Northern Michigan FruitNet 2006
Weekly Update

NW Michigan Horticultural Research Station

Jim Nugent, District Horticulturist
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Bill Klein, Farm Mgr, NWMHRS
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May 2, 2006

Growing Degree Day Accumulations as of May 1, 2006 at the NWMHRS.

Year	2006	2005	2004	2003	2002	16yr. Avg.
GDD42	329	274	204	211	203	212.3
GDD50	115	113	55	64	103	61.8

WEATHER

April ended with above normal temperatures and well below normal precipitation. Through the end of April, base 42 °F degree day accumulation was above 300° for the first time since 1990. Frost occurred on 4/28.

GROWTH STAGES at NWMHRS (5/1/06—1:00pm)

Apple: Pink
Pear: Bartlett: White bud
Sweet Cherry: Hedelfingen, Napoleon, Gold: Full bloom
Tart Cherry: Montmorency: 20% Bloom; **Balaton:** First bloom
Apricot: In shuck
Plum: NY 12: First bloom
Grapes: Chardonnay: Late bud swell

COMMODITY REPORT

Apple: Rosy apple aphids are present at low levels in apples. Spotted tentiform leaf miner is about at first adult peak. Second instar green fruitworm and oblique banded leaf rollers are evident at this time. Benzie County reported a wetting period beginning on 4/30 that resulted in a low level apple scab infection.

Cherry: Benzie County's wetting event also resulted in a light cherry leaf spot infection period. Frost that damaged the area's sweet cherry blossoms on April 28th is not expected to lead to significant bacterial canker infection due to dry conditions before and after the event.

Grape: Cutworms are still particularly active in grapes and newly planted orchards. The Benzonia weather station reported a wetting event that resulted in a grape leaf black rot infection.

ROSY APPLE APHID ALERT
Nikki Rothwell, District Fruit IPM Educator

Rosy apple aphid (RAA), *Dysaphis plantaginea* (Passerini), has been spotted in low levels in apple around the NW region. Although this aphid is found throughout the fruit growing regions of the U.S., RAA are primarily a problem in Cortland, Golden Delicious, and especially Ida Red. RAA overwinters in the egg stage, and hatch happens early in spring, about the time buds begin to open. The newly hatched aphids feed on the outside of the leaf and fruit bud until the leaves open; they then move down the clusters and begin feeding on sap from the stems and small fruits. Feeding damage is recognizable by the curling leaves, which is characteristic of RAA; this leaf curling provides protection for the feeding aphids.

Monitoring for RAA is essential at this time, especially on susceptible varieties. A sound scouting protocol is to examine 100 fruit clusters in the center of a susceptible block--from tight cluster through petal fall. Control is warranted if an average of one colony of RAA per tree is found in the block. Chemical control timing is of particular concern with this pest because those protective curling leaves reduce the ability of insecticides to reach RAA. Early applications are most optimal as the aphids are exposed at this time, and traditionally a tight cluster, pre-pink spray has been used. Oils are an option any time before full pink, but as soon as trees reach the full pink stage, we run the risk of phytotoxicity--Lorsban 75 WG

spray would work at this time. Another newer recommendation at pink is a low level of Assail 70 WP, and 1.1 oz does wonders to clean up RAA.

CHERRY LEAF SPOT REVIEW
Nikki Rothwell, District Fruit IPM Educator

One of the major constraints to economically viable tart cherry production is the fungal disease cherry leaf spot (CLS), which is caused by the pathogen *Blumeriella jaapii* (Rehm). Because most of the Michigan tart cherry acreage consists of the CLS-susceptible cultivar 'Montmorency' and a new 'Balaton' cultivar that is also susceptible to CLS, fungicide inputs are required for adequate disease control. CLS affects sweet cherries to a lesser degree, but sweets also need fungicide applications throughout the season.

CLS primarily infects the foliage, but overall, this disease decreases the vigor and health of the trees. During wet weather with warm temperatures, the pathogen attacks vulnerable cherry leaves, and lesions originate on the upper leaf surface. Although lesions first appear purplish in color, they eventually combine if they are many lesions on one leaf and turn brown. White masses of conidia show up on lesions on the undersides of the leaves with wet weather conditions; these masses often look raised or 3-D with a hand lens. Leaves with only a few lesions can turn yellow and abscise from the trees, and if infection levels are high, infected trees can result in severe defoliation. Trees that are defoliate prior to harvest also cause fruit to ripen unevenly, are light in color, and are low in sugar content. If trees defoliate in mid-summer, they are less winter hardy and are susceptible to winter kill.

CLS fungus overwinter on the orchard floor on the previous season's infected leaves. In spring, the spores produce fruiting bodies (apothecia) around 62 F. These fruiting bodies contain ascospores, and these ascospores are discharged after a rain between 60-85 F, although some can be released at lower temperatures (41-46 F). These discharged ascospores infect cherry leaves through mature stomata; stomata are considered mature when the leaf is unfolded.

During a spring with wet and warm conditions, the decision to apply fungicide for CLS control can be tricky. For instance, at this point in the season around NW Michigan, most tart cherries are starting to bloom, and most of the green tissue is not yet susceptible, hence unfolded. However, there are very small bract leaves that are open and completely unfolded at this time. These bract leaves are susceptible to CLS, and if they do become infected, they can be a source of CLS inoculum for the remainder of the season. Nonetheless, these leaves are so small in size, they are not often worth the expense of a preventative CLS fungicide application. This rule of thumb is especially relevant this year as most NW orchard have low CLS inoculum due to the dry 2005 season.

As we progress through this seemingly accelerated season, trees will be susceptible throughout the coming months. We will continue to monitor for CLS infection periods, which are governed by the duration of wetting events in relation to temperature. The approximate number of hours of wetting required for conidial infection by CLS fungus is summarized in the following chart, which can help growers determine the potential for CLS infection. Information on predicted CLS infection from wetting events at they occur during the summer are available at www.enviroweather.msu.edu.

		Wetting Period (hr) (b)		
Average		**Light**	**Moderate**	**Heavy**
temperature		**infection**	**infection**	**infection**
(F)	(C)			
81	27.2	28	43	-
80	26.7	21	35	-
79	26.1	18	30	-
78	25.5	16	27	42
77	25.0	14	24	36
76	24.4	12	21	32
75	23.8	11	19	29
74	23.3	9	18	27
73	22.7	8	16	25
72	22.2	7	15	23
71	21.6	7	14	22
70	21.1	6	13	21
69	20.5	6	13	20
63 - 68	17.2 - 20.0	5	12	19
62	16.6	6	12	19
61	16.1	6	13	20
60	15.5	7	13	20
59	15.0	7	14	21
58	14.4	8	15	22
57	13.8	9	16	23
56	13.3	10	17	24
55	12.7	11	18	25
54	12.2	12	19	27
53	11.6	14	21	29

52	11.1	15	23	31
51	10.5	17	25	33
50	10.0	19	27	35
49	9.4	20	29	38
48	8.8	23	32	42
47	8.3	25	34	46
46	7.7	28	38	51

Adapted from Eisensmith and Jones, 1981. Plant Dis. 65:955-958 and Phytopathology 71:728-732

The infection period is considered to start when rain begins.

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, 2006

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May 9, 2006

Growing Degree Day Accumulations as of May 8, 2006 at the NWMHRS.

Year	2006	2005	2004	2003	2002	16yr. Avg.
GDD42	426	337	240	269	249	288.2
GDD50	199	148	89	110	123	128.1

WEATHER

Last week was generally warm and dry. A freeze event occurred on the morning of 5/6 in NW Michigan. The May 6th inversion freeze event caused significant damage to tree fruit crops in NW Michigan. Any tree fruit crop, including apples and cherries, in an area with poorer air drainage was badly damaged. Apples were generally in pink at the time and appear to have sustained the most damage, due in part to the location of many apples relative to the sites on which cherries are planted. The freeze was severe enough that even on some high sites with good air drainage, cherries in bloom sustained some damage on the tops of limbs.

GROWTH STAGES at NWMHRS (5/8/06—1:30pm)

Apple: King bloom
Pear: Bartlett: Full bloom
Sweet Cherry: Hedelfingen, Napoleon: In the shuck; **Gold:** Petal Fall
Tart Cherry: Montmorency: Early petal fall; **Balaton:** Early petal fall
Apricot: Shuck split
Plum: NY 12: Petal fall
Grapes: Chardonnay: 1-3" shoots

PEST REPORT

Apples: A wetting event was reported for May 2nd that resulted in a high scab infection period at the NWMHRS. Another wetting event on May 7th was recorded at other stations in NW Michigan, but none of this moisture was enough to cause an apple scab infection. Powdery mildew is showing up in some of our apple blocks, but this disease is probably left over from last year. We caught our first Oriental fruit moth at the NWMHRS, and we had a count of 30 moths in a minimally managed block in the area. Our spotted tentiform leaf miners (STLM) counts are declining from last week. We have seen plenty of obliquebanded leaf roller (OBLR) larvae in apple blocks in the region.

Cherry: The May 2nd wetting event resulted in a low cherry leaf spot (CLS) infection at the NWMHRS. OBLR larvae have been reported in high numbers in many sweet cherry blocks, and we have even seen a few larvae in tarts. OBLR appears to have developed OP resistance in a few sites in NW Michigan, though this observation has not yet be confirmed. American plum borers have been trapped at the NWMHRS, at an average of 7 per trap.

Grapes: We have not seen many changes in grapes this past week.

LOOKING AHEAD TO PETAL FALL/SHUCK SPLIT
Nikki Rothwell, District Fruit IPM Educator

Diseases

When the cherry petals begin to drop and the fruit becomes visible, the pest management season really moves into high gear. In terms of diseases, both cherry leaf spot (CLS) and brown rot have the potential to cause major problems later in the season if they take hold at this time. CLS is a pathogen that affects the foliage of the cherry trees, and this disease is especially prominent in tart cherries, although we can have CLS show up in sweets. Since we documented widespread resistance to sterol inhibitors (SI's), growers should avoid these chemistries at this time. Bravo (chlorothalonil) is our best option through shuck split as this

chemistries at this time. Bravo (chlorothalonil) is our best option through shuck split as this fungicide does not have a high potential for developing resistance. Bravo is rated 'excellent' against CLS, and since it is only labeled for use through shuck split (and post-harvest), this chemistry is the one to be using now. Remember that the life of our fungicides is finite, and the longer we can stretch out their use, the better we will be down the road.

Brown rot is another disease that can wreak havoc in cherry orchards, and this pathogen is particularly problematic in sweet cherry. Last year, growers in the NW Michigan area reported varying levels of brown rot control, even with our old standbys, the SI's. The SI's, Orbit, Elite, and Indar, are all rated excellent on brown rot blossom blight, with Indar's formulation providing the best efficacy against this pathogen. However, with the hints and rumors of SI resistance to brown rot, growers should avoid using these chemistries at petal fall/shuck split in order to save the SI's for harvest time when brown rot control is much more critical. As this year has started off particularly dry, brown rot may not need the 'big guns' so early in the season. The following chemistries are also available for this time of the year: 1) Bravo, which is only rated fair-good on brown rot, but an option for early season control, especially with dry conditions, 2) Rovral is an excellent brown rot material, but it can only be applied through petal fall, 3) tank mix of Captan and Sulfur or Captan and an strobulurin (Flint is rated good on brown rot), or 4) if pressure builds due to wet conditions, a tank mix of an SI with Captan—we should always try to tank-mix our SI's. Recent work in apple at Cornell University suggests that SI fungicides have a lifetime of ~60 applications before resistance develops. Although this work was done on apple scab, these scary numbers are a reminder that SI resistance has and will continue to develop in orchard systems. This SI resistance issue is particularly noteworthy for sweet cherry growers who want to keep the SI's for brown rot control as long as possible since there are no other good alternatives! To end on a positive note, brown rot susceptibility decreases after the tree is finished with bloom.

Insects

Petal fall/shuck split is also the time where growers start pulling out their insecticides. In sweet cherry, we need to be particularly diligent about keeping our eyes open for plum curculio (PC)—they love sweets and those little cherries are the first to poke their heads out this time of year. Green fruitworm (GFW) is another pest that is evident at this time. These Lepidopterans can be cyclical, with high populations one year and lower numbers in other years. We have seen GFW moths flying around for almost two months, so we expect to see hungry larvae any moment. If an orchard has both PC and GFW, one tactic has to been to apply a tank mix of a half rate of a pyrethroid and a half rate of Guthion—Guthion for PC and the pyrethroid for GFW. This tank mix is good at this time, but if continued into the season, pyrethroids will flare plant parasitic mites to beat the band.

These two insect pests in tart cherries can be handled a bit differently. A model was developed in tart cherry to determine the likelihood of a PC larva to remain in the fruit at harvest time. The premise behind this model is to delay insecticide application until the last GDD where the tree would not abort the fruit containing the PC larva; hence, the grower could save on early PC treatments because the tree would 'remove' its own fruit infested with PC. After a certain cut off point (375 GDD), PC that lay their eggs in the fruit have the potential to remain on the tree until that PC-filled cherry is harvested. This model can be found at www.enviroweather.msu.edu-- go to the weather station closest to you, click on Fruit, then on 'Tart Cherry Plum Curculio'. To use this model, growers must know their biofix date for each block, and biofix for this model is the date of full bloom. From biofix, growers must either calculate the number of growing degree days, base 50F, until that block reaches 375GDD or look up the chart in Enviroweather. Growers will need to apply an insecticide for PC when they reach 375GDD because after this point, larvae have the potential to show up in fruit at harvest. This model should only be used if a grower is actively scouting for PC in tart cherry, and this model cannot be used for sweet cherry. Again, pyrethroids work well for GFW in tart cherry as well as sweet cherry. Bt and insect growth regulators also receive an excellent rating against GFW: Spintor, Intrepid, and Entrust.

A special mention about obliquebanded leaf rollers (OBLR) is necessary now. We have seen actively feeding OBLR larvae in both apples and cherries this season. As their behaviors are slightly different in both fruits, these larvae can be particularly problematic and seem to be growing more so with time. In apple, OBLR feed on the continuously growing new terminal shoots, and this type of feeding makes these insects hard to target because they are always feeding on new growth—the leaves without insecticide coverage. In cherry, OBLR are also a pain, but in a different way: OBLR feeds on leaves inside the cluster of fruits, so they are hard to reach with insecticides. This pest may lead to brown rot issues in sweet cherries close to harvest. The larvae web together the fruit clusters to feed, and this behavior creates the perfect opportunity for the brown rot pathogen (*Monolinia fructicola*) to invade the damaged fruit. In tart cherries, we should be scouting for OBLR because if we do not control them for this first generation, the second shows up right around harvest time. In both cherry and apple crops, OBLR numbers seem to be on the rise, and there has been documented organophosphate (OP) resistance. Growers can no longer assume they control OBLR with OP's or pyrethroids sprays. Therefore, growers need to be monitoring for OBLR larvae and trapping for adult moths, even after insecticide applications.

OBLR activity can be predicted using degree-day models, although the information is not as reliable as that provided by the codling moth model. Using GDD42 for OBLR, first adult emergence is at approximately 900, 1150 to 1200 for peak adult activity, and 1250 to 1350 for first egg hatch. First sustained moth capture (capture on two successive dates) in pheromone traps is used as a biofix, thus if moth flight peaks between 250 and 300 GDD after initial biofix, the heaviest egg hatch should be about 400 GDD later. If the overwintering generation was effectively controlled earlier in the spring, then scouting orchards for OBLR larvae in actively growing terminals is the best way to judge whether infestations will require further

actively growing terminals is the best way to judge whether infestations will require further control. This investment of time could result in saving several sprays.

FIRE BLIGHT BRIEF
Nikki Rothwell, District Fruit IPM Educator

As we are entering bloom in **apples**, growers need to be concerned about fire blight. This disease is particularly hard to control because of a variety of reasons: 1) unlike **apple scab**, the **fire blight bacteria** are dispersed several weeks prior to 1st infection, 2) *Erwinia amylovora* (the FB bacterium) is a complete epiphyte, which means it grows and relies on the apple blossom for support only, 3) the doubling time of the pathogen is about 20-30 minutes when temperatures are between 65-75 F, 4) infection can occur in minutes, so almost any wetting event is a potential infection period, 5) new infections produce many new bacteria which are efficiently transmitted by insects, wind, and rain, 6) trauma events (rain, hail, or wind) put every orchard at risk, and lastly 7) overwintering cankers are often difficult to find and remove, so they are likely to be present in spring in time for warm wet weather.

With all the negatives listed above, we need to be on the look out for weather conditions that favor fire blight, especially in susceptible varieties (See list of susceptible varieties below). Bacterial populations within the flowers will build when temperatures are between 65-86 F. Infection can occur with a small amount of rain or immediately following a warm period that allows bacterial populations to reach critical levels. The Enviroweather website has a reliable chart growers can use to determine if an antibiotic spray is needed. Click on www.enviroweather.msu.edu, go to the weather station closest to you, then to Fruit, then to 'Fire Blight of Apple Blossoms'. Locate the biofix date (the date bloom first opened **OR** the date a spray was applied to control fire blight) on the top row. Follow that column down to determine Epiphytic Infection Potential (EIP) for that block on each date in the left column. If this number is greater than 100, and the average temperature is greater than or equal to 60 F, this area will be shaded and rain or trauma (high winds or hail) is all that is needed for infection.

This time of year is particularly difficult to gauge fire blight as we often have warm and rainy weather, but we don't want to 'waste' an antibiotic spray if it is not truly necessary. If the fire blight model's EIP is not at 100, but kind of close to call, there are a few rules of thumb to determine if an antibiotic application is warranted: 1) a block with a history of fire blight, 2) susceptible varieties, and/or 3) visible cankers are all pretty good reasons to go into a rainy period with a strep spray.

The rainy weather predicted for the coming days is to be accompanied by cool temperatures. This combination of events does not favor fire blight infection, but to be sure, check the Enviroweather web site.

Susceptible Varieties

Gala, Fugi, Jonathan, Rome, Ida Red, Ginger Gold, Mutsu (Crispin), Rhode Island Greening, Paulared

WEED STEAMER DEMONSTRATION
Nikki Rothwell, District Fruit IPM Educator

A weed steamer from Australia, The Stinger, has made its way to northern Michigan. We are currently conducting experiments for the steamer's efficacy against weed, disease, and insect pests. We will be operating the steamer on our test plots in the vineyard at **Black Star Farms** on **Friday, May 12th at 11:00am**. We invite all growers to come down, have a donut, and check out this new piece of machinery!

If you decide to attend this demonstration, Black Star Farm is located just off M-22, south of Suttons Bay, on Revold Road. Please park at the upper vineyard just inside the gate of the farm.

We will also demonstrate the steamer at the **Antrim County IPM Update** on **June 12th** at **10:30am**. We will be meeting at Jack White's farm, located at 10877 US-31, just south of Elk Rapids.

A HANDY ENVIROWEATHER TIP
Bill Shane, District Horticulturalist and Academic Specialist
Nikki Rothwell, District Fruit IPM Educator

The new Enviroweather web site (www.enviroweather.msu.edu) of Michigan State University is quickly becoming a favorite place to find weather-related information for fruit growers. One of the especially useful features in Enviroweather for this time of year is the Overnight Temperature Report which gives a quick look at the prospect for freeze damage based on the weather stations in a region. The report provides hourly average temperatures from 10 PM of the previous day to 7 AM of the current day.

I am providing here a quick tip for going back in time to previous time periods for this overnight temperature report. The tip requires a very slight introduction to URLs, the "Uniform Resource Locator". This is the address of a site (resource) on the Internet, such as the URL given above for the Enviroweather. The URL is usually in the format such as "http://www..." and so on. By changing the URL slightly, Enviroweather can provide reports for earlier time periods.

If you go on the Enviroweather web site and view an overnight temperature report, such as for the SW Michigan Research and Extension Center, the URL address is given, usually at the top of the screen as:

www.enviroweather.msu.edu/run.asp?stn=swm&mod=w_nt&yr=&mo=&da=

Ignore all the information in the address line except the part at the very end that says "mo=&day=". In this instance, the overnight report is given for the default time period, namely the current day and the night before. To get a report for a desired day, say April 10th, add a 4 after "mo=", and a 10 after "da=", and the new URL should read:

www.enviroweather.msu.edu/run.asp?stn=swm&mod=w_nt&yr=&mo=4&da=10

If you now push the "Enter" button on the keyboard, Enviroweather will give the overnight temperature report for the April 9 and April 10. This feature is also available for the other models on Enviroweather, even if the other models provide the last series of dates for a wetting event for cherry leaf spot (CLS). For example, if you go to the NWMHRS for CLS infection today, the chart would pull up the wetting events that may have potentially triggered an infection period for the following dates: 4/22-4/24, 4/24-4/25, and 5/2-5/3. However, you may be interested in what happened prior to those last wetting events, just simply type in the month's number and the date you need. Piece of cake!

A more elegant method to get retrospective information will likely be added to Enviroweather at some point; however, the tip given here will be useful to many of you.

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May 16, 2006

GROWING DEGREE DAY ACCUMULATIONS as of May 15, 2006 at the NWMHRS							
Year	**2006**	**2005**	**2004**	**2003**	**2002**	**2001**	**16yr. Avg.**
GDD42	518	405	339	356	291	455.0	372.0
GDD50	242	182	145	153	135	236.0	172.9

WEATHER

The past week began fairly warm but quickly changed, with an extended period of cool, wet weather. Rain has been recorded at the NWMHRS for the past seven consecutive days, resulting in some very long wet periods.

GROWTH STAGES at NWMHRS (5/15/06 9:30 am)

Apple: Mac: 50% petal fall, **Red delicious:** early petal fall
Pear: Bartlett: Late petal fall
Sweet Cherry: Hedelfingen: 7mm fruit, **Gold:** Shuck split
Tart Cherry: Montmorency: Late petal fall; **Balaton:** Late petal fall
Apricot: 10 mm fruit
Plum: NY 12: Late petal fall
Grapes: Chardonnay: 1-3" shoots

PEST REPORT

Tree Fruit Report

Apple: We had a close call for fireblight infection on 5/10 and 5/11. Some growers sprayed varieties that are especially susceptible. Temperatures then cooled too much for the rest of the week for fireblight to be of concern. Moisture and temperature conditions have been favorable for apple scab infection. No codling moth have been trapped at the NWMHRS, but two consultants each had a site in the region where codling moth were trapped this week. Sites were in areas of high populations last year or next to stored apple bins. We expect more widespread flight activity when warmer evening temperatures return. The first adult generation of spotted tentiform leaf miner is declining.

Stone fruits: Moisture and temperature conditions have been favorable for cherry leaf spot infection. Due to the rain, growers have had a hard time getting in to put on sprays. The recent extended cool, wet weather will also favor the development of European brown rot where tart cherries are still in bloom. Balaton orchards in the Northport area are of particular concern at this time, but Montmorency can also be attacked by this fungus. One lesser peach tree borer was trapped at the NWMHRS, signaling the beginning of adult flight. American plum borer adults and oriental fruit moth adults are on the rise. Plum curculio has not been active during the recent cold weather. We expect increased activity once warmer evening temperatures return. Black cherry aphid is fairly common this season on sweet cherries.

CHERRY LEAF SPOT AND A LOT OF RAIN
Nikki Rothwell, District Fruit IPM Educator
George Sundin, Plant Pathology

With the continuing onslaught of rain, growers are wondering about the best options for cherry leaf spot control. Because the rain has provided so few windows for fungicide applications, there have been varying amounts of fungicide applied to tart and sweet cherry blocks. As rain is expected to continue for the remainder of the week, growers need to make quick decisions about the chemistry to apply when the rain actually stops for a while and the wind dies down enough to apply a spray. The following scenarios are meant to help growers decide the best product for their orchard:

***Scenario 1*:** Growers that applied a full cover of Bravo on Tuesday or Wednesday last week (May 9th or 10th) and had relatively good coverage can assume they were protected, but they will have to make an educated guess as to 'how protected'. There will be no way to know how long the Bravo lasted or if it is still there, but for the most part, growers with a full rate of Bravo can assume some level of comfort. If this is the case for a particular farm, a grower should go back in with another full rate of Bravo as soon as possible. This scenario assumes a good degree of protection from the cherry leaf spot (CLS) pathogen, and Bravo is the choice for continued protection into the future, up to shuck split. The one thing to keep in mind with this program is that the grower should shorten the interval between sprays if the rain continues as the material will remain on the trees for a shorter amount of time.

***Scenario 2*:** Growers that applied only a half cover of Bravo should assume they were NOT protected and need to go back

into the orchard with something other than Bravo (as Bravo is only a protectant and does not have the ability to eradicate). As we have little knowledge of after-infection activity of some of our options (strobulirins and Pristine), we have to assume that these products will provide some eradication potential. First, there are no fungicides that will eradicate a spore that has germinated 5-7 days ago. Sterol inhibitors (SI's) used to provide some back action; however, those days are gone as CLS has developed resistance to these products throughout Michigan. Syllit (dodine), another product with some back action, can provide back action up to 36 hours; however, we do not know the current extent of dodine resistance in the CLS pathogen. These two products are an option if an orchard does not have SI or dodine resistance, but the likelihood of having an orchard without SI resistance is very low. Using SI's to control CLS is not recommended, and a total control failure is probable with these products. Dodine may be more efficacious against CLS, but we have no recent data to verify this assumption; if dodine is used, the flowable rate is 27 oz/acre.

The remaining products are the strobulurins and the strobulurin/boscalid compound Pristine. One tactic for growers that have applied a half side is to come in with a full rate and both sides of Pristine at 14.5 oz/acre, Flint at 4 oz/acre, or the new product Gem at 6 oz/acre (see new product write-up for more information). The full rate is essential to get the best control now and slow a possible CLS epidemic. If a grower applies one of these chemistries at a higher rate, he or she can follow up that spray with another Bravo spray at shuck split timing, about 7 days from now. This strategy does not recommend tank mixing at this time for best efficacy against CLS as well as costs. Bravo is better used as the next spray at the shuck split timing. We should also not be cutting back on the rates of the strobulurins and Pristine if orchards have gone without protection during this wet weather.

***Scenario 3*:** Growers that have had no coverage at all in the last week should follow the recommendations for scenario 2, but bump up the rate for Gem to 8 oz/acre.

A final reminder for all growers is that we still need to keep resistance management in mind as we move through this super rainy period. Tank mixes are usually the best bet, so we should be trying to keep full rates of fungicides alone at a minimum, although dire circumstances often require dire measures.

MINIMAL SPRAY STRATEGY FOR FROSTED APPLE TREES

Nikki Rothwell, District Fruit IPM Educator
Amy Irish-Brown, District Fruit IPM Educator
Jim Nugent, District Horticulturist

After the early morning frost of Saturday, May 6th, many apples in the northwest region were affected. Based on some preliminary observations, we have found most apples in 'cherry sites' fared pretty well, although some trees in those 'good fruit sites' picked up some damage. After growers determine the damage on their farms, if they find their trees suffered a lot of frost damage, they may want to opt for a minimal management program. This program is designed to keep the trees healthy for next year, but also to reduce input costs on acreage with no expected returns.

For those growers with crop insurance, the guidelines of your policy commonly state that you have to maintain the trees in a normal fashion in order to qualify for claim payments. With reduced or no crop on the tree, several insects and diseases may be ruled out of your spray programs (thankfully!).

Fire Blight - Fire blight is still an issue for a lot of the region, especially with this recent wet weather, and the big question is whether we can still become infected from fire blight with so many dead blossoms. There has been little work done on this topic, but we know that dead pistils on frosted blossoms cannot support a population of *Erwinia amilavora*, the causal agent of fire blight; hence, the more dead blossoms there are in the orchard, the lower the potential of fire blight infection. We are in essence reducing our fire blight inoculum in the orchard by eliminating the number of viable fire blight infection areas (flower pistils). Although most growers fear the worst, ie. 100% destruction, we cannot assume all flowers in the orchard are dead. Therefore, we must continue to monitor and potentially spray for fire blight because we may have some viable flowers still in the block. We especially cannot assume we have a total wipe out in blocks with susceptible varieties. In addition, trauma blight situations still may occur with high winds and hail, and these events can still cause devastation to orchards. Trauma blight situations should still be managed with applications of streptomycin, Mycoshield, Serenade, or copper. Streptomycin is the best material to use and will give the best management of fire blight in a post-trauma blight situation where resistance is not an issue. Mycoshield, Serenade, and copper applications should be made ahead of a trauma blight situation, and this option is not always the most economical choice as growers attempt to stay one step ahead of the weather forecast, which we all know is virtually impossible.

Apple Scab - As for all blocks, those with and without a crop, apple scab is best controlled if growers stayed ahead of primary scab. The best method to control scab blocks with little crop would be to control these initial scab lesions before growers reduce or eliminate fungicide applications from the block. If blocks have scab in them now, these blocks could defoliate early and have reduced winter hardiness and a high potential inoculum level for 2007. As we are still in primary scab, growers should not cut back on fungicides at this time. If an orchard makes it through primary scab this season **without infection**, we could reduce and potentially eliminate all other fungicide applications for the season.

Powdery Mildew (PM) - Just as with apple scab, powdery mildew left uncontrolled can lead to reduced vigor and winter hardiness. Again, as with apple scab, most commercial blocks have had some mildewcides in their programs already this year, so mildew will not probably be a concern in most blocks with no crop. If you have a mildew problem now, treat it soon in order to reduce the inoculum potential for the 2007 season.

Plum Curculio (PC) - If there is no crop, there is no reason to spray for PC (or for other fruit feeders like apple maggot). However, growers should keep in mind that PC are good fliers, and if one block has no apples, those buggers can move from the no-apple block to an orchard with fruit in a short amount of time. Growers should be keeping an eye for PC in the orchard as well as on their neighbors' crops to determine if PC may be migrating from one orchard to another. Under light fruit load conditions, plum curculio will compete heavily for the fruit that is present. If the remaining fruit are left unprotected, these weevils can oviposit many times in one fruit, and ultimately may result in a much higher percent damage level per fruit than normal. The good news is that most of this fruit will drop, but the larvae that emerge could be the source of next year's "resident" population. Next season, growers will need to account for the difference in managing a resident population versus the predominant situation of controlling immigrants moving in from outside wild hosts. The other factor to consider is the amount of frost damage you have, and this issue remains true for other fruit insect pests: the fewer fruits per block, the less food insects will have to consume. Growers should know in the next few weeks how many fruits are left in their blocks, and this information can be considered for fruit insect pest control strategy.

Potato leafhopper (PLH) - PLH is normally controlled when broad-spectrum insecticide programs are used to control

primary pests like plum curculio, codling moth, and oriental fruit moth. If growers reduce or eliminate insecticides for these key pests because of little or no crop, PLH should not be ignored. The PLH first arrives in late May with southerly-based weather fronts. Those adults lay eggs, which hatch and begin feeding on the phloem of foliage and shoot tips of actively growing terminals in mid-June. Populations vary greatly year to year. PLH often reach high populations by early July. The resulting damage appears as necrotic cupped-leaf margins and can stunt growth significantly. Apple growers should check for potato leafhopper during weekly orchard monitoring beginning in early June. Look for curled leaves and shoots that are not growing as vigorously as they should. Check the undersides of leaves for nymphs and adults. As leafhoppers are easily disturbed, and move off the leaf, it is important to do assessments in the field. Turn the leaf over slowly when monitoring to assess how many leafhoppers are on the lower leaf surface. In apples, one or two nymphs per leaf can cause leaf curling if they are allowed to feed for a prolonged period of time (four to seven days). Control will be particularly important in young blocks that still have space to fill.

Obliquebanded leafroller (OBLR) - The OBLR is largely a foliage feeder, but can do significant damage to fruit. Fruit damage from the summer generation of OBLR is often related to when terminal growth slows or buds set, forcing larvae from the preferable young foliage to fruit. Fruit damage is also common under conditions of heavy fruit set where full clusters and adjacent foliage prevent adequate penetration of targeted insecticides. Light fruit-load conditions like this year should reduce the risk of OBLR damage compared to normal years.

Codling Moth (CM) - No control is required in blocks with no fruit. If growers have a few fruits on the trees - perhaps as few as 10 or 20 fruits on a dwarf tree - codling moth will easily infest these fruits in their first generation if you eliminate cover sprays for CM. Eliminating early sprays can lead to very high CM numbers and increases the potential damage for the 2007 season. Growers should also be aware of CM moving in from an orchard with little fruit to a neighboring orchard with fruit. This movement can happen with the first generation but will be more of a concern for second generation CM. If growers have orchards **with** a crop, they should be conscious of any nearby orchards that may be on a reduced insecticide program because of no crop. If a neighboring block has no crop, the CM that are residents in those apple trees will most likely move to nearby blocks with fruit to lay their eggs. If a neighboring block has a few fruits and the first generation CM is not controlled, then the second generation CM will most likely move to neighboring blocks to look for more favorable egg-laying sites. Older orchards generally have higher resident populations than younger blocks.

Oriental Fruit Moth (OFM) - OFM larvae bore into new growing terminals and cause the terminals to look ragged and flagged over. This injury is most apparent in first generation OFM, but second generation will appear as the fruit sizes and become more desirable to OFM. Populations of OFM are generally very low in NW Michigan, so reducing or eliminating spray for other pests will not likely lead to an OFM problem. However, if OFM is present, then a light fruit set will likely increase the incidence of terminal flagging during the second-generation OFM egg hatch period (July). Also, if insecticide cover sprays are eliminated from apple blocks, OFM and some other insects may build in number, likely increasing pest pressure the following year.

Apple Maggot (AM) -- As this insect pest can be found on other trees outside of commercial apple blocks, ie. hawthorns, crabapples, and abandoned blocks, they move into a block to infest fruit. If no fruit is present then thre is no need for an insecticide, in which case the adult will seek egg laying sites elsewhere. There is evidence of AM building up in orchards that remain unsprayed, so we may potentially increase AM in blocks that have some fruit but do not have insecticides. However, in a year with little fruit, there will be few oviposition sites (apples) in which AM will lay their eggs. So, if a grower plans to harvest a block with a light crop, keep in mind that the apples that do remain will be a haven for many AM larvae. Again, growers should monitor their apple crop in order to make the decision to spray for AM.

European Red Mites (ERM) and **Two-spotted Spider Mites** (TSSM) - Left uncontrolled, ERM's and TSSM's can reduce photosynthesis and overwintering carbohydrate reserves. These reserves provide the tree with its winter hardiness, as well as help set the next year's crop. They can cause severe bronzing, but if this occurs in a year without a crop, the damage will not be as severe, due to the lack of competition for the carbohydrates from fruits. In other words, the tree can tolerate more mites. Plus, if certain broad-spectrum insecticides are left out of an orchard system (for codling moth, for example), then mite predators will have a chance to build their populations to help curb the ERM. This season may be one to save some money by eliminating a miticide spray!

****Some growers may find they have to spray more than these general rules of thumb while other growers may not need as many applications. One important thing growers can do to reduce the number of chemical applications is to diligently monitor for insects and diseases throughout the season. This scouting could be the difference between spraying and not spraying based on the pests in the field.**

Other concerns:

Benefits of Beneficials
One possible benefit of reducing broad-spectrum insecticide sprays would be a potential increase in biological control organisms such as beneficial insects. By eliminating the number of insecticide applications could be helpful for the future of an orchard system.

Return Bloom for 2007
Next year will most likely have a tremendous return bloom. With little crop, the vegetative growth should be at a maximum for 2006, which will lead to extra pruning for the dormant season. A strong dormant pruning program will help regulate the 2007 crop. Apogee applications will help reduce terminal growth and could reduce pruning costs by as much as 30%. Apogee applications are not inexpensive, and a grower should weigh the costs of the applications against the costs of dormant pruning. Also, Apogee is best timed when the king bloom is starting to drop petals, so you may be out of the window for good growth control with Apogee for this current season.

Eliminating fruit
If you have a small crop, you might want to consider eliminating fruit completely from the trees. You can limit the infestation from the apple insects like codling moth and apple maggot, by eliminating the fruits on the trees. Chemical fruit removal may be done with high labeled rates of spray thinners, such as NAA and Sevin XLR plus a spray oil. The best program would be to make two applications. If weather is warm (favorable for thinning), the first chemical thinners should be applied as soon as the flower petals are 80% fallen (not too soon in bloom or you can harm pollinators). A second application, 10 to 14 days later, may be needed to remove more fruit. Even with two applications of chemical thinners, there may be some fruit remaining that may need to be removed by hand. If only one application is planned, then suggest applying when the first period of warm weather occurs after petal fall. Suggested fruit removal program:

15-20 PPM NAA (6-8 oz. NAA in 100 gallons of water) PLUS 1 quart Sevin XLR plus 1 quart spray oil/100 gal..

Large Fruits
Fruit size will most likely be large on trees with a light to moderate crop set. Large fruits have some potential inherent problems such as bitter pit, water core, and cracking, which can cause storage and marketing problems. Calcium sprays can help and might be justified in certain higher value varieties that commonly have problems such as bitter pit.

Scarred Fruits
There may be a lot of surface damage on apples this year due to the cold weather during bloom. Growers should evaluate crop quality - if it is poor, eliminating the fruit and using a reduced spray schedule should be considered.

Nutrition
Trees with little to no crop do not need as much nitrogen. If a split application was planned, the second application should be reduced or eliminated. If no apples will be harvested, apply only foliar nutrients where a known deficiency exists. For example, if N was applied to the soil prior to the freeze, then there should be no need for foliar N this season. As noted above, if a light crop will be harvested, then foliar calcium will be especially important on bitter pit susceptible varieties.

In Conclusion
Be sure of your crop situation before you decide to eliminate cover sprays entirely from an apple block. Apple fruit set can fool the eye sometimes, especially now that the foliage if growing so rapidly. One week may look like a total loss and the next week, the fruit will start to show up more readily. Also, if you have crop insurance, be sure to check with your insurance representative of the details that they may require of your pest management program so that you are not disqualified in any way.

A LONG LOOK AT FIRE BLIGHT
Dr. Nikki Rothwell, District Fruit IPM Educator

As we are entering bloom in apples, growers need to be concerned about fire blight. This disease is particularly hard to control because of a variety of reasons: 1) unlike apple scab, the fire blight bacteria are dispersed several weeks prior to 1st infection, 2) *Erwinia amylovora* (the FB bacterium) is a complete epiphyte, which means it grows and relies on the apple blossom for support only, 3) the doubling time of the pathogen is about 20-30 minutes when temperatures are between 65-75 F, 4) infection can occur in minutes, so almost any wetting event is a potential infection period, 5) new infections produce many new bacteria which are efficiently transmitted by insects, wind, and rain, 6) trauma events (rain, hail, or wind) put every orchard at risk, and lastly 7) overwintering cankers are often difficult to find and remove, so they are likely to be present in spring in time for warm wet weather.

Fire blight bacteria growth is favored with temperatures over 65 F. Degree hours using a base of 65 F (DH65) is used to estimate bacterial population growth, with 198 degree hours (base 65 F) from first bloom needed to build the population to a potentially dangerous level. According to current research, fire blight bacteria build up on the tip of the flower pistil (the stigmata, which receives pollen grains). Once the population has built up on the stigmata, a rain or heavy dew can wash the bacteria deep inside the flower where infection can take place.

The fire blight model is based on the EIP value (Epiphytic Infection Potential), which is a way to express this heat unit accumulation on a 0 to 100 scale. ("Epiphytic" = plant surface). The EIP is calculated by dividing the current DH65 accumulation by 195 and then multiplying this by 100. If the DH65 reaches 195 (which also means that the EIP is 100), then a rain or heavy dew at this time will wash the bacterial down into the infection site at the base of the pistil.

The blossom blight model reduces the EIP value under cooler weather conditions by figuring in blossom life. In addition, the model reduces the EIP if the maximum temperature for a day is not above 64 F, because the fire blight bacteria require warm temperatures to grow. The EIP value is reduced by 1/3 by one "cool" day, another third by a second consecutive cool day, and to zero with a third. A day with freezing temperatures reduces the EIP to zero. However, once the EIP reaches 200, cool weather no longer reduces the accumulation.

The fire blight model is very different from our other pest models in that it is based on degree 'hours' rather than degree 'days'. Since the threshold temperature for fire blight is 65 F, we often go above that temperature for many hours in one day, so it takes a lot less time to collect degree hours above the threshold compared to collecting 'daily' temperatures that average above 65 F. Growers must be particularly diligent about checking for fire blight infection because the temperatures can change drastically in one day, and slight changes can cause the EIP to raise quickly and warrant a fire flight spray.

Therefore, at this time of the year, we need to be on the look out for weather conditions that favor fire blight, especially in susceptible varieties (See list of susceptible varieties below). Infection can occur with a small amount of rain or immediately following a warm period that allows bacterial populations to reach critical levels. The Enviroweather website has a reliable chart growers can use to determine if an antibiotic spray is needed. Click on www.enviroweather.msu.edu, go to the weather station closest to you, then to Fruit, then to 'Fire Blight of Apple Blossoms'. Locate the biofix date (the date bloom first opened **OR** the date a spray was applied to control fire blight) on the top row. Follow that column down to determine Epiphytic Infection Potential (EIP) for that block on each date in the left column. If this number is greater than 100, and the average temperature is greater than or equal to 60 F, this area will be shaded and rain or trauma (high winds or hail) is all that is needed for infection.

This time of year is particularly difficult to gauge fire blight as we often have warm and rainy weather, but we don't want to 'waste' an antibiotic spray if it is not truly necessary. If the fire blight model's EIP is not at 100, but kind of close to call, there are a few rules of thumb to determine if an antibiotic application is warranted: 1) a block with a history of fire blight, 2) susceptible varieties, and/or 3) visible cankers are all pretty good reasons to go into a rainy period with a strep spray.

Susceptible Varieties

Gala, Fuji, Jonathan, Rome, Ida Red, Ginger Gold, Mutsu (Crispin), Rhode Island Greening, Paulared

EXAMPLE: Interpreting the Enviroweather Chart

First pick the column that best corresponds to the first day blossoms opened in your orchard (see figure). The numbers in the squares gives the EIP (Epiphytic Infection Potential) for these blossoms. Bacterial populations (larger EIP) build on days with temperatures over 65 F. When the EIP reaches 100, a rain or trauma event (strong wind or hail) will initiate a blossom infection. The higher the EIP, the greater is the risk of infection with rain or trauma.

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

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

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

QUICK LOOK AT EUROPEAN BROWN ROT FOR THE NORTHPORT AREA
Nikki Rothwell, District Fruit IPM Educator, MSU Extension

This cool, wet weather and open bloom is the combination for European brown rot to invade tart cherries. Although this pathogen *(Monilinia laxa)* rarely infects Montmorency, it can be a problem in years under the right conditions. Montmorency trees infected with European brown rot are found in low areas of the orchard or along hedgerows, locations that do not dry off quickly. This pathogen is a major disease in other cultivars like Meteor, English Morello, and Balaton.

European brown rot infects and kills blossoms and spurs when wetting events last for a day or more (we have had plenty of those days lately!). The infected blossoms turn brown, and the leaves are also killed by the pathogen. Eventually, the pathogen moves into the spur and causes a systemic infection. Cankers form at the end of the infected spurs, which can infect the tree again in the following season.

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. Indar at the 2 oz rate is the most efficacious fungicide for controlling European brown rot. Pruning the infected spurs during dormant months will reduce inoculum for the following season.

NEW PRODUCTS
Nikki Rothwell, District Fruit IPM Educator

Gem
A new strobulirin fungicide labeled for stone fruit. The active ingredient is trifloxystrobin, the same ingredient as in the product Flint. This product provides control of cherry leaf spot (*Blumeriella jaapii*), powdery mildew (*Podosphaera* spp. and *Sphaerotheca pannosa*), and scab (*Cladosporium carpophilum*) at 4-8 oz/acre. Gem also controls shot hole (*Wilsonomyces carpophilus*) at 6-8oz/acre and shows some disease suppression of blossom blight (*Monilinia* spp.) at 4-6 oz/acre. Growers cannot apply more than 32 oz of Gem per acre per season, and this product cannot be applied within one day of harvest. For resistance management, growers should not make more than two sequential application of Gem or apply more than four applications per season.

Proclaim
A new insecticide is now become available for pome fruit: Proclaim. The active ingredient in this product is emamectin benzoate. Proclaim is labeled for Lepidopteran pests, such as OBLR, RBLR, codling moth, lesser apple worm, and OFM, and it is also effective on pear psylla, leafminers, and two-spotted spider mites. The product works best if it is applied to small larvae, just after hatch. The product needs good coverage with sufficient water when applying. The recommended rates are 3.2 oz/acre for low to moderate infestations and 4.8 oz/acre for high infestations. The PHI on Proclaim is 14 days, and the maximum amount is 14.4 oz/acre for the season. Proper resistance management strategies are recommended for this product.

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, 2006

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

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NW Michigan Horticultural Research Station

Jim Nugent, District Horticulturist
Nikki Rothwell, District Fruit IPM Agent
Bill Klein, Farm Mgr, NWMHRS
Duke Elsner, Agricultural & Regional Viticulture Agent
Jim Bardenhagen, Leelanau Extension Director

May 23, 2006

Year	2006	2005	2004	2003	2002	16yr. Avg.
GDD42	574	495	438	456	313	468.6
GDD50	265	228	198	204	143	225.9

WEATHER

During the past week weather remained very cool with some continued moisture. Scattered frost occurred on 5/21, 5/22 and 5/23.

GROWTH STAGES at NWMHRS (5/22/06 10:00 am)

Apple: Mac: Late petal fall, Red delicious: Late petal fall

Pear: Bartlett: 6mm fruit

Sweet Cherry: Hedelfingen: 9mm fruit, Gold: 10mm fruit

Tart Cherry: Montmorency: Shuck split; Balaton: Shuck split

Apricot: 15 mm fruit

Plum: NY 12: Early shuck split

Grapes: Chardonnay: 1-3" shoots

TREE FRUIT REPORT

Apple: Over the past two weeks conditions for **apple pollination** have been very poor. It will be particularly important this year to assess crop potential prior to application of thinners. Even with all the rain, we have seen very little **scab** in managed orchards. **Fireblight** has not been an issue in most blocks so far this year, but as temperatures warm and secondary bloom opens, we need to be aware of fireblight infection for the coming days. Growers should check blocks for late bloom and use the fireblight model on Enviroweather to determine infection potential. **Oriental fruit moth** numbers are down to zero for the week, probably due to cold temperatures. We have been catching **codling moth** (CM) but only an average of one per trap here at the NWMHRS and five per trap in an unmanaged block. Blocks that do not have exceptionally high overwintering CM populations have not yet had enough flight to establish a biofix. Our adult **spotted tentiform leaf miners** (STLM) counts are down to an average of 30 per trap.

Cherry: Sweet cherry fruit are exhibiting a lot of **frost scars**. The major problem with frost scars is that they lead to cracks during the preharvest fruit swell. This in turn increases the potential for brown rot and Alternaria fruit rot. We have not observed **cherry leaf spot** so far this season, but **European brown rot** has shown up in most **Balaton** blocks and a few Montmorency orchards. No **plum curculio** have been evident in cherry, but with warming temperatures, we expect them to be in sweet and tart cherries in the next few days. **Green fruitworm** is present in **tart** blocks, and we have seen **black cherry aphids** in higher numbers than is typical.

Small Fruit:

Grapes: Cold temperatures resulted in very slow **shoot growth** during the last week. Chardonnay shoots are still only at 2-4 inches in length, with clusters now showing. There has been no sign of significant **cold injury** at the NWMHRS and, so far, only limited reports of injury from growers. The predicted warm temperatures should result in rapid shoot growth over the next week, so growers need to get ready for early **powdery mildew** sprays. Insect activity has been minimal over the last week.

Miscellaneous:

Deer have already begun feeding on young fruit trees. Growers in Benzie County are reporting the highest deer population in years. Repellents are generally most effective if

applied prior to first damage, or at least as soon as possible after first damage, to try to alter behavior before they think you are providing a banquet!

IPM REPORT
By Dr. Nikki Rothwell, District IPM Educator

European Brown Rot

This past week was cool and wet, and with open bloom this combination is perfect for European brown rot (EBR) invasion. So far this season, we have seen many EBR infections in Balaton blocks, and we have observed infection in Montmorency. The timing for EBR chemical control is popcorn through bloom, and the chemistry of choice is Indar. If a block is past bloom, there are no chemical control options. However, growers should plan to prune out the infected areas this winter to reduce inoculum in the orchard for next season.

Fireblight Reminder

Temperatures are predicted to warm through this week and into the weekend, and many orchards have secondary bloom opening; this situation is ideal for fireblight infection. Growers need to be aware of fireblight infection potential for the coming days; they should check blocks for late bloom and use the fireblight model on Enviroweather to determine infection potential (www.enviroweather.msu.edu). Remember that because this disease is based on degree HOURS, not degree DAYS, the infection potential can change very quickly, so growers will need to be check the fireblight model on a routine basis until apples have finished blooming.

PRELIMINARY, BUT NOTEWORTHY FIND: EFFICACY OF INSECTICIDES WITH COPPER AND LIME
Nikki Rothwell, District Fruit IPM Educator
Johanna Nugent, Research Technician
Lisa Talbot, Research Technician
Renae Tuller, Research Technician

In recent years, we have documented cherry leaf spot (CLS) resistance to sterol inhibitors (SI's). We are currently investigating the potential of using copper to control this disease. Based on data from 2004, we have shown copper at a rate of 1.2 lb actual Cu/acre to be highly efficacious against CLS. However, we have also documented copper's ability to cause phytotoxicity in hot, dry weather. To minimize copper's phytotoxic effects, we recommend mixing the copper with lime at a rate of 6 lb/acre. In research plots at the NWMHRS, we have shown this combination of copper and lime to control CLS and reduce phytotoxicity.

Although these results are positive, concerns remain about tank-mixing copper and lime with insecticides. Some insecticides are pH-sensitive, and when lime is added to the tank mix, the water's pH could be altered enough to change the efficacy of the insecticide. Last week, we conducted a study at the NWMHRS to determine if copper plus lime would reduce the effectiveness of four standard cherry insecticides against field-caught plum curculio (PC). Five PC were placed into petri dishes containing each of the following insecticides: Guthion, Imidan, Actara, and Avaunt. We also compared these insecticides with 'low' copper and lime (3.75 lb Cu and 3 lb lime) and a 'high' copper and lime (7.5 lb Cu and 6 lb lime). All mixtures were allowed to sit in solution for an hour to simulate actual spray time in the orchard. For control purposes, we placed PC into petri dishses with water, lime alone and copper alone. Because Imidan and Guthion are contact poisons, we placed the chemical mixtures on filter paper. Avaunt must be ingested to cause mortality, so we dipped cherries in the chemical blend before placing them into the petri dishes. Actara, a newer insecticide in the class of neonicotinoids, is a contact material when it is first sprayed. After 3-4 days, the compound is absorbed into the plant and there is a reduction in lethal activity, but insects' ability to oviposit (lay eggs) dramatically declines. Therefore, we used dipped cherries for Actara. The graphs only reflect PC mortality; oviposition measurements will be documented in the next trial.

The following results are preliminary, but there is an important discovery for growers that intend to use a copper/lime and insecticide tank mix for one of their cover sprays. When Imidan is mixed with high and low levels of copper/lime, the insecticide becomes completely ineffective (Figure 2). In other words, lime changes the pH of the water in the 'spray tank' so drastically that Imidan loses all of its insecticidal properties. Another word of caution is in the Avaunt trials where the data suggest this material does not cause PC mortality (Figures 1 and 5). Although these weevils were not dead, their functioning was severely reduced, enough to consider them non-threatening as a pest. Although Avaunt is not killing the weevils outright, it does render them incapacitated. We intend to repeat this experiment multiple times throughout the season to verify the results.

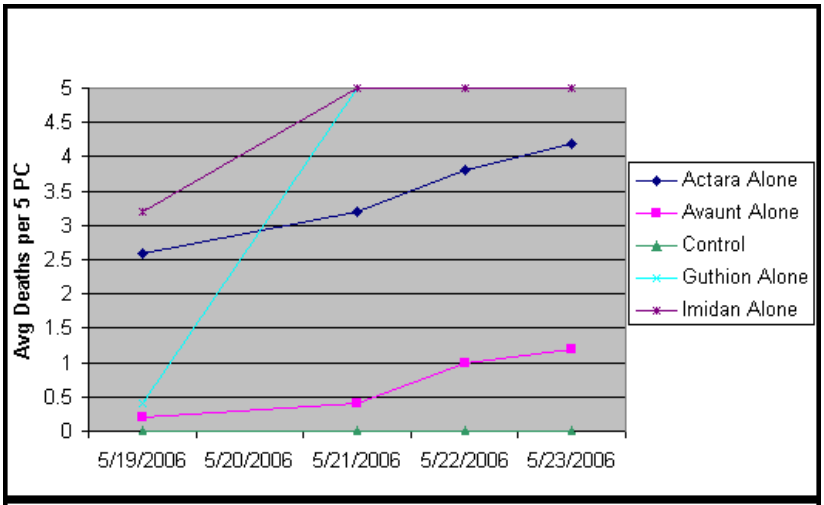
Figure 1: Efficacy of insecticides alone against plum curculio

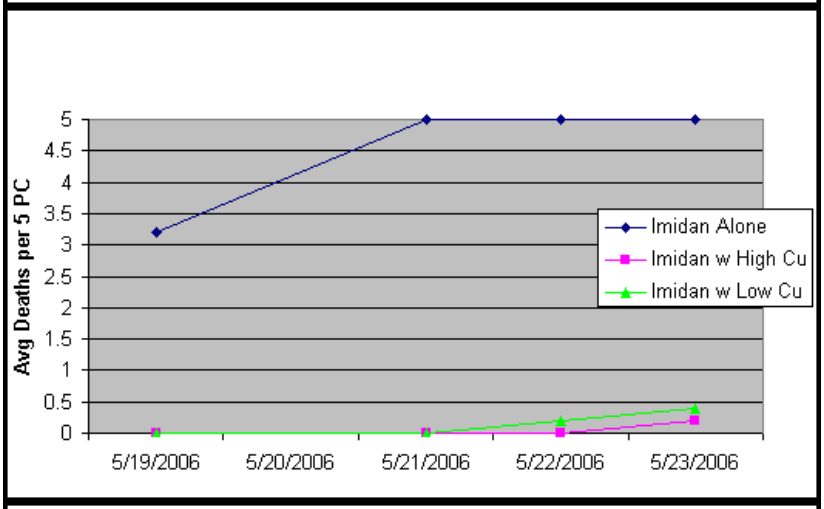
Figure 2: Efficacy of Imidan with high and low copper against plum curculio

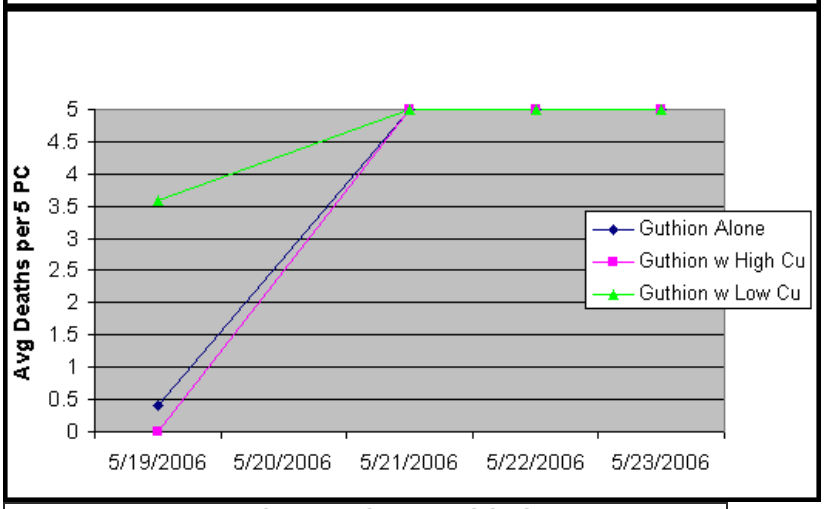
Figure 3: Efficacy of Guthion with high and low copper against plum curculio

Figure 4: Efficacy of Actara with high and low copper against plum curculio

Figure 5: Efficacy of Avaunt with high and low copper against plum curculio







Seasonal Evaporation & Precipitation
Beginning May 1, 2006, at NWMHRS

Date	Rainfall/wk at NWMHRS (in.)	Rainfall minus 75% of Evaporation	Evap/week (in.)	75% of Evap/week
5/2	0.00	-1.05	1.40	1.05
5/9	0.03	-1.12	1.53	1.15
5/16	2.02	1.51	0.68	0.51
5/23	0.61	-0.21	1.09	0.82
Totals	**2.66**	**-0.87**	**4.70**	**3.53**

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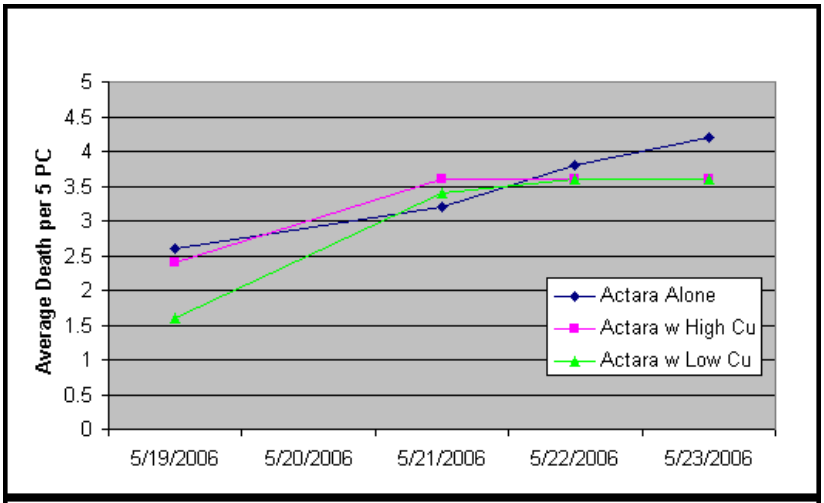
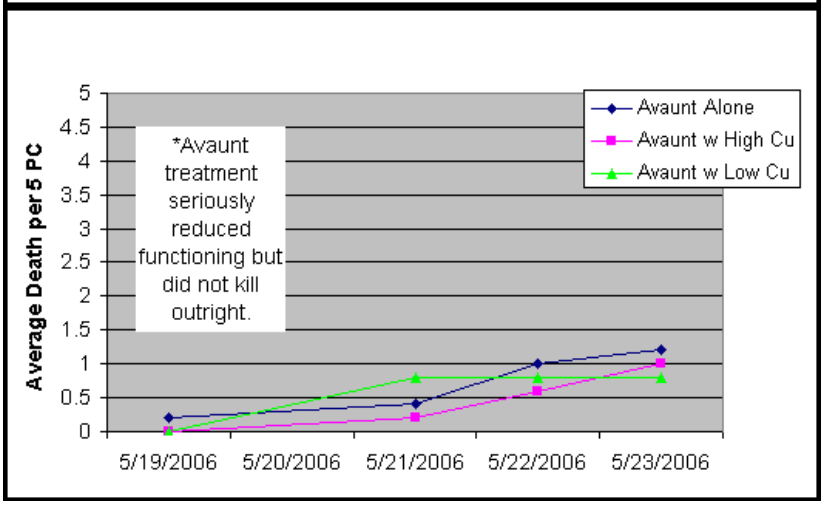
http://www.maes.msu.edu/nwmihort/faxnet.htm





ACTUAL AND PREDICTED DEGREE-DAY ACCUMULATIONS SINCE MARCH 1, 2006

Please send any comments or suggestions regarding this site to:
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Northern Michigan FruitNet 2006
Weekly Update
NW Michigan Horticultural Research Station

Jim Nugent, District Horticulturist
Nikki Rothwell, District Fruit IPM Agent
Bill Klein, Farm Mgr, NWMHRS
Duke Elsner, Agricultural & Regional Viticulture Agent
Jim Bardenhagen, Leelanau Extension Director

May 30, 2006

Growing Degree Day Accumulations as of May 29, 2006 at the NWMHRS.

Year	2006	2005	2004	2003	2002	16yr. Avg.
GDD42	738	604	509	560	401	575.1
GDD50	378	283	259	204	193	284.1

WEATHER

Temperatures this past week were well above normal. Rain occurred on 5/25 and 5/28, giving us over a quarter inch of precipitation.

GROWTH STAGES at NWMHRS (5/30/06 8:00 am)

Apple: Mac: 9mm fruit, Red delicious: 8mm fruit

Pear: Bartlett: 10mm fruit

Sweet Cherry: Hedelfingen: 13mm fruit, Gold: 12mm fruit
Tart Cherry: Montmorency: 10mm fruit; Balaton: 11mm fruit

Apricot: 25mm fruit

Plum: NY 12: 8mm fruit

Grapes: Chardonnay: 10-16" shoots

TREE FRUIT REPORT

Apple: Fruit on most varieties is currently 7-9 mm at the NWMHRS, so we are entering an ideal time for **thinning**. Growers should assess crops carefully to determine if thinning is needed. Be sure to check the tops of the trees as well as the bottoms when making a decision on thinning. Also check crops on both hills and valleys. If the crop has been wiped out by frost in a block, the trees should come back next year with a good bloom without the aid of any chemical thinners. Thunderstorms and high humidity in the area resulted in an **apple scab** infection varying from high to low levels, depending on the region. **Codling moth** are flying in the area, but the numbers are all over the board. Growers should consider monitoring for codling moth, as the populations seem to vary considerably, even in adjacent blocks.

Stone Fruit: The warm weather and rain on 5/28 have again resulted in low **cherry leaf spot** (CLS) infection in most areas, while East Leland and Northport stations reported high infection for CLS. CLS symptoms from an earlier infection are just beginning to become visible. Check for symptoms on older leaves and on the small bract leaves. The extended cold, wet weather earlier this month has resulted in both **bacterial canker** symptoms in **sweets** and **European brown rot** in **Montmorency** and **Balaton**. We are still seeing **black cherry aphid** in both **tarts** and **sweets**. **American plum borer** and **lesser** and **greater peach tree borer** are flying. **Plum curculio** stings are now being found in stone fruits.

SMALL FRUIT REPORT

Strawberry: A case of **cyclamen mite** has been reported in NW Michigan. **Strawberry** growers should be on the lookout for this unusual pest. Also check fields for **tarnished plant bug** nymphs.

Grapes: Ample moisture and hot weather produced rapid growth on all varieties. Some shoots are nearing a foot in length. No insect problems have been seen recently, but growers need to be scouting for the arrival of **potato leafhopper adults**. These have been seen in southern Michigan. **Powdery mildew** control is very important as bloom approaches.

There will be a grape grower meeting at the NWMHRS vineyard on ***Thursday, June 8***, starting at ***6:00 p.m***. Dr. Tom Zabadal will be present to discuss various **vineyard management** practices and progress in a project to study **mechanical dormant pruning** of wine grapes.

MOVEMENT AND STORAGE OF HORN-FACE BEES
Erin Taylor, Horticulture Technician
Nikki Rothwell, District IPM Educator

Nesting containers should be removed from orchards before spraying insecticides. If insecticides are not a factor, nesting containers may be left in place until a significant, visible decline in activity is observed. Once the containers are removed from the orchard, they

should be placed in a storage area where they will remain for the duration of the season. DO NOT place them in a cooler as larvae need to complete their development at seasonal temperatures throughout the summer and fall months. Take caution when moving the containers because the larvae are attached to their provisions at this time and if they become disconnected they usually die. We recommend that you store the container with the nest-entrances facing up to increase the chance of a detached larvae reattaching to its provisions.

Relocating containers and nesting shelters results in all or most of the females interrupting their nesting activity and leaving the new site. Relocating the nest before egg-laying is completed is not recommended, but if moving the nest is necessary, the following steps will reduce bee losses: 1) 85% re-establishment can be obtained by marking shelters with large visual landmarks (e.g. plywood sheets), 2) containers and shelters should be moved at night when temperatures are cool and females are inside their nesting cavities, and 3) cavity entrances should be covered with a non-adhesive material to prevent females from leaving during transport. Be sure to use the same nesting shelter at the new site and place the containers within the shelter in the same position as before or females become disoriented and leave. Take care when moving the containers even early in the season (now) as eggs and young larvae are already present.

PLUM CURCULIO MANAGEMENT AND SPRAY TIMING

Mark Whalon, John Wise, Larry Gut, Dave Epstein and Andrea Coombs
Dept of Entomology, MSU

Plum curculio (PC) overwinter as adults in the soil, litter and ground cover trash in orchards and in surrounding areas. As soon as daytime and evening temperatures exceed 60°F, PC will begin to move, especially when a light, misty rain and/or humid nights occur simultaneously with early spring warming trends. The weevils move into orchards and begin to feed as leaves begin to emerge. Their feeding activity expands to blossoms, stems and fruit as they become available.

Monitoring

Pyramid traps are the most efficient means of monitoring PC activity early in the season. These traps out catch in-tree screen traps about 1.8:1 in many seasons. Baiting traps with lures (plum essence and/or benzaldehyde) significantly increases trap catch but pheromone baits only slightly increase (1.2:1) PC captures in either trap.

Traps are a good indicator of likely PC pressure in the area and should be placed on the borders of orchards where producers or scouts have observed damage in past years. Often these locations have woods, unsprayed orchards, feral trees or other sources of overwintering PC populations.

Population pressure rating: General trap catch/week bloom to 370 GDD50 PC

	Apple		**Cherry**		**Peach**	
Rating	**Pyramid**	**Screen**	**Pyramid**	**Screen**	**Pyramid**	**Screen**
V. Low	1	0	0	0	1	0
Low	2-3	1	1	0	2-3	1
Mod.	4-7	2-3	2	1	4-7	2-3
High	8-11	>4	3-4	2	8-11	3-4
Extreme	>12	>4	>5	>3	>12	>4

Management

In low pressure situations in apples and peaches, growers may want to consider only one insecticide between 200 and 250 GDD50. In cherries, it is advisable to cover spray trees from shuck split to 400 GDD50, if PC are still being trapped, include a third cover beyond 400 DD.

Four key factors should be considered when deciding when, how often and with what to manage PC populations in the spring. Note that some growers may want to consider summer generation control of PC in moderate, high or extreme pressured cherry orchards. In these situations, Guthion and Esteem work well. Normally, mid-season controls suppress PC populations in apple and peach orchards and no summer generation controls are warranted for PC. An exception occurs when pome and stone fruit management targeting codling moth and leafrollers in mid-season is primarily pheromone disruption and/or virus (from 1250 GDD50 to harvest).

First, historical damage in previous years should be considered. The greater the PC pressure in the previous 1 or 2 seasons; the greater the care and focus on PC in the current season. Second, the best timing (see the accompanying chart) depends to a great extent on the accumulated degree days and the insecticide(s) chosen. Third, understanding and identifying the chosen insecticide's characteristics. For instance, whether or not the insecticide selected has "curative activity" (kills larvae in fruit) and the length of its residual action window. It is also important to consider the modes of insecticidal activity that each compound has, some relying solely on lethal activity versus those that have repellent, antifeedant and oviposition deterrent effects. Lastly, a number of weather related factors can dictate re-treatment to control PC; especially in processed cherries. Therefore, degree day accumulation (for timing sprays), rain events (residue wash off), and other seasonal characteristics (like cool and cloudy versus warm and sunny) can affect breakdown of sprays and the need for additional coverage. Obviously, other pest control needs also factor into PC control timing, insecticide selection and re-treatment.

Compounds 2	**Crop**	**Rate**	**Crop stage and initial control timing (GDD50)**
Guthion 50W	Pome fruit	2 lb	Petal fall (approx. 250 DD)
	Cherries	2 lb	Petal fall (approx. 175 DD)
Imidan 70W	Pome fruit	3 lb	Petal fall (approx. 250 DD)
	T. Cherry	2½ lb	Petal fall (approx. 175 DD)
Actara 25WG	Pome fruit	4½ oz	Petal fall + 3-5 days (approx. 300 DD)
	Stone	4½ oz	Shuck-off (approx. 250 DD)

Calypso 480SC	Pome fruit	4 oz	Petal fall + 3-5 days (approx. 300 DD)
Assail 70W	Pome fruit	3.4 oz	Petal fall + 3-5 days (approx. 300 DD)
Clutch 50WDG	Pome fruit	3 oz	Petal fall + 3-5 days (approx. 300 DD)
Avaunt 30WG	Pome fruit 1	5 oz	Petal fall (approx. 250 DD)
Surround WP (Not recommended for cherries)	Pome & Stone Fruits	Usually 16 lb by First Cover	Start a base before bloom and make sure coverage is very good.

1 Avaunt should be used first when in a program combination with a neonicotinoid (Actara, Provado, Assail, Clutch or Calypso). Avaunt lethal activity on PC is enhanced with adult ingestion. Neonicotinoids are antifeedants, which may prevent Avaunt's major mechanism of exposure = ingestion.

2 For a complete list of insecticides registered and/or recommended for PC control, see the 2006 *MSU Fruit Management Guide* (MSU bulletin E-154).

USING GA TO ADJUST CROPPING IN CHERRIES
By Jim Nugent, District Horticulturist, MSU Extension

Gibberellic acid (GA) may be used on tart and sweet cherries to reduce flowering during the early years of an orchard's life. The reduced flowering and subsequent reduced fruiting allows the young trees to increase vegetative growth. Also, minimizing flowering in early years helps slow the transmission of pollen-borne viruses to the young trees. GA is also used in mature tart cherries to increase fruiting capacity by stimulating the formation of lateral shoots and spurs.

The application of GA causes a portion of the flower buds forming for next year to instead be vegetative buds. Therefore, GA application this year influences flowering next year. The effectiveness of GA is dependent on rate, timing and temperature, plus it can be influenced by the use of surfactants. High 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.

Apply when daily high temperatures are expected to be above 70° F for 2 to 3 days, if possible. Applications made when high temperatures are expected to be below 60° F have given poor results.

Non bearing
GA is typically applied to non-bearing cherries with a hand gun, so rates are based 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. Do not apply GA to trees the year of planting, due to possible phytotoxicity. Vigorously growing trees in their second leaf don't 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 get off to a poor start. Treat at high rates until the year prior to desired fruiting.

Early bearing

To bring young tart cherries into bearing following treatment with high rates during non-bearing years, it is very important to phase down GA rates, rather than discontinue all at once. A sudden drop of GA from high rates to none will result in oversetting of fruit and stunting of trees. Trees that have been kept vegetative have tremendous capacity to set fruit. The year prior to desired first fruiting, apply GA at 30 to 40 ppm if spraying dilute (12-16 fl oz./100 gal.), or about 20-24 fl. oz./acre if applied concentrate. 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 applied concentrate. The following year, 10 ppm is optional but often not required. In orchards where growth is weaker, it may be desirable to simply continue annual GA applications at 10-15 ppm as described for bearing trees, rather than discontinue at this time.

Bearing tarts

Apply about 3 to 4 weeks after bloom or when trees have 5 to 7 leaves (3 to 5 fully expanded) on terminal growth. Use 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./a 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 from over activity with phytotoxicity to no effect. 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. Rate studies on Balaton are in progress.

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