – 28 mm fruit
**Pear**: Bartlett: 21 mm fruit
**Sweet Cherry**: Hedelfingen: 19 mm fruit
Napoleon: 18 mm fruit
Gold: 17 mm fruit
**Tart Cherry**: 14 mm fruit
**Balaton**: 14 mm fruit
**Apricot:** 33 mm fruit
**Plum**: 19 mm fruit
**Grapes**: 50% bloom

**Weather Report**
Temperatures have gone from hot last week to cool this week and with some rain in between. Temperatures were up in the 80's and low 90's last week, and on Monday, we dropped into the 60's and have minimum temperatures in the low 50's in the forecast over the coming week. Overall, degree day accumulations are 1203 base 42 and 676 base 50. These accumulations are still behind the 19-year average of 1302 base 42 and 776 base 50. We also received rainfall throughout the region, with just under 0.5" at the NWMHRS.

**Crop Report**
Pears are at 21-26mm while apricots are at 33mm. Apples range from 23-28mm. Montmorency cherries are 14mm and Balatons are 14mm in size. Sweet cherries are 17-19mm in size. These sizes are not much different than last week's readings (13mm in tart cherry and 19-25mm in apple). Strawberry harvest is in full swing, but picking has been difficult with the temperature differentials.

**Pest Report**
In ***apples***, we continue to catch emerging **codling moth** adults with an average of 9 per trap. **Spotted tentiform leafminer** numbers are averaging 13 per trap. **Oriental fruit moth** trap catch is at 9 per trap for the second week in a row. **Oblique-**

**banded leafroller** are emerging in higher numbers now with an average of 32 per trap. High numbers of **rose chafer** have been reported in some apple orchards. Along with the wet weather, the **apple scab** model is predicting a heavy infection period in association with the wetting period that started on June 27. Despite cool temperatures, apple scab infection will occur under extended wetting periods. Growers are reporting scab lesions from earlier infection periods around the region and the end of primary scab is not yet predicted.

In ***cherries***, **American plum borer** emergence appears to be tapering off with only 1 per trap this week (season long catch as follows: 37-6-15-7-9-1). **Lesser peach tree borer** continues to emerge with trap catches of 7-18-7 over the past three weeks. **Greater peachtree borer** continue to emerge for the second week in a row with an average of 3 per trap this week. As in apple, **oblique-banded leafroller** numbers are up in cherry with an average of 27 per trap this week. Growers are beginning to report some **plum curculio** ovipositioning scars, but less than we would expect at this time. We have not caught **cherry fruit fly**. High **rose chafer** populations have been reported in some orchards. The **cherry leaf spo**t model has predicted a moderate and high infection potential on June 26-27 due to the wet weather. Symptoms of **bacterial canker** are common on sweets and we have also seen bacterial canker on green tart cherries – giving the fruit a chocolate brown appearance. **Sour cherry yellows** is showing up in many area tart cherry blocks, particularly in older trees.

In ***grapes***, we continue to catch **grape berry moth** in high pressure sites. **Potato leafhopper** are arriving in higher numbers. Some sights are experiencing high numbers of **rose chafer**. No reports of **powdery or downy mildew** yet.

**PREDICTED APPLE HARVEST DATES**
Phil Schwallier, District Horticulturist, MSU-E

**Normal Dates**

| **Station** | **McIntosh** | **Jons** | **Reds** |
|---|---|---|---|
| SWMREC | 10-Sep | 21-Sep | 28-Sep |
| Deerfield | 8-Sep | 21-Sep | 2-Oct |
| Flint | 10-Sep | 25-Sep | 2-Oct |
| Peach Ridge | 14-Sep | 26-Sep | 4-Oct |
| Ludington | 18-Sep | 3-Oct | 14-Oct |
| NWMHRS | 22-Sep | 10-Oct | 23-Oct |

| | **Full bloom date** | | | **Predicted harvest date** | | | |
|---|---|---|---|---|---|---|---|
| **Station** | **McIntosh** | **Jons** | **Reds** | **McIntosh** | **Jons** | **Reds** | **Observer** |
| SWMREC | 4-May | 6-May | 6-May | 5-Sep | 26-Sep | 2-Oct | Shane |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Deerfield | 5-May | 7-May | 8-May | 6-Sep | 27-Sep | 4-Oct | Tritten |
| Romeo | 9-May | 12-May | 13-May | 12-Sep | 3-Oct | 12-Oct | Tritten |
| Peach Ridge | 12-May | 14-May | 14-May | 15-Sep | 6-Oct | 12-Oct | Schwallier |
| Ludington | 16-May | 19-May | 19-May | 20-Sep | 11-Oct | 17-Oct | Danilovich |
| NWMHRS | 20-May | 21-May | 22-May | 24-Sep | 8-Oct | 15-Oct | Rothwell |

**ETHEPHON ON CHERRIES**

N.L. Rothwell, District Horticulturist, MSU-E
J. Nugent, Retired District Horticulturist, MSU-E

Ethephon is a plant growth regulator, and its uses vary with plant species, chemical concentration, and time of application. Ethephon regulates phases of plant growth and development by application to various growth sites. This plant growth regulator has systemic properties where it penetrates the plant tissues and is decomposed to ethylene. This decomposition impacts the plants' growth processes. In cherry systems, ethephon promotes fruit loosening to facilitate mechanical harvesting. Ethephon, sold under the trade name Ethrel, has been used as a common management practice in both tart and sweet cherry harvest.

Ethephon releases ethylene, which penetrates plant cells and binds to receptors that affect expression of various genes. In the case of cherries, ethephon affects the gene that controls the synthesis/activation of cell wall loosening enzymes such as polygalacturonase and pectin methylesterase, thus dissolving the pectins between cells in the abscission layer. This chain-like reaction leads to cell separation in the developmentally-programmed abscission zone between pedicel and fruit or pedicel and spur. In short, ethephon loosens the cherries from the stem, which results in a gentle 'shaking' of the tree to remove the fruit.

One main concern in recent years (2005-2007) has been the amount of ethephon-induced damage with the hot, dry weather conditions. Ethephon can have excessive activity under a certain set of conditions, which can result in tree injury. As mentioned last season, we remind growers that we have observed quite a bit of ethephon damage in the past few years, especially in sweet cherries and of those varieties, Golds seem the most sensitive. This damage occurred when ethephon was applied during hot and dry weather conditions during 2007, 2006 and even in many blocks in 2005. Trees under stress, particularly drought stress, become more susceptible to ethephon damage. Damaged trees exhibit excessive gumming, and branches lose their leaves. We have also noticed areas within a block may show considerably more ethephon damage than other areas. Most likely the trees that show the most damage were more stressed in some way at the time of application, and soils in a particular area can help showcase this ethephon damage.

Timing the ethephon application is an important factor. A lower rate of ethephon provides adequate loosening if given adequate time for action (10 to 14 days), while higher rates will loosen fruit to the same degree more quickly. Therefore, it is possible to substitute time for rate and obtain the same effect. Secondly, it is important that the chemical not be applied too early in the season. The fruit should be in Stage III of growth, where the fruit is growing rapidly and the grass-green color begins to yellow or take on a tinge of red. If ethephon is applied earlier than Stage III, the fruit may fail to grow further and has the potential to drop off the tree with the stems attached.

As mentioned above, both temperature and tree vigor are associated with the degree of response achieved. At higher temperatures during the 72 hours following application, the magnitude of response is increased and at lower temperatures it is decreased. Trees low in vigor or under stress respond to a greater extent, and gumming and leaf abscission may result. Do not treat such trees! Repeat, do not treat such trees!

The following recommendations should be used when applying ethephon to cherries:

1. **Rate:** Vary the rate depending on anticipated temperatures for 72 hours after application, days before harvest, tree stress and past experience. *Lower rates decrease the likelihood of tree injury.*

1. **Light sweets** -- When applied concentrate (80 gals. water/acre or less), 1 to 2 pts/acre applied 10-14 days before anticipated harvest should provide adequate loosening. Rates up to 2.5 pts/acre may be necessary for harvesting in less than 10 days. When applied dilute, use no more than ¾ pt/100 gals or 3 pts/acre.
2. **Dark sweets** -- When applied concentrate, use 1.5 to 2.5 pts/acre applied 10-14 days prior to anticipated harvest. Rates up to 3 pts/acre may be necessary for harvesting in less than10 days. When applied dilute, use no more than 1 pt/100 gals. or 4 pts/acre.
3. **Tart cherries** -- When applied concentrate, use 0.5 to 1 pt/acre applied 7 to 14 days prior to anticipated harvest. When applied dilute, apply no more than 1/3 pt/100 gals or 1 pt/acre.

2. **Time of Application:** Apply approximately 7 to 14 days before anticipated harvest. Do not harvest within 7 days of application (7-day PHI).
3. **Temperature:** Avoid application when high temperatures are expected to exceed 85° F or remain below 60° F for the 72 hour period after application. Use relatively high rates when high temperatures are expected to be in the 60's ° F and lower than normal rates when highs are expected in the lower 80's.
4. **Tree stress:** Do not spray trees that are low in vigor or under stress conditions.
5. **Do not** spray trees that had serious gumming the previous year.
6. **Crop load:** Heavy crop load, ie, low leaf to fruit ratio, is more difficult to loosen so use relatively higher rates or expect a longer time to achieve desired loosening.
7. **Concentrate spraying:** Applying ethephon with concentrate sprayers (i.e., 80 gallons of water/acre or less) achieves the same level of loosening at lower rates per acre than does dilute applications. Uniform coverage is important.
8. **Tree size:** Suggested rates/acre are based on full-sized trees. Adjust rates downward when treating blocks with smaller trees.

Growers should pay particular attention to the temperatures. As evident from the last three seasons, hot temperatures can really do damage to cherry trees. Growers that have had problems in the past years should avoid ethephon, especially if the trees showed serious gumming and leaf loss.

**EFFICACY OF TANK-MIXING INSECTICIDES AND ETHEPHON**

N.L. Rothwell and K.L. Powers, Northwest Michigan Hort. Research Station

Insecticides and fungicides are pH-sensitive, and when tank-mixed with plant growth regulators, such as ethephon, could present efficacy issues. This purpose of this trial was to evaluate the impact of ethephon on pH in the tank as many growers traditionally tank-mix this application with fungicides and/or insecticides. Our concern is that the pH of the tank will be lowered considerably with ethephon which may inactive the pesticides in the tank.

**Table 1** represents the pH of each product in tap water. We measured pH after agitation and 30 minutes of 'spray time'. The more ethephon added to water, the lower the pH. At 3 pints per 100 gallons of water, the pH is down to 2.8, an extremely acidic environment. Many growers use a 2 pint per 50 gallon rate, and this amount of ethephon would also lower the pH below 3. The pH of the tank at these rates is much too low for fungicides and insecticides, as these chemistries are most efficacious in a neutral pH range. See **Table 2** for a list of optimal pH's for common pesticides (courtesy of Annemiek Schilder).

**Table 3** is a summary of a few insecticides mixed with copper/lime and ethephon at 1, 2, and 3 pint rates. Based on these results, pH is altered with copper/lime and with ethephon and potentially to a point where the activity of insecticides is altered. Lowering the pH of the tank with ethephon may reduce the efficacy of insecticide in the tank; therefore, growers should be aware of tank-mixing ethephon with insecticides or fungicides. Additionally, lime will raise the pH of the tank and ethephon works optimally at a lower pH. Tank mixing copper/lime with ethephon is not recommended.

**Table 1.** pH of all products individually when mixed with tap water.

| | **pH** |
|---|---|
| Tap Water (NWMHRS) | 7.1 |

| | |
|---|---|
| Ethephon, 1 pt/100 gal | 6.4 |
| Ethephon, 2 pt/100 gal | 5.2 |
| Ethephon, 3 pt/100 gal | 2.8 |
| Cuprofix 20 DF | 7.4 |
| Lime 3 lbs | 10.0 |
| Lime 6 lbs | 10.0 |
| Warrior | 7.5 |
| Provado | 7.6 |
| Actara | 7.5 |
| Imidan | 7.4 |

**Table 2**. Llist of optimal pH's for common pesticides (courtesy of Annemiek Schilder)

| **Product** | **Active ingredient** | **Optimum pH** | **Half Life / Time until 50% Hydrolysis**** |
|---|---|---|---|
| **Insecticides/Miticides** | | | |
| Admire | Imidacloprid | 7.5 | Greater than 31 days at pH 5 - 9 |
| Agri-Mek | Avermectin | | Stable at pH 5 - 9 |
| Ambush | Permethrin | 7 | Stable at pH 6 - 8 |
| Apollo | clofentezine | | pH 7 = 34 hrs; pH 9.2 = 4.8 hrs |
| Assail | acetamiprid | 5 - 6 | Unstable at pH below 4 and above 7 |
| Avaunt | indoxacarb | | Stable for 3 days at pH 5 – 10 |

| | | | |
|---|---|---|---|
| Carzol | formetanate hydrochloride | 5 | Not stable in alkaline water; use within 4 hrs of mixing. |
| Cygon/Lagon | dimethoate | 5 | pH 4 = 20 hrs; pH 6 = 12 hrs; pH 9 = 48 min |
| Cymbush | cypermethrin | | pH 9 = 39 hours |
| Diazinon | phosphorothioate | 7 | pH 5 = 2 wks; pH 7 = 10 wks; pH 8 = 3 wks; pH 9 = 29 days |
| Dipel/Foray | *B. thuringiensis* | 6 | Unstable at pH above 8 |
| Dylox | trichlorfon | | pH 6 = 3.7 days; pH 7 = 6.5 hrs; pH 8 = 63 min |
| Endosulfan | endosulfan | | 70% loss after 7 days at pH 7.3 – 8 |
| Furadan | carbofuran | | pH 6 = 8 days; pH 9 = 78 hrs |
| Guthion | azinphos-methyl | | pH 5 = 17 days; pH 7 = 10 days; pH 9 = 12 hrs |
| Imidan | phosmet | 5 | pH 5 = 7 days; pH 7 < 12 hrs; pH 8 = 4 hrs |
| Kelthane | dicofol | 5.5 | pH 5 = 20 days; pH 7 = 5 days; pH 9 = 1hr |
| Lannate | methomyl | | Stable at pH below 7 |
| Lorsban | chlorpyrifos | | pH 5 = 63 days; pH 7 = 35 days; pH 8 = 1.5 days |
| Malathion | dimethyl dithiophosphate | 5 | pH 6 = 8 days; pH 7 = 3 days; pH 8 = 19 hrs; pH 9 = 5 hrs |
| Matador | lambda-cyhalothrin | 6.5 | Stable at pH 5 - 9 |
| Mavrik | tau-fluvalinate | | pH 6 = 30 days; pH 9 = 1 - 2 days |
| Mitac | amitraz | 5 | pH 5 = 35 hrs; pH 7 = 15 hrs; pH 9 = 1.5 hrs |
| Omite | propargite | | Effectiveness reduced at pH above 7 |

| | | | |
|---|---|---|---|
| Orthene | acephate | | pH 5 = 55 days; pH 7 = 17 days; pH 9 = 3 days |
| Pounce | permethrin | 6 | pH 5.7 to 7.7 is optimal |
| Pyramite | pyridaben | | Stable at pH 4 – 9 |
| Sevin XLR | carbaryl | 7 | pH 6 = 100 days; pH 7 = 24 days; pH 8 = 2.5 days; pH 9 = 1 day |
| SpinTor | spinosad | 6 | Stable at pH 5 – 7; pH 9 = 200 days |
| Thiodan | endosulfan | 6.5 | 70% loss after 7 days at pH 7.3 to 8 |
| Zolone | phosalone | 6 | Stable at pH 5 – 7; pH 9 = 9 days |
| **Fungicides** | | | |
| Aliette | fosetyl-al | 6 | Stable at pH 4.0 to 8.0 |
| Benlate | benomyl | | pH 5 = 80 hrs; pH 6 = 7 hrs; pH 7 = 1 hr; pH 9 = 45 min |
| Bravo | chlorothalonil | 7 | Stable over a wide range of pH values |
| Captan | captan | 5 | pH 5 = 32 hrs; pH 7 = 8 hrs; pH 8 = 10 min |
| Dithane | mancozeb | 6 | pH 5 = 20 days; pH 7 = 17 hrs; pH 9 = 34 hrs |
| Nova | myclobutanil | | Not affected by pH |
| Ridomil | mefenoxam | | pH 5 – 9 = more than 4 weeks |
| Rovral | iprodione | | Chemical breakdown could take place at high pH |
| Orbit | propiconazole | | Stable at pH 5 – 9 |
| **Herbicides** | | | |
| Banvel | dicamba | | Stable at pH 5 - 6 |

| | | | |
|---|---|---|---|
| Fusilade | fluazifop-p | | pH 4.5 = 455 days; pH 7 = 147 days; pH 9 = 17 days |
| Ignite | glufosinate-ammonium | 5.5 | |
| Gramoxone | paraquat | | Not stable at pH above 7 |
| Poast | sethoxydim | 7 | Stable at pH 4.0 to 10 |
| Princep | simazine | | pH 4.5 = 20 days; pH 5 = 96 days; pH 9 = 24 days |
| Prowl | pendimethalin | | Stable over a wide range of pH values |
| Roundup | glyphosate | 5 - 6 | |
| Touchdown | glyphosate | 5 - 6 | |
| Treflan | triflularin | | Very stable over a wide range of pH values |
| Weedar | 2,4-d | | Stable at pH 4.5 to 7 |

**The half-life is the period of time it takes for one half of the amount of pesticide in the water to degrade. Other factors than the pH can affect the rate of hydrolysis, incl. temperature, solubility, concentration, type of agitation, humidity, and other pesticides and adjuvants in the mixture.

**Table 3.** pH of Warrior, Provado, Actara, and Imidan when tank mixed with lime, copper, and 3 rates of ethephon.

| | **pH** |
|---|---|
| Warrior | 7.5 |
| Warrior, 3 lbs Lime, Cu | **10.9** |
| Warrior, 3 lbs Lime, Cu, 1 pt Ethephon | 5.2 |
| Warrior, 3 lbs Lime, Cu, 2 pt Ethephon | 4.4 |
| Warrior, 3 lbs Lime, Cu, 3 pt Ethephon | 3.8 |
| | |

| | |
|---|---|
| Provado | 7.6 |
| Provado, Lime, Cu | **8.9** |
| Provado, 3 lbs Lime, Cu, 1 pt Ethephon | 5.2 |
| Provado, 3 lbs Lime, Cu, 2 pt Ethephon | 4.8 |
| Provado, 3 lbs Lime, Cu, 3 pt Ethephon | 4.2 |
| Actara | 7.5 |
| Actara, Lime, Cu | **9.3** |
| Actara, 3 lbs Lime, Cu, 1 pt Ethephon | 5.6 |
| Actara, 3 lbs Lime, Cu, 2 pt Ethephon | 5.4 |
| Actara, 3 lbs Lime, Cu, 3 pt Ethephon | 4.9 |
| Imidan | 7.4 |
| Imidan, Lime, Cu | **9.2** |
| Imidan, 3 lbs Lime, Cu, 1 pt Ethephon | 5.5 |
| Imidan, 3 lbs Lime, Cu, 2 pt Ethephon | 5.0 |
| Imidan, 3 lbs Lime, Cu, 3 pt Ethephon | 4.7 |

**KEEP AN EYE ON PESTICIDE PREHARVEST INTERVALS AS HARVEST APPROACHES**
Erin Lizotte, IPM/IFP District Educator

| Days Between Final Spray and Harvest in Cherry | |
|---|---|
| Pesticide | Preharvest Interval (Days) |
| Propimax | 21 |
| Quash | 14 |
| Ziram 76 DF | 14 |
| Actara | 14 |
| Admire Pro | 21 |
| Apollo | 21 |
| Asana | 14 |
| Avaunt | 14 |
| Beleaf | 14 |
| Diazinon | 21 |
| Esteem | 14 |
| Lorsban (foliar) | 14 |
| Mustang Max | 14 |
| Onegar | 28 |
| Savey | 28 |
| Thiodan | 21 |
| Vendex | 14 |
| Voliam flexi | 14 |
| Warrior | 14 |

As harvest approaches, growers should be aware of the PHI's of commonly sprayed pesticides. By request, we have put together a table to help growers make appropriate insecticide management decisions, particularly as sweet cherry harvest is around the corner. Additionally, even though apple harvest seems a long way out, there are pesticides with long PHI's listed in the table below.

| Days Between Final Spray and Harvest in Apple | |
|---|---|
| Pesticide | Preharvest Interval (Days) |
| Agri-mycin | 50 |
| Bayleton | 45 |
| EBDCs | 77 |
| Firewall | 50 |
| Inspire | 72 |
| Scala | 72 |
| Vangard | 72 |
| Apollo | 45 |
| Centaur | 60 |
| Esteem | 45 |

**INDAR® 2F SUPPLEMENTAL LABELING**

Leslie Abbott, Dow AgroSciences, provided the following note and label.

"We submitted a request for a state label allowing for Indar to be used at higher use rates for brown rot control in stone fruit.

This label allows Michigan growers to use up to 12 oz. per application with a season long limit of 48 oz. and has now been approved by the state.

I believe 8 to 9 oz. would be all that is needed in orchards where you have experienced problems controlling brown rot in past seasons.

The grower should have this label **on hand** if they are planning to use the higher use rates."

**Supplemental Labeling**
**Dow AgroSciences LLC 9330 Zionsville Road Indianapolis, IN 46268-1054 USA**
**Indar® 2F**
**EPA Reg. No. 62719-416**
**EPA 24(c) Special Local Need Registration SLN MI-090002**
**For Distribution and Use Only in the State of Michigan**
**Control of Blossom Blight and Fruit Brown Rot in Cherries, Peaches and Nectarines**

**ATTENTION**

- It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
- This labeling must be in the possession of the user at the time of application.
- Read the label affixed to the container for Indar® 2F fungicide before applying. Carefully follow all precautionary statements and applicable use directions.
- Use of Indar 2F according to this supplemental labeling is subject to all use precautions and limitations imposed by the label affixed to the container for Indar 2F.

**Directions for Use**

Refer to product label for Mixing, Handling and Application instructions.
Indar 2F is a protectant fungicide. Best disease control is achieved when a protectant application schedule is followed.
Use 6 to 12 fl oz of Indar 2F (0.094 to 0.188 lb active) per acre in a minimum of 20 gallons of water by ground or 10 gallons of water by air. Indar 2F may be applied up to the day of harvest.
To control blossom blight in cherries, peaches and nectarines, begin applications at early red bud stage before infection occurs. If conditions are favorable for disease development, apply again at full bloom and at petal fall.
To control fruit brown rot in cherries, peaches and nectarines, begin applications 2 to 3 weeks before harvest using a 7- to 10-day spray interval.

**Specific Use Restrictions:**

- Do not make more than 8 applications at the 6 fl oz rate or 4 applications at the 12 fl oz rate.
- Do not apply more than 48 fl oz of Indar 2F (0.75 lb active) per acre per season.
- Do not graze livestock in treated areas or feed cover crops grown in treated areas to livestock.
- **Chemigation:** Do not apply this product through any type of irrigation system.

**Expiration Date: May 12, 2014**

R349-007
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**WEBSITES OF INTEREST**

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

**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://www.maes.msu.edu/nwmihort/faxnet.htm

ACTUAL AND PREDICTED DEGREE-DAY
ACCUMULATIONS SINCE MARCH 1, 2009

**Please send any comments or suggestions regarding this site to:**
Bill Klein, kleinw@msu.edu

Last Revised: 6-30-09

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UNIVERSITY


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