Home
Background & Projects
Calendar
Directions
InfoVideos
Links
Extension Expert Search
Publications
Staff

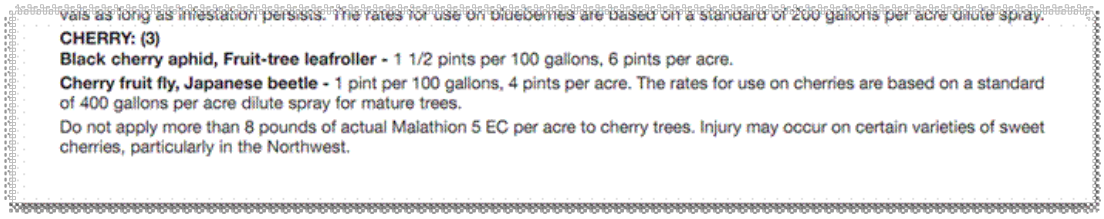
Northern Michigan FruitNet 2011
Special Update
NW Michigan Horticultural Research Station

Nikki Rothwell, District Horticulturist
Erin Lizotte, District Fruit IPM/IFP Agent
Bill Klein, Farm Mgr, NWMHRS
Duke Elsner, Agricultural & Regional Viticulture Agent

July 1, 2011

MALATHION—GUTHION—WHAT'S THE DIFFERENCE?
Erin Lizotte, IPM Educator, MSU-E
John Wise, Trevor Nichols Research and Extension Center

At this week's IPM Update on Old Mission, the question arose as to why we talk about Guthion and Imidan as control options for a number of our fruit pests, but Malathion is rarely mentioned. Malathion is a milder organophosphate insecticide that is registered for use in cherry, peach, apricots, and nectarines as well as a number of small fruits. We were unable to locate a current label on Malathion for apple. One of the potential major advantages of Malathion is the shorter pre-harvest interval (as short as 3 days on some labels in cherry). The shorter pre-harvest interval is due to the relatively short residual activity of just 2-4 days. Comparatively, Guthion and Imidan have residual activity for 14 days or more. Malathion may be a good fit in late-season applications when human exposure and safety or harvest date is a concern. Labeled rates vary by label, crop, and target pest. For example, Malathion 5 EC includes the following recommendations for cherry:


vals as long as infestation persists. The rates for use on blueberries are based on a standard of 200 gallons per acre dilute spray.

CHERRY: (3)
Black cherry aphid, Fruit-tree leafroller - 1 1/2 pints per 100 gallons, 6 pints per acre.
Cherry fruit fly, Japanese beetle - 1 pint per 100 gallons, 4 pints per acre. The rates for use on cherries are based on a standard of 400 gallons per acre dilute spray for mature trees.
Do not apply more than 8 pounds of actual Malathion 5 EC per acre to cherry trees. Injury may occur on certain varieties of sweet cherries, particularly in the Northwest.

Further efficacy work and rate recommendations have not been developed for this product due to the likely short lifespan of the product.

STILL NO CHERRY FRUIT FLY TRAPPED IN NORTHWEST MICHIGAN
Erin Lizotte, IPM Educator, MSU-E

We still have not trapped a cherry fruit fly in the north; area scout and grower traps also remain empty. The first regional trap catch is a critical indicator of when to apply pesticides for cherry fruit fly. If growers trap on farm, please give us a call at the station so we can spread the word—of course the farm reporting trap catch will remain anonymous. Also—just a reminder, growers should have apple maggot traps out at this time.

DON'T LET DOWNY MILDEW GET YOU DOWN
Downy mildew has been sighted in southwest Michigan, so scout and keep an eye on vineyards with susceptible cultivars. Know the symptoms, biology and management of downy mildew in grapes.
Published June 28, 2011
Annemiek Schilder, Michigan State University Extension, Department of Plant Pathology

Downy mildew has gotten a relatively early start this year in southwest Michigan with first sightings from mid- to late June, depending on location and cultivar. So far, the most affected cultivar has been Chancellor with anywhere from 1 to over 40 infected clusters per vine in unprotected vineyards. Often, downy mildew will be visible on clusters before leaves in Chancellor. Downy mildew was also noticed on leaves of unsprayed 'Niagara' vines and can be found on wild grapes especially those growing in humid locations, such as near ponds or in ditches.
Downy mildew is caused by the fungal-like organism *Plasmopara viticola* and can seriously damage leaves and clusters of susceptible cultivars. Leaf infections may lead to premature defoliation, which can reduce winter hardiness and sugar accumulation in the fruit in severe cases. Cluster infections usually translate into direct losses, as the infected cluster stems and berries will become necrotic and fail to develop. This is often the case with Chancellor, which is highly susceptible to downy mildew. First symptoms on the leaves may be yellow or light-green spots that may have a greasy appearance (oil spots). On older leaves, lesions are smaller and more angular as they are delimited by leaf veins. White sporulation usually develops on the underside of the leaf after warm nights with high relative humidity. Infected clusters and tendrils may also be covered with a fluffy white growth.

Biology of the pathogen
The pathogen overwinters as thick-walled spores (oospores) in fallen infected leaves on the ground. Oospore germination is favored by moist soils and temperatures over 50ºF, and typically starts several weeks before bloom in this region. Oospores develop a second spore type, sporangia, which are splashed by rain or carried by wind to young leaf and shoot tissues. The sporangia release zoospores (swimming spores) that need a film of water (rain or dew) to infect plant tissues. Infection by zoospores is relatively rapid and a wetting period of two to three hours is often sufficient. Zoospores infect the plant exclusively through the stomates, or breathing pores on the leaf, which are mostly located on the lower leaf surface. Young leaves and berries are particularly susceptible, but become resistant to infection as they age.
Lesions appear within 5 to 17 days after infection, depending on the temperature. The fungus then sporulates on infected tissues under warm, humid conditions (greater than 98 percent humidity and greater than 55°F) at night. The optimal temperature for sporulation is 65 to 72ºF. On leaves, sporulation typically occurs on the underside of the leaf or rarely along veins on the upper leaf surface. This is in contrast to powdery mildew, where sporulation mostly occurs on the upper surface. Lesions typically sporulate three times before they turn brown and die. Rain is the principal factor driving epidemics. Temperature plays a less important role by retarding or accelerating the development of the disease.
The most serious epidemics occur when a wet winter is followed by a wet spring and a warm summer with cloudy days and intermittent rainstorms every 8 to 15 days. Since the generation time of the fungus can be as short as five days under optimal conditions, this can lead to "explosive" disease development. Once the weather turns warm and dry, the downy mildew fungus goes "on vacation" and may not be very active until favorable conditions return in late summer and early fall. Often, in late summer, heavy dews at night promote disease development.

Disease monitoring
Since downy mildew can develop explosively under conducive conditions, frequent disease monitoring is important even when fungicide sprays have been applied. Scout several rows in various places in a vineyard. Visually scan leaves and clusters, and also look for symptoms on tendrils and shoots. Early in the season, lesions may be most visible on leaves and shoots close to the ground, but later on, they may appear higher in the canopy. If you see yellow lesions, turn the leaf over to look for white sporulation on the lower leaf surface. If no sporulation is present, it may be that the lesions are still young and conditions have not been right yet for sporulation. Occasionally, low-level paraquat herbicide injury may resemble downy mildew lesions but these spots do not show sporulation. Also, in the case of herbicide injury you'll see typical necrotic lesions associated with paraquat injury on the same or nearby leaves. If you are not sure of the cause, remove symptomatic leaves and place them in a plastic bag with a moist paper towel at room temperature (68 to 75°F) overnight. If it is downy mildew, white sporulation should become visible on the underside of the leaf within one or two days.

Control options
Fungicide sprays for downy mildew are recommended for susceptible varieties, especially in vineyards where the disease has been found. Be careful with young vines as downy mildew can defoliate and greatly decrease winter survival. Be extra careful with young vines in grow tubes as the tubes provide excellent conditions for disease development. Keeping the disease from defoliating vines may also be important after harvest to allow the vines to build up maximum reserves for the winter. In general, juice grapes are able to withstand more disease than wine grapes, especially if the crop is light. If the crop is heavy, the vines will be more stressed and brix and cane cold-hardiness may be reduced by downy mildew destroying part of the leaf area. If downy mildew has been found in your vineyard, don't allow the disease to develop to epidemic proportions before taking action. Listed below are some characteristics of fungicides that may help you decide which ones are most appropriate. At this point, it may be too late to use fungicides with extended pre-harvest intervals (PHI).

Abound (azoxystrobin)**, Pristine** (pyraclostrobin + boscalid)**, Sovran** (kresoxim-methyl) (strobilurins/Quinone outside inhibitors; systemic or locally systemic; 14-day PHI). Very good to excellent preventive activity (~14 days), limited post-infection activity so would be better applied on a preventative basis. Strobilurins will reduce sporulation in existing lesions, thus slowing the epidemic. Abound is phytotoxic to apples, Pristine is phytotoxic to 'Concord' and some other Labrusca-type grapes; Sovran is phytotoxic to some sweet cherry varieties.
Aliette, ProPhyt, Phostrol, Agri-Fos (salts of phosphorous acid) (phosphites; highly systemic; 0-day PHI; Aliette: 15-day PHI), good to excellent preventive and curative activity. systemic and highly mobile within the plant. They have at least 4 days of curative activity and 7-10 days of protective activity. These products do not eradicate active lesions, but can reduce spore production. Use higher rate if applying after an infection period. Research in New York has shown good to excellent disease control on a 14-day schedule, except on highly susceptible varieties, which may require more frequent sprays. When using after infection, applying a booster spray 5 days after the first spray improves efficacy. There is a risk of phytotoxicity when applied to plants under stress or at high temperatures. Do not tank-mix with copper products, Quintec, surfactants or foliar fertilizers. There are many other generic versions available – compare by looking at the phosphorous acid equivalent).
Captan (captan) (phthalimides; protectant; 0-day PHI): good preventive activity; not allowed on juice grapes after bloom by some processors; suspected carcinogen.
Copper (copper) (inorganics; protectant; 0-day PHI; 24-day REI): good preventive activity, some grape varieties are sensitive to copper, especially under cool, slow-drying conditions. Specific formulations can be used in organic vineyards.
Dithane, Penncozeb, Manzate (mancozeb) (EBDC's; protectant; 66-day PHI):good preventive activity; however, the long PHI precludes their use late in the season. Also, EBDCs are not allowed on juice grapes after bloom by some processors; suspected carcinogens.
Forum (dimethomorph) (carboxylic acid amines; systemic, 28-day PHI): new fungicide for control of downy mildew in grapes. Use Forum as a preventive application before infection occurs. The minimum application interval is 7 days. Performance may be improved by using Forum as a tank mix with another fungicide. The addition of a spreading/penetrating adjuvant is prohibited. Do not make more than 5 applications per year, and no more than one application before switching to a fungicide with a different mode of action. Forum has not been evaluated for disease control in Michigan but is used widely in Europe for control of downy mildew.
Gavel (zoxamide + mancozeb) (benzamides and EBDC's; protectant; 66-day PHI): broad-spectrum protectant fungicide. Addition of an agricultural surfactant will improve fungicide performance. Do not make more than 8 applications per acre per season. Consider Gavel and all other EBDC fungicides in observing the maximum seasonal use rate recommendations for mancozeb. Gavel was effective against downy mildew in grape trials in Michigan but its use is limited later in the season because of the 66-day pre-harvest interval.
Presidio (fluopicolide) (acylpicolides; systemic, 21-day PHI) is a new fungicide which very good protective, curative,

eradicative, and antisporulant properties. Presidio is compatible with many fungicides and insecticides and is rainfast in 2 hours. No more than two sequential applications are allowed. A tankmix with another fungicide with a different mode of action must be used with Presidio for fungicide resistance management.
Ranman (cyazofamid) (Quinone outside inhibitors; locally systemic, 30-day PHI) is a new fungicide for control of downy mildew in grapes. Ranman has limited systemic activity, so it should be applied in a preventive mode. Apply on a 10-14 day schedule when conditions are favorable for disease development.
Reason (fenamidone) (Quinone outside inhibitors; systemic, 30-day PHI) is a new broad-spectrum fungicide related to the strobilurins, which may result in cross resistance. Reason has not been evaluated in Michigan yet, but has shown good control of downy mildew in other states.
Regalia (extract of *Reynoutria sachalinensis* = giant knotweed) (plant extract; protectant, 0-day PHI) is a biofungicide that is OMRI approved for organic production. It is labeled for broad-spectrum disease control in grapes. The proposed mode of action is by increasing the plant's natural defenses. This induced resistance is not systemic throughout the plant but limited to the leaf it is applied to. The resistance reaction takes 1 to 2 days to develop. Regalia should therefore be used as a preventative treatment. In past trials in grapes with a different formulation, Regalia showed moderate control of downy mildew.
Revus (mandipropamid) (carboxylic acid amines; systemic, 14-day PHI) is a fungicide which is active against diseases caused by downy mildew. Revus Top is a pre-mix of mandipropamid and difenoconazole, a powdery mildew fungicide. It has preventative and limited curative properties. A maximum of four sprays and two sequential sprays is allowed. The addition of a spreading/penetrating type adjuvant such as a non-ionic based surfactant or crop oil concentrate is recommended. Do not apply Revus Top to Concord, Thomcord or Noiret grapes due to phytotoxicity concerns.
Ridomil Gold Cu (mefenoxam + copper) (phenylamides and inorganics; systemic + protectant; 42-day PHI), **Ridomil Gold MZ** (mefenoxam + mancozeb) (phenylamides and EBDCs; systemic + protectant; 66-day PHI). Ridomil Gold has excellent preventive and curative activity (i.e., it will stop development of lesions before and after symptoms start to show). It also stops or reduces sporulation in developing and existing lesions. It has up to 21 days of protective activity. However, the pre-harvest interval may preclude their use at this time of the season. Consider your earliest estimated harvest date to decide if these are still an option.
Serenade Max (*Bacillus subtilis*: biocontrol agent; protectant; 0-day PHI): moderate to good preventive activity, especially when applied with Nu-Film-P or similar spreader-sticker. Good coverage is important for control. Serenade has no maximum seasonal application rate. Approved for use in organic vineyards.
Tanos (famoxadone and cymoxanil) (strobilurins and cyanoacetamide-oximes; systemic, 30-day PHI) has curative and locally systemic properties against downy mildews. Tanos rapidly penetrates into plant tissues and is rainfast within 1 hour of application. It must be tank-mixed with a contact fungicide labeled for that crop (e.g., mancozeb, captan or copper). A maximum of 9 applications of Tanos including other group 11 (strobilurin).
Ziram (ziram) (dithiocarbamates; protectant; 21-day PHI): good preventive activity. Apply on a preventive basis. Susceptible to wash-off by rain.

PROTECT GRAPE CLUSTERS FROM POWDERY MILDEW AND DOWNY MILDEW
Published June 14, 2011
Annemiek Schilder, Michigan State University Extension, Department of Plant Pathology

No symptoms of powdery and downy mildew have been seen yet, but may manifest themselves any time from now. It is advised to keep scouting carefully on at least a weekly basis. In 2009, we first observed downy mildew in Chancellor in Fennville during the first week of June and in 2010 during the second week of June. It is safe to assume that these pathogens will be active during the warm, humid weather that is forecast for the coming weeks. Growers are therefore strongly advised to protect flower and fruit clusters from infection using effective fungicides as soon as possible if the vines are not already protected. Also, continue to monitor vineyards for signs of infection.
At this stage, the young clusters are highly susceptible to all major diseases, including downy mildew, powdery mildew, black rot and Phomopsis. Black rot and Phomopsis lesions have been seen for several weeks and indicate that the pathogens are active. Grape anthracnose symptoms are also visible on shoots and leaves and on cluster stems. The risk of infection is especially high if we have multiple or big rain events and moderate to warm temperatures during this time. Prolonged wet conditions during bloom can also allow Botrytis to get a foothold in the clusters of susceptible varieties by promoting growth on senescing flower parts.
If active infections are found, use fungicides with post-infection activity at the highest labeled rate. For downy mildew, Ridomil Gold MZ or Ridomil Gold Copper are the strongest fungicides, followed by phosphorous acid fungicides like Phostrol and ProPhyt. If using phosphorous acids, it is beneficial to apply a "booster spray" five days after the first spray. Strobilurin fungicides have limited post-infection activity and should preferentially be used in a preventive mode. Newer fungicides for downy mildew control are Presidio, Revus and Revus Top (don't apply Revus Top to Concord or Noiret vines due to phytotoxicity concerns), Gavel (contains mancozeb), Forum and Tanos. While some of these new fungicides have post-infection (curative) activity, they are best applied on a preventative basis. They are excellent for integration into a fungicide resistance management program as they represent new and different chemistries.
It will be especially critical to protect clusters of susceptible varieties from powdery mildew at this time. Sterol inhibitor, like Elite and Rally, and strobilurin, like Sovran and Flint, fungicides have the ability to cure early infections, but will not eliminate already established colonies. JMS Stylet Oil and potassium bicarbonate fungicides (Kaligreen, Armicarb, MilStop) can be used to eradicate visible powdery mildew colonies. Make sure that coverage is thorough (use sufficient spray volume), as only those colonies contacted by the fungicide will be killed. Since strobilurin-resistant powdery mildew isolates have been found in Michigan vineyards – mostly MSU experimental vineyards and wine grape vineyards with a history of strobilurin use – and we have circumstantial evidence for sterol inhibitor resistance, we recommend adding a protectant fungicide like Sulfur or Ziram to the tank-mix when using either type of fungicide.
Sulfur is the most cost-effective option for non-sulfur sensitive grape cultivars. Over the past two years, we have noticed that Ziram as a tank-mix partner did improve control of powdery mildew in a spray program. Also, alternate with fungicides with different modes of action, for example Quintec, Vivando, Endura, Serenade, Sonata and Regalia. Revus Top is a new fungicide for powdery and downy mildew and black rot control in grapes. However, the ingredient that is active against powdery mildew is difenoconazole which belongs to the sterol inhibitor class. This fungicide may be phytotoxic on Concord grapes, so do not use on Concords.
Protect clusters for at least four to five weeks after bloom. As the berries develop, they become naturally resistant to black rot, downy mildew and powdery mildew, and the need for protection diminishes after the susceptible period ends. This happens quite rapidly for downy mildew (two to three weeks after bloom), whereas for powdery mildew it is about four weeks after bloom. Concord grapes become resistant to black rot four to five weeks after bloom, but some wine grape

varieties may remain susceptible to black rot for up to eight weeks postbloom. However, be aware that the cluster stem (rachis) and berry stems can remain susceptible longer than the berries in most cases. The only disease to which berries remain susceptible throughout their development is Phomopsis, but the risk of infection diminishes after bunch closure because inoculum levels drop off then. Botrytis is just the opposite in that berries actually become more susceptible as they get closer to harvest, especially in tight-clustered varieties. In general, aim to protect the clusters from the major diseases from immediate pre-bloom until four to five weeks after bloom.

Dr. Schilder's work is funded in part by MSU's AgBioResearch.

WEBSITES OF INTEREST

Insect and disease predictive information is available at:
http://enviroweather.msu.edu/homeMap.php

60 Hour Forecast
http://www.agweather.geo.msu.edu/agwx/forecasts/fcst.asp?fileid=fous46ktvc

Information on cherries is available at the new cherry website:
http://www.cherries.msu.edu/

Fruit CAT Alert Reports
http://www.ipmnews.msu.edu/fruit/

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

ACTUAL AND PREDICTED DEGREE-DAY
ACCUMULATIONS SINCE MARCH 1, 2011

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

Last Revised: 7-1-11

Home
Background & Projects
Calendar
Directions
InfoVideos
Links
Extension Expert Search
Publications
Staff

Northern Michigan FruitNet 2011
Weekly Update
NW Michigan Horticultural Research Station

Nikki Rothwell, District Horticulturist
Erin Lizotte, District Fruit IPM/IFP Agent
Bill Klein, Farm Mgr, NWMHRS
Duke Elsner, Agricultural & Regional Viticulture Agent

July 5, 2011

GROWTH STAGES AT NWMHRS (July 5 – 2:00 p.m.)

Apple: Red Delicious – 37 mm fruit
Gala – 32 mm fruit
Yellow Delicious – 32 mm fruit
Pear: Bartlett: 25 mm fruit
Sweet Cherry: Hedelfingen: 19 mm fruit
Napoleon: 21 mm fruit
Gold: 18 mm fruit
Montmorency: 18 mm fruit
Balaton: 15 mm fruit
Apricot: 31 mm fruit
Plum: 22 mm fruit
Grapes: Chardonnay: Bloom

CHERRY FRUIT FLY TRAPPED AT NWMHRS
Erin Lizotte, MSUE
Dr. Nikki Rothwell, MSUE

The first cherry fruit flies (CFF) of the season were detected in the NWMHRS trap line this morning (**5 July**). Positive trap catches have also been reported on Old Mission Peninsula and in Benzie County. Growers should refer to the wing guide in the upper right hand corner to accurately identify cherry fruit fly as many of the Ragolitis species appear similar. CFF overwinter as pupae in the soil, and produce one generation per year. Flies emerge for about a month, and peak emergence is in late June to early July. Seven to ten days after emergence, females deposit eggs in the fruit where hatching larvae immediately burrow in and feed. Most control strategies employ insecticides that target the adult stage during that 7-10 day window. *If flies are trapped on-farm, but a regional trap catch was recorded earlier, the treatment should be timed based on the earlier regional capture to minimize the risk of larvae in the fruit.* However, because population size influences trap catch, it is critically important that growers monitor their own farms for CFF to help predict population size as well as duration of activity. Larvae mature in the fruit and then drop to the soil where they enter the ground, pupate, and start the next generation's life cycle the following season.

Recent work has shown that a great deal of CFF activity occurs after harvest providing a postharvest opportunity for management in sites with high populations. Preliminary research has shown that imidacloprid products such as Prey and Provado work well at the post-harvest application timing seven days after harvest. This spray could be tank-mixed with the post-harvest chlorothalonil application for cherry leaf spot.

As mentioned above, chemical control of cherry fruit fly is focused on the adult, with the goal of preventing egg-laying and eliminating the risk larvae from the fruit. Refer to the table below (Gut et al.) for available treatments and application timing, refer to the E-154 Fruit Management Guide for more information and always read and follow pesticide labels carefully.

Compound trade name	Chemical class	Optimal spray timing for cherry fruit fly begins	Residual activity	Effectiveness rating**	PHI
Guthion, Imidan (no Imidan on sweets)	Organophosphate	7-10 days after the first fly is captured	14+ days	E	7-15
Sevin	Carbamate	7-10 days after the first fly is captured	5-7 days	G	3-7

Asana, Warrior, Baythroid, Ambush	Pyrethroid	7-10 days after the first fly is captured	7-10 days	F-G	3-14
Delegate, Entrust*, GF120 NF*	Spinosyn	Immediately after the first fly has been captured	7-10 days	F-G	0-7
Assail, Actara, Provado	Neonicotinoid	7-10 days after the first fly is captured	10-14 days	G	7-14
Altacor	Anthranilic diamides	Immediately after the first fly has been captured	10-14 days	G	10
Surround WP*	Particle Film, Protectant	Multiple applications before fly emergence	As long as thorough coverage of the tree canopy is maintained	G	0
Voliam flexi	Neonicitinoid and Anthranilic diamides	Immediately after the first fly has been captured	10-14 days	G	14
Leverage	Neonicitinoid and Pyrethroid	7-10 days after the first fly is captured	10-14 days	G	7

ETHEPHON ON CHERRIES

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

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 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. Trees under stress, particularly drought stress, become more susceptible to ethephon damage. Damaged trees exhibit excessive gumming, and branches lose their leaves.
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.
The following recommendations should be used when applying ethephon to cherries:

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.*

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.

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.

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.

Time of Application: Apply approximately 7 to 14 days before anticipated harvest. Do not harvest within 7 days of application (7-day PHI).

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.

Tree stress: Do not spray trees that are low in vigor or under stress conditions.

Do not spray trees that had serious gumming the previous year.

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.

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.

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.

MANAGEMENT OF SUMMER GENERATION OBLIQUE-BANDED LEAFROLLER
Erin Lizotte, MSUE
Dr. Nikki Rothwell, MSUE

Growers looking to treat for the summer generation of oblique-banded leafroller (OBLR) larvae should keep a close eye on the OBLR model over the coming days. Based on the biology of the insect we can expect egg hatch to begin 400-450 DD42 after sustained catch. Sustained adult trap catch was recorded on 20 June at the NWMHRS and we have accumulated 310 DD42 toward the treatment window for larvicide application; the forecast data predicts we will be in the treatment window over the coming weekend.

OBLR has been observed more commonly in both sweet and tart cherry during the past seasons. These insects are not internal feeders in the fruit, and although they can cause some damage from defoliation, the greater concern is their threat as a contamination pest if they are found in cherry tanks at harvest. Growers with problem orchards risk having tank-loads rejected at the processor if OBLR larvae are present. Organophosphate resistance (and pyrethroid cross-resistance) in OBLR is likely one of the factors contributing to larvae in cherry tanks at harvest. Fortunately, there are several new insecticides that have been efficacious against summer generation OBLR. Apple OBLR larvicide materials include: Delegate, Entrust, Proclaim, Altacor, Belt, Voliam flexi, and Leverage. Tart and sweet cherry OBLR larvicides include: Delegate, Belt, Altacor, Voliam flexi, or Entrust. As we approach sweet cherry harvest, the pre-harvest interval should be a primary consideration when selecting an insecticide.

Optimizing the timing of insecticide applications to effectively target OBLR in cherry can be particularly challenging. First instar OBLR are small and can be difficult to spot. At this time of the year, growers should be looking for larvae in cherry clusters and apple spurs—now is the time to begin monitoring for these summer generation larvae. The larvae have a distinct black head capsule that is slightly flattened. OBLR larvae vary from light yellow to green in color and grow to 1". Growers can also monitor for the adult moths using pheromone baited stick traps. Treatments should be applied if average trap catches approach or exceed 20 moths/trap or 2-3 active larvae per tree are observed.

OBLR larvae with black head capsule. Photo by E.M. Lizotte.

REPORT ON BROWN MARMORATED STINK BUG TASK FORCE MEETING IN PENNSYLVANIA
MSU's tree fruit experts are learning from East Coast experience about the brown marmorated stink bug. None have been found yet in Michigan in 2011.
Published June 28, 2011
Mike Haas, Anne Nielsen, Matt Grieshop, and Larry Gut, Michigan State University Extension, Department of Entomology

They gathered seven miles north of the Gettysburg battlefield memorialized in President Lincoln's famous speech. The first one to speak appeared exhausted, with an underlying tone of defeat in his voice as he pleaded with the group, "We need help." Two others were to follow, each as weary and desperate-sounding as the first. Civil War soldiers come to swap battle stories? No, three growers invited to talk to the brown marmorated stink bug (BMSB) working group assembled in Biglerville, Pennsylvania, at the Pennsylvania State University Fruit Research and Extension Center, June 20-21.

These three men recounted their current efforts to protect apples and peaches from the new stink bug pest. They had literally come directly from spraying to address the group, each expressing uncertainty about their ability to continue their spray programs due to cost, outbreaks of secondary pests and lack of sustainability.

The BMSB working group is comprised of university personnel, government agencies (state and federal), farmers and chemical company representatives. The attendees gave research updates on a variety of topics. Below is a list of topics that were covered.

Biocontrol efforts. Several parasites from Asia (native land of the BMSB) show promise and are being considered for release in the United States within three to five years after host specificity testing is complete.
Trapping. For both field monitoring and for in-home removal of overwintering infestations, updates on trap design and pheromone attractant.
Cultural control. Varietal differences and border applications are being explored.
Insecticides. Efficacy in the lab and field, new materials and new registrations are being tested.

Phenological studies. Preliminary results on the effects of adult and nymphal feeding at different times during the season are being researched.
Regulatory issues. New pesticide registration procedure and progress: specifically a Section 18 for dinotefuran.

By the end of the two-day session, it was apparent that much research is being conducted and there is reason to be hopeful that it will result in effective management tactics. However, we still have a lot to learn about this important new pest. Mid-Atlantic growers have the disadvantage of being behind the 8-ball right now with most areas experiencing high levels of pest pressure due to two generations of BMSB in 2010. Many growers are modifying their IPM programs to include weekly applications of insecticides starting at petal fall without seeing sufficiently reduced damage (example: 70 percent down to 50 percent). How early season damage manifests itself at harvest is still unknown, but BMSB adults and nymphs are feeding on peaches and apples in early season (prior to pit hardening).

Almost every researcher who spoke reported on lab and field insecticide trials. The primary hurdle for management of BMSB with chemicals is that only the harshest insecticides show efficacy on the adults and repeated applications are needed due to short residual control and highly mobile BMSB adults. A negative side effect of the repeated application of broad-spectrum chemicals is that growers are seeing secondary pest outbreaks of aphids, scales, mites and mealy bugs that were biologically managed under previous, "softer" IPM programs.

Michigan growers should be concerned about this serious threat, but also need to keep in mind that a total of just four BMSB were discovered in 2010 and none have been reported so far in 2011. Increases in stink bug feeding damage, cat facing and apparent bitter pit or cork spot are signs that indicate that BMSB may be active in your area. Michigan State University and MDA researchers and Extension professionals are being proactive in our approach to acquire the best information available and to prepare for the time if and when BMSB becomes a significant agricultural pest here. Also, we have the advantage of using the information being collected on the East Coast populations in terms of biology, ecology and management. We will also likely have only a single generation per year —compared to two in Maryland and Virginia— which should reduce the intensity of early season damage.

Michigan State University personnel are currently monitoring for this pest in many areas in the Lower Peninsula. **To date (June 28, 2011), none have been detected in our over 20 traps**. With time, we will understand where BMSB is a real threat in the state and when it becomes active. If you find a stink bug that you believe to be BMSB, or are noticing increased amounts of stink bug damage, please collect specimens and send them to MSU Diagnostic Services for identification. See tips on submitting insects for identification.

The work of Dr. Grieshop and Dr. Gut is funded in part by MSU's AgBioResearch.

WEBSITES OF INTEREST

Insect and disease predictive information is available at:
http://enviroweather.msu.edu/homeMap.php

60 Hour Forecast
http://www.agweather.geo.msu.edu/agwx/forecasts/fcst.asp?fileid=fous46ktvc

Information on cherries is available at the new cherry website:
http://www.cherries.msu.edu/

Fruit CAT Alert Reports
http://www.ipmnews.msu.edu/fruit/

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

ACTUAL AND PREDICTED DEGREE-DAY ACCUMULATIONS SINCE MARCH 1, 2011

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

Last Revised: 7-5-11

Home
Background & Projects
Calendar
Directions
InfoVideos
Links
Extension Expert Search
Publications
Staff

Northern Michigan FruitNet 2011
Special 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

July 8, 2011

OBLIQUEBANDED LEAFROLLER IN CHERRY
Nikki Rothwell and Erin Lizotte, NWMHRS

As we move into cherry harvest, growers should be aware of obliquebanded leafroller (OBLR) in orchards. As we mentioned on Tuesday, there has been evidence in 2010 that these insects could become problematic again this season—particularly that organophosphates (OP's) have been the backbone of many of our cherry programs and the likelihood of OP resistance in OBLR. We are strongly recommending a caterpillar material (not OP's or pyrthroids) in the tank for both tart and sweet cherry, especially if growers had an issue with these pests last season.
OLBR overwinter as larvae, feed in the spring and into the summer and pupate in late June. These adults mate and lay eggs, and the larvae present in sweet and/or tart cherry orchards are just newly hatched or large late overwintering generation larvae. As we had cool conditions this spring, there is potential for both overwintering and summer generation larvae to be present in orchards at this time. The noticeable difference, obviously, is the size of the larvae, and from past experience, smaller larvae are easier to kill than larger ones. However, growers will still need to control these caterpillars, no matter what the size, before harvesting their fruit. Again, we can make the assumption that if larvae are still present in fairly high numbers in the orchard, growers should assume they have no efficacy from OP's against OBLR. Therefore, growers will need to apply a chemistry with a short PHI that will be effective. We have three new Lepidopteran materials that work well against OBLR: Delegate (7D PHI), Belt (7D PHI), and Altacor (10D PHI), and all three materials provide excellent control of OBLR. Sevin and the pyrethroids have a three-day PHI, but older data tell us that these chemistries will not be effective due to cross resistance with the OP's.

SURE DISASTER PROGRAM DEADLINE APPROACHES FOR 2009 CROPS

United States Department of Agriculture

Farm and Foreign
Agricultural
Services

Farm Service Agency

Grand Traverse Area Service Center
1501 Cass Street
Traverse City, MI 49684-4187
231-941-0951
FAX: 231-929-7890

Serving
Grand Traverse
Kalkaska
and
Leelanau
Counties

Greg Shy Executive Director for the United States Department of Agriculture Farm Service Agency reminds producers that they have until Friday, July 29, 2011, to apply for assistance for 2009 crop losses under the Supplemental Revenue Assistance Payments (SURE) Program. The program provides crop disaster assistance payments to eligible producers on farms that have incurred crop production or quality losses.
"USDA wants to ensure that all eligible producers are aware of the approaching deadline," said Shy. "SURE covers producers on farms in disaster counties that incurred crop production, crop-quality losses or both, but in order to qualify, you need to file in a timely manner. I encourage anyone with questions to visit their local USDA Farm Service Agency Office."
The SURE program takes into consideration losses on all crops grown by a producer nationwide. To be eligible, producers must have suffered at least a 10 percent production loss on a crop of economic significance and obtained a policy or plan of insurance under the Federal Crop Insurance Act or the Noninsured Crop Disaster Assistance Program (NAP), for all

economically significant crops. A producer must have a farming interest physically located in a county that was declared a primary disaster county or contiguous county by the Secretary of Agriculture under a Secretarial Disaster Designation or have actual production on the farm that was less than 50 percent of the normal production on the farm due to a natural disaster.
A producer interested in signing up for SURE for their 2009 crops must do so before close of business July 29, 2011, at the county FSA office servicing the producer. The sign-up for the SURE program for the 2010 crops will be announced at a later date.
For more information about USDA Farm Service Agency disaster assistance programs, visit a local FSA county office or http://disaster.fsa.usda.gov/

To file a complaint of discrimination, write to USDA, Assistant Secretary for Civil Rights, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, S.W., Stop 9410, Washington, DC 20250-9410, or call toll-free at (866) 632-9992 (English) or (800) 877-8339 (TDD) or (866) 377-8642 (English Federal-relay) or (800) 845-6136 (Spanish Federal-relay). USDA is an equal opportunity provider, employer and lender.

WEBSITES OF INTEREST

Insect and disease predictive information is available at:
http://enviroweather.msu.edu/homeMap.php

60 Hour Forecast
http://www.agweather.geo.msu.edu/agwx/forecasts/fcst.asp?fileid=fous46ktvc

Information on cherries is available at the new cherry website:
http://www.cherries.msu.edu/

Fruit CAT Alert Reports
http://www.ipmnews.msu.edu/fruit/

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

ACTUAL AND PREDICTED DEGREE-DAY
ACCUMULATIONS SINCE MARCH 1, 2011

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

Last Revised: 7-8-11

Home
Background & Projects
Calendar
Directions
InfoVideos
Links
Extension Expert Search
Publications
Staff

Northern Michigan FruitNet 2011
Weekly Update
NW Michigan Horticultural Research Station

Nikki Rothwell, District Horticulturist
Erin Lizotte, District Fruit IPM/IFP Agent
Bill Klein, Farm Mgr, NWMHRS
Duke Elsner, Agricultural & Regional Viticulture Agent

July 14, 2011

GROWING DEGREE DAY ACCUMULATIONS through July 11th at the NWMHRS

Year	2011	2010	2009	2008	2007	2006	21 yr. Avg.
GDD42	1535	1942	1451	1516	1872	1782	1624.1
GDD50	934	1200	828	900	1189	1082	987.6

Growth Stages at NWMHRS (July 11 – 1:00 p.m.)

Apple: Red Delicious – 41 mm fruit
Gala – 33 mm fruit
Yellow Delicious – 34 mm fruit
Pear: Bartlett: 26 mm fruit
Sweet Cherry: Hedelfingen: 19 mm fruit
Napoleon: 22 mm fruit
Gold: 19 mm fruit
Montmorency: 18 mm fruit
Balaton: 15 mm fruit
Apricot: 31 mm fruit
Plum: 22 mm fruit
Grapes: Late bloom

Weather
Summer has truly arrived in the north. We have had daytime temperatures in the 80's and most nights have been cool—50's and 60's. The warm temperatures have really moved along our degree days. The NWMHRS weather station is down; we will have our degree day accumulations later in the week. The warm temperatures have also brought no rainfall into the region, and soils are quite dry at this time. Most forecasts have predicted thunderstorms over the past week, but most storms have broken up over the lake before they hit our region.

Crop Report
Strawberry harvest has ended over the weekend. Growers are starting sweet cherry harvest; at this time, they are picking early varieties for the fresh market and stem-on sweet cherries for the brine market. By the weekend, sweet cherry harvest will be in full swing. For the cool start we had to our spring, harvest seems to be 'normal'. Tart cherries are also moving along, and the fruit is 18mm and red on most trees. As the fruit colors, crops are looking bigger than we originally observed. Fruit quality is looking good at this time. Apples are sizing, and some growers that did not get good thinning are hand thinning now. Crop loads are looking good in most blocks. Growers are tucking and tying grapes, and we are past bloom for most vinifera varieties.

Pest Report

Apple
As apples continue to size, growers should be sure to scout for apple scab lesions to help gauge the risk of fruit scab. Most orchards in the region appear to have made it through primary scab season with relatively clean leaves. Despite high fire blight potential early in the season, very few blossom or shoot blight infections have been observed. Given the wet and warm weather growers in the north, growers will be keeping an eye out for sooty blotch flyspeck. Sooty blotch flyspeck (SBFS) is more common further south where more moisture is present in the season. SBFS is caused by a fungal disease complex (Gloeodes and Leptodontidium and Schizothyrium) of apple in humid fruit growing regions of the U.S. The diseases can cause significant economic losses due to the unsightly appearance of affected fruit. Both pathogens colonize the waxy surface of pome fruit but do not penetrate lower layers. The two fungi are found on a wide range of perennial hosts commonly found in the woods, including wild brambles. Spores of the two pathogen groups are present in orchards from late pink throughout the summer and into fall. The fungi that cause sooty blotch survive from one season to the next on apple twigs as well as other perennial vegetation with a waxy cuticle. The fungus is dispersed by wind and in

windblown rainwater to developing fruit in the spring and early summer. Secondary spread from these primary colonies occurs throughout the summer. Growth of sooty blotch on fruit can begin 2 to 3 weeks after petal fall and a week or two later for flyspeck. Growth of these fungi is favored by temperatures between 65° and 80° F, and wet, humid conditions. It usually takes 20 to 25 days for colonies of sooty blotch to appear on fruit after infection occurs and 3 to 6 weeks for flyspeck. Control of SBFS is achieved through dormant and summer pruning and tree training, which open trees and facilitate drying and fungicide deposition, and through preventive fungicidal sprays. Ziram and Captan are rated as very good as protectant SBFS materials and have activity against apple scab as well, though Captan is a significantly stronger scab material. Removal of wild blackberry from the boarder of the orchard can help by eliminating a potential reservoir host. There is a SBFS model available on Enviroweather that takes the guess work out of determining if fruit is vulnerable to infection. According to the model, we can expect potential infection if we receive more rain in the coming weeks.

Codling moth trap catch last week was zero—this week emergence began again with a total of 3 moths in six traps. Based on trap catch data from the Research Station, we set the codling moth biofix for first generation (sustained catch) as 31 May and have accumulated ~500 DD50 since. The moths in the traps this week are likely late emergers from the first generation; second generation codling moth treatment will not begin until approximately 1200 DD50 (though detecting second generation adult biofix and predicting egg hatch is a more accurate gauge of the ideal treatment window for second generation). Growers can track their site-specific progression using the codling moth model. Oblique-banded leafroller (OBLR) continue to emerge as adults; adult moth trap catches are down over the past two weeks with an average of 5 moths per trap this week, eggs are laid and summer generation larvae hatch has likely begun in area orchards opening another potential OBLR larvae (Figure A) treatment window. Growers can scout for multiple life stages of OBLR; adults moths are easily trapped with pheromone baited delta traps, and tiny larvae are also likely present at this time and rolling leaves. Growers looking to treat for the summer generation of oblique-banded leafroller (OBLR) larvae can use the OBLR model as a reference. Based on the biology of the insect, we expect egg hatch began 400-450 DD42 after sustained catch (sustained adult trap catch was recorded on 20 June at the NWMHRS). Apple OBLR larvicide materials include Delegate, Entrust, Proclaim, Altacor, Belt, Voliam flexi, and Leverage. Plum curculio egg laying scars in apple have been reported by area scouts, even in conventionally managed sites. There have also been reports of feeding damage. Green apple aphid (Figure A) numbers on foliage and fruit have exploded with the warm weather and lots of succulent growth on apples. Always read and follow pesticide labels carefully.

Cherry

Oblique-banded leafroller (OBLR) activity continues in cherry, with adults and tiny larvae present in area orchards at this time. Adult OBLR trap catch averaged 8 moths/trap. For growers that were not able to make an application targeting overwintering larvae earlier this season, a second management window is or will open as we approach harvest. OBLR has been observed more commonly in both sweet and tart cherry during the past seasons. These insects are not internal feeders in the fruit, and although they can cause some damage from defoliation, the greater concern is their threat as a contamination pest if they are found in cherry tanks at harvest. Growers with problem orchards risk having tank-loads rejected at the processor if OBLR larvae (Figure A) are present. Organophosphate resistance (and pyrethroid cross-resistance) in OBLR is likely one of the factors contributing to larvae in cherry tanks at harvest. Fortunately, there are several new insecticides that have been efficacious against summer generation OBLR larvae. Tart and sweet cherry OBLR larvicides include: Delegate, Belt, Altacor, Voliam flexi, or Entrust. As we approach sweet cherry harvest, the pre-harvest interval should be a primary consideration when selecting an insecticide. Optimizing the timing of insecticide applications to effectively target OBLR in cherry can be particularly challenging. First instar OBLR is small and can be difficult to spot. At this time of the year, growers should be looking for larvae in cherry clusters—now is the time to be monitoring for these summer generation larvae. The larvae have a distinct black head capsule that is slightly flattened. OBLR larvae vary from light yellow to green in color and grow to 1". Growers can also monitor for the adult moths using pheromone baited stick traps. Treatments should be applied if average trap catches approach or exceed 20 moths/trap or 2-3 active larvae per tree are observed. Plum curculio activity appears to be waning in cherry with no adults in the traps or observed working in the tree canopy. It appears that second generation American plum borer emergence has begun—delineating between generations can be difficult as trap catches often never stop completely. However, as trap numbers begin to climb, the increased catch of moths indicate the flush of second generation emergence will likely occur in the coming weeks. Lesser peach tree borer (LPTB) emergence has rebounded with an average of 3 per trap. Peach tree borer numbers are up slightly with an average of one moth per trap. The first cherry fruit flies (CFF) of the season were detected in the NWMHRS trap line on 5 July. Positive trap catches have also been reported on Old Mission Peninsula and in Benzie County. Numbers were up this week with 63 flies caught in 4 trap locations. CFF (Figure A) emerge for about a month, with peak emergence in late June to early July. Seven to ten days after emergence, females deposit eggs in the fruit where hatching larvae immediately burrow in and feed. Most control strategies employ insecticides that target the adult stage during that 7-10 day window. If flies are trapped on-farm, but a regional trap catch was recorded earlier, the treatment should be timed based on the earlier regional capture to minimize the risk of larvae in the fruit. However, because population size influences trap catch, it is critically important that growers monitor their own farms for CFF to help predict population size as well as duration of activity. Larvae mature in the fruit and then drop to the soil where they enter the ground, pupate, and start the next generation's life cycle the following season. Recent work has shown that a great deal of CFF activity occurs after harvest providing a postharvest opportunity for management in sites with high populations. Preliminary research has shown that imidacloprid products such as Prey and Provado work well at the post-harvest application timing seven days after harvest. This spray could be tank-mixed with the post-harvest chlorothalonil application for cherry leaf spot. Refer to the E-154 Fruit Management Guide for more information and always read and follow pesticide labels carefully. Black cherry aphid (BCA) is also visible in significant numbers on the terminals of sweet cherry branches. Black cherry aphid (Figure A) feeding curls and stunts leaves, and deforms shoot growth. Highly susceptible varieties include Black Tartarian, Napoleon, Schmidt and Windsor. Young cherry trees are especially susceptible to injury and can be killed if infestations are heavy. Severe infestations may also reduce the quantity and quality of the crop on mature trees. Overwintering BCA eggs hatch as cherry buds begin to open in April. Two to three generations are usually completed on cherry. Several summer generations are produced on alternate hosts, with winged adults returning to cherry orchards in September and October to mate and lay overwintering eggs. There are a number of effective insecticides for the management of BCA in sweet and tart cherry, including Provado, Actara, Assail, Beleaf, Vloiam flexi, Movento, Voliam flexi, and Leverage (management may be delayed until postharvest). As we approach harvest, growers should be aware of the preharvest intervals of various materials and always read and follow pesticide labels carefully.

The potential for epidemic levels of cherry leaf spot (CLS) is a concern this season. We began seeing significant cherry leaf spot infections early this season and defoliation is already underway in some blocks, particularly those with foliar bacterial canker infections from this spring. Growers should look closely to determine if it is CLS, bacterial canker, virus, or phytotoxicity causing defoliation as all are present this season. CLS is resistant to sterol inhibitor fungicides (Indar, Elite,

Orbit) in all the major fruit producing areas of Michigan. As cover treatments are applied, remember to alternate the use of fungicide classes and tank mix dodine and strobilurin fungicides with a full rate of captan to manage against resistance development. Under cool conditions, copper is an excellent CLS material and a good strategy for resistance management; copper rates of 1.2 lb metallic copper are adequate. Lime is also recommended as a safener for copper applications, but Imidan cannot be used in this tank mix due to pH. Early bacterial canker symptoms allowed American brown rot (ABR) infections to become established on green fruit early and hail damage and sites with a history of ABR are also at risk at this time with weather conditions highly favorable for disease development. Indar should be applied at a 6 fl oz/A rate, a 8 fl oz/A application rate should only be used if a shift in fungal sensitivity is suspected (only Indar 2F is labeled for increased rates). Surfactants, high water application volumes, full covers, and slow speeds are important strategies for ABR management. Growers looking to treat for CLS and hedge their bets against ABR could utilize Pristine at this time.

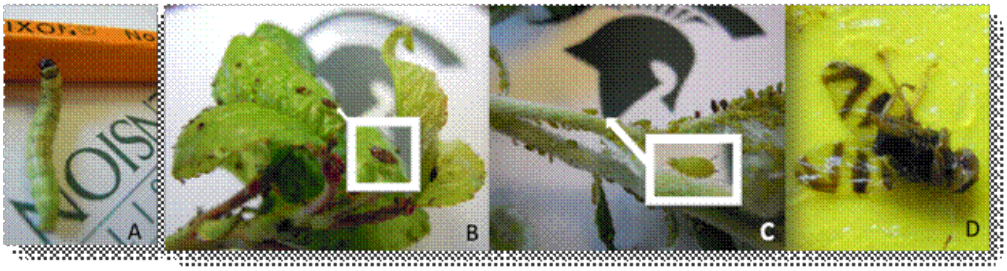


Figure A; A) Oblique-banded leafroller larvae, B) Black cherry aphid, C) Green apple aphid, D) Cherry fruit fly. Lizotte

Wine Grapes
All cultivars are through with bloom now; some of the earlier hybrids have berries approaching 4 mm in diameter. Fast shoot growth has required prompt attention to shoot positioning and tucking. Powdery mildew is still absent from the station vineyards, but it ought to be out there somewhere—don't relax efforts to scout for it as we are still in a critical time for protecting the tiny berries. Potato leafhopper injury has not progressed rapidly in recent weeks, but it is still quite obvious in some sites. Rose chafer adults have lingered on much longer than anticipated, but their feeding injury is virtually done at last. Some grape berry moth adults have been taken in traps; this is the start of the second generation in our area.

We need some volunteers to help tuck shoots at the Northwest Station this Friday, July15**.** Contact Duke at 922-4822 for more details.

The Viticulture Field Day at the Southwest Michigan Research and Extension Center in Benton Harbor is on Wednesday, July 27. Although the program features a lot of juice grape information, it is still a very valuable program for NW Michigan growers to attend. For more information on the field day, contact Duke Elsner at elsner@msu.edu or 231-922-4822.

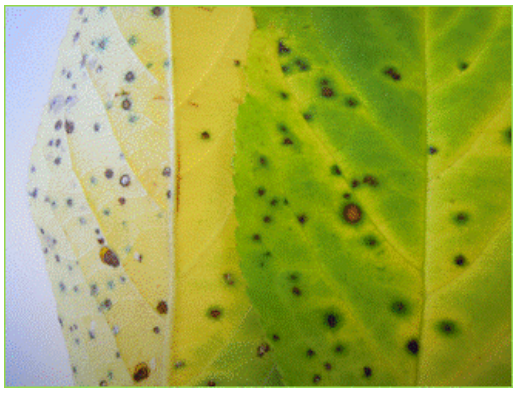
Saskatoons
Fruit is ripening and harvest should be underway. There have been a few reports of rust fungus infections to leaves, stems and berries in the last two weeks.

ARTICLES

Cherry

CHERRY LEAF SPOT AND TART CHERRIES PRIOR TO HARVEST
Erin Lizotte, Nikki Rothwell, and George Sundin, MSU

Figure A. Symptoms of cherry leaf spot on the lower and upper leaf surface of Montmorency. E. Lizotte



We have observed significant cherry leaf spot (CLS) infections early this season, and defoliation from this disease is underway in some blocks. Leaf loss appears particularly high in blocks that had early foliar bacterial canker infections. Growers should look closely to determine if it is CLS, bacterial canker, virus, or phytotoxicity that is causing defoliation in their blocks (see *Leaf Loss in Tart Cherry article*). Cherry leaf spot forms small, purple spots that first appear on the upper surface of leaves; white to pink spore masses develop during wet weather on the undersides of the spots (Figure A). These white spore masses on the underside of the leaf are one of the major identifying characteristics that will not be present with other potential causes of defoliation like bacterial canker or phytotoxicity. The CLS lesions turn brown and often fall out, causing a shot-hole effect. Cherry leaf spot is primarily a disease of tart cherry, but we have observed lesions in sweet cherry this season. Because of the intense disease pressure this season, blocks that did not receive adequate control have pedicel infections (Figure B), and fruit infection (Figure C) is possible.

Figure B. Symptoms of cherry leaf spot on pedicels of Montmorency. G. Sundin

Figure C. Symptoms of cherry leaf spot on fruit of Montmorency. G. Sundin

With the current inoculum loads in orchards, disease pressure is high and will continue to drive the CLS epidemic for the rest of the season. Even if CLS infection has been kept in check thus far, continued control should be maintained to keep orchards clean. Pristine+Captan, Gem+Captan, Adament+Captan, copper formulations (1.2 lb actual Cu/A), and Syllit+Captan are all excellent cover applications for cherry leaf spot control; remember to check the preharvest interval on these materials as harvest approaches. Sterol inhibitors such as Indar, Orbit, or Elite that are being applied for American brown rot management will *not* provide control of CLS. A minimum of one and possibly two postharvest applications for leaf spot will be necessary in blocks with significant current CLS symptoms. With the potential of CLS and from what we have observed so far this season, full cover post-harvest chlorothalonil applications at 10-day intervals or ½ side applications at 7-day intervals are recommended. Spores of this fungus are dispersed from leaf to leaf by rainfall, so if we continue to see dry weather, the potential for CLS infection will decrease and management programs may be adjusted accordingly in low pressure sites (high pressure sites should remain more conservative in their practices regardless of weather).

Trees need to retain a minimum of 50% of their leaves through the end of September in order to maintain winter hardiness. However, leaf losses of 50% or more can impact fruit quality and yield in subsequent years. The bottom line is the more leaves on the tree as they move into winter, the better overall tree health. Growers should be sure to read pesticide labels and follow the manufacturer's directions.

LEAF LOSS IN TART CHERRY

N.L. Rothwell, E.M. Lizotte, G.W. Sundin, MSU

Defoliation has been observed in many tart cherry orchards across the region. The list of potential culprits causing this leaf drop is long, and we are still investigating the cause of defoliation in many blocks.

First, bacterial canker is prevalent in tart cherry blocks with our cool, wet spring. This disease is most problematic in sweet cherries, but under the right conditions, bacterial canker can be present in tart cherry following cold wet weather during bloom. Leaves that had bacterial canker infections earlier this season are now turning yellow and dropping from the trees. Canker symptoms on tart cherry leaves are characterized by large brown spots that are circular to somewhat angular. Sometimes these spots coalesce and form large dead areas on the leaves; leaves with bacterial canker also have a tattered appearance (Figure A). We are seeing leaf drop from these early bacterial canker infections at this time, particularly in tart cherry.

The next offender on the defoliation list is cherry leaf spot (CLS). This disease is notorious for dropping leaves; however, with good spray coverage and timing, leaf loss does not usually occur until sometime after harvest. The early 2011 season was fraught with rainy weather, and growers were challenged to keep foliage covered to prevent CLS infection. We suspect growers had wash off with the prolonged wetting period early in the season, and it was difficult to get back into the orchard to reapply fungicide applications with the continuous rain. This scenario resulted in CLS infections in May, and many of these early-infected leaves are now dropping from the tree. Figure B is a good example of leaves infected with CLS.

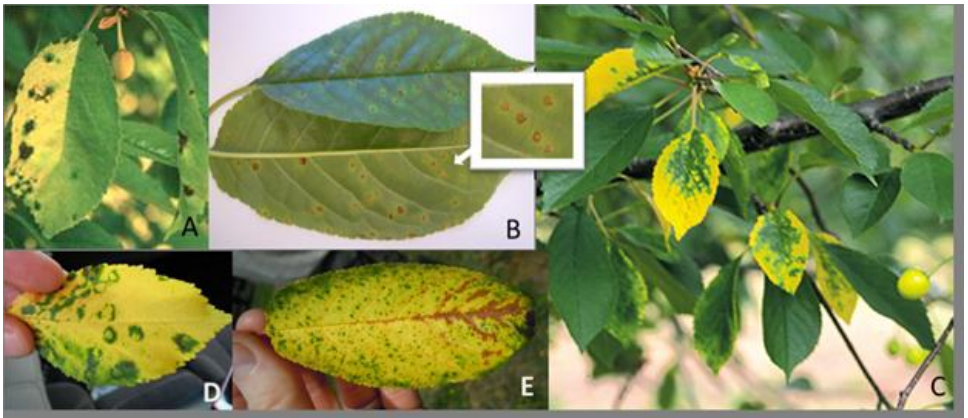
Cherry yellows is a viral disease that also causes tart cherries to drop their leaves. This classic leaf yellowing disease is caused by the prune dwarf virus. Defoliation is happening now, and often occurs in waves throughout the season. The severity of leaf drop is temperature dependent at 30 days prior to defoliation, and cold temperatures result in increased development of later symptoms. Leaves that are infected by cherry yellows have a yellow and green mottling that is not in a distinct pattern (Figure C).

Another viral disease that causes defoliation in tart cherry is green ring mottle virus (GRMV). We do not regularly observe this disease as most of our trees are certified virus-free. Leaves infected with GRMV are similar to those infected with cherry yellows except that the green spots within the yellow leaf are in a ring pattern (Figure D).

The last two potential causes of leaf drop this season are from phytotoxicity caused by spray applications that are still under investigation. Growers have reported leaf loss after using dodine and copper products. We cannot conclude for certainty that these materials caused the leaf loss as it has not been consistent in all orchards. There may be secondary factors in blocks that caused leaf drop, such as temperature, humidity, slow drying time, fast drying time, and other factors. Dodine has not been recommended for sweet cherries because of the potential for phytotoxicity, and we have observed phytotoxity in Balatons in past seasons. We suspected that dodine phytotoxity in Balatons is a result of the sweet cherry parentage in this variety. This season growers, particularly from Wisconsin, have observed phytotoxity in Montmorency, and the common denominator in those blocks appears to be the use of dodine (No figure available at this time). Leaves that are damaged from spray applications will eventually drop from the tree.

Lastly, we have some reports of phytotoxicity from copper products (Figure E). Many growers that used copper in the 1960s remember the phytotoxity issue in tart cherries with copper use, as copper was one of the recommended fungicides for CLS control. More recent data have shown that copper products are particularly effective against CLS, and provide excellent control at 1.2 lb of metallic copper. However, the potential from phytotoxicity from copper use remains a concern for many growers, and this year, we have evidence that suggests that some copper formulations can cause some leaf

loss. But as mentioned above, we have blocks where copper was used, and defoliation was a concern while other blocks received the same amount of copper product and resulted in significantly less leaf loss. Until we further investigate this issue, growers should not abandon the use of copper products, particularly as those blocks that have used copper exclusively this season are some of the cleanest CLS orchards in the region. Some of this phytotoxicity may also be related to the amount of lime used in a copper spray—many growers have reduced the lime in the spray tank as it is difficult to use. Reduced amounts of lime may have influenced the phytotoxicity in the copper applications.



Causes of leaf yellowing and defoliation on Montmorency visible at this time: A) bacterial canker, B) cherry leaf spot, C) sour cherry yellows, D) green ring mottle, E) copper phytotoxicity. *Photos by A. Jones and E. Lizotte.*

Apple

PREDICTED 2011 APPLE HARVEST DATES

Erratic weather conditions set predicted apple harvest days two to seven days behind normal.

Published July 12, 2011, MSU-E News for Agriculture - Fruit

Phillip Schwallier and Amy Irish-Brown, Michigan State University Extension

This season started out slow and late with considerable cold temperatures and above normal rainfall. Frost events were few and only minor in scope. Harvest dates appear to be about normal to a few days behind normal. The state experienced short bouts of near record hot temperatures and then below normal cool temperatures around the bloom stage. The whole state experienced these wild fluctuations in temperature. Bloom dates were behind normal this year, but not by much. Apple maturity for 2011 is expected to be two to seven days behind normal. Southeast Michigan has the greatest delay in predicted harvest dates due to the extreme rainy cool period near bloom and during the fruit set period.

The delayed bloom and erratic weather following bloom give us predicted harvest dates (Table 1) about two to seven days behind normal. These predicted harvest dates are for the center or peak harvest of these varieties for CA storage. This year, the 2011 predicted harvest dates are 9 to 23 days behind last year's predicted harvest dates (Table 2). Last year was a very early year.

Hot temperatures during July and August will hasten the maturity of some varieties. Gala is notorious for ripening early when late summer temperatures are above normal. Other varieties are less prone to hot temperatures, advancing fall maturity. Still, other varieties ripen when cold temperatures occur near harvest time.

The normal harvest dates for other varieties are listed in Table 3 for the Grand Rapids area. This year's 2011 predicted dates are a rough estimate based on the McIntosh, Jonathan and Red Delicious predicted dates. Other areas of the state should adjust non-predicted varieties based on their own history.

Table 1. 2011 predicted peak harvest dates.

Full bloom date				**Predicted harvest date**			
Station	**McIntosh**	**Jons**	**Reds**	**McIntosh**	**Jons**	**Reds**	**Observer**
SWMREC	5/11	5/12	5/12	9/12	9/26	10/2	Shane
Deerfield	5/13	5/15	5/17	9/15	9/29	10/5	Tritten
Romeo	5/19	5/21	5/21	9/17	10/2	10/8	Tritten
Peach Ridge	5/18	5/19	5/20	9/16	9/29	10/6	Schwallier
Ludington	5/21	5/22	5/22	9/20	10/4	10/10	Danilovich
NWMHRS	5/23	5/27	5/27	9/24	10/10	10/16	Rothwell

Table 2. Predicted 2011 peak harvest dates compared to normal and last year.

Days ahead of normal				**Days ahead of last year**		
Station	**McIntosh**	**Jons**	**Reds**	**McIntosh**	**Jons**	**Reds**
SWMREC	-5	-5	-4	-13	-10	-11
Deerfield	-7	-8	-3	-15	-10	-9
Romeo	-4	-7	-5	-16	-14	-14
Peach Ridge	-2	-3	-2	-14	-13	-14
Ludington	-2	-1	4	-16	-20	-19

NWMHRS	-2	-4	1	-20	-23	-23

Table 3. Normal peak harvest dates for varieties for the Grand Rapids area.

Variety	Normal date	2011 predicted date
Paulared	8/24	8/26
Gingergold	8/26	8/28
Gala	9/10	9/12
McIntosh	9/14	9/16
Honeycrisp	9/18	9/20
Empire	9/22	9/24
Jonathan	9/26	9/29
Jonagold	9/28	9/30
Golden Delicious	10/2	10/4
Red Delicious	10/4	10/6
Idared	10/10	10/12
Rome	10/15	10/17
Fuji	10/25	10/27
Braeburn	10/25	10/27
Goldrush	11/1	11/3

Small Fruit

MID-SUMMER GRAPE DISEASE UPDATE

Carefully scout for grape diseases, especially downy mildew, powdery mildew and black rot.

Published July 12, 2011, MSU-E News for Agriculture - Fruit

Annemiek Schilder, Michigan State University Extension, Department of Plant Pathology

Grape disease symptoms are becoming more apparent now, although well managed vineyards continue to look very clean. Downy mildew has been active for about a month due to abundant spring rains. The first cluster infections were first seen in 'Chancellor' grapes around mid-June, and unsprayed Niagara and Concord vineyards are showing foliar infections.

The first powdery mildew colony was sighted on a berry in the unsprayed sentinel plot in southwest Michigan late last week (July 3-9). Phomopsis symptoms have been present on leaves and canes since May and new growth may be obscuring older infections. We should be nearing the end of Phomopsis cluster infections. Anthracnose symptoms are increasing in severity in table grapes and some wine grapes. The pathogen is able to spread rapidly through rain splash and wind-driven rain and reddish spots are now visible on young berries. Fungicide applications are recommended to protect clusters and shoots from further infections.

Black rot symptoms are coming on strong in unsprayed or poorly sprayed vineyard blocks, and low levels may also occur in some sprayed vineyards due to suboptimal spray timing or fungicide wash-off by rain. Symptom development is relatively early this year, despite hot and dry weather over the last few weeks. Black rot is always a bit confusing as symptoms that are showing up now are the result of infections that happened during rain events (infection periods) two to three weeks ago. Applying a fungicide now may not do much to control infections that are becoming visible at this time. However, depending on the age of the berries, fungicides applied now may still be able to prevent new infections.

Grape berries are most susceptible to black rot infection for the first two to three weeks after bloom and become progressively more resistant as they develop, finally becoming highly resistant about five to eight weeks after bloom, depending on the variety. In general, 'Concord' berries are resistant to infection about four to five weeks after bloom, while some *V. vinifera* cultivars don't become fully resistant until eight weeks after bloom. Thus, the key to control black rot in juice grapes is preventing the establishment of early berry infections during the first few weeks after bloom. This means that most disease control was provided by the first and second post-bloom fungicide sprays. See MSU Extension Bulletin E-154, Michigan Fruit Management Guide, for fungicide recommendations.

Continue careful scouting for all grape diseases, including virus diseases. We have seen symptoms of peach rosette mosaic virus in juice grapes, and tobacco ringspot virus and grapevine leafroll virus in wine grapes. Herbicide injury symptoms are also commonly seen on foliage, including RoundUp, Gramoxone, and Stinger injury.

Dr. Schilder's work is funded in part by MSU's AgBioResearch.

TIME TO RENOVATE STRAWBERRIES

Developing a strong stand early with fertilization and irrigation while managing weeds and insects insures a strong start on next year's strawberry crop.

Published July 12, 2011, MSU-E News for Agriculture - Fruit

Eric Hanson, Mark Longstroth and Bob Tritten, Michigan State University Extension, Department of Horticulture; Michigan State University Extension

Strawberry beds to be carried over for another harvest season need to be renovated. Deciding whether to renovate or remove a bed differs with every grower's circumstances, such as market demand, land availability and production costs. As strawberry fields age, yields and berry size decline while weeds and diseases problems increase. Growers with high market demand, but limited available acreage, will retain beds longer. The decision requires knowledge of your production costs and net returns over the preceding seasons. If you decide to renovate, start after harvest as soon as possible. The

earlier runner-plants develop, the higher they yield the following year, so delaying renovation will reduce yields next year. Keep in mind that renovated beds need abundant water in July and August to ensure good growth this year and good returns next year.

Effective strawberry renovation ensures a healthy productive field in the fall.

In renovating matted-row strawberries, the fields are mowed and the rows narrowed. Fertilizers and herbicides are applied and the fields are irrigated to develop a strong stand for next year's crop.

Mow off the leaves just above crown height if the plants are healthy. Mowing may not be desired if the plants are stressed by drought or root diseases because weak plants have difficulty developing new leaves. Also, do not mow the leaves if renovation is delayed for more than a few weeks after the end of harvest.

Mowing is often the initial step in renovation.

Narrow the rows to 8 to 10 inches by cultivating with a rototiller or disk. Rototillers with tines removed above the row work very well because they toss some soil on top of remaining plants, encouraging additional rooting. More than an inch of soil may smother the plants. Some growers have success narrowing rows by treating the row middles with directed or shielded sprays of Gramoxone (paraquat). Gramoxone is a contact weed killer that is not mobile in plants, so it only kills treated tissues. This effectively narrows the plant row and does not expose new weed seeds by disturbing the soil. One problem with this approach is that it does not provide a loosely tilled soil for the rooting of runner plants. It also does not throw soil back over crowns.

Herbicides. Renovation is also a useful time to treat broadleaf weeds with amine forms of 2,4-D, such as Amine or Formula 40. Strawberry plants tolerate 2,4-D after harvest because they are not actively growing. If broadleaf weeds are a serious problem, apply 2,4-D a few days before mowing. This herbicide must be absorbed by the weed leaves to be effective, so don't mow off the weed leaves before applying 2,4-D.

Sinbar can also be applied at renovation for preemergent weed control. Apply 3-6 oz. of Sinbar 80W per acre, using the lowest rates on sandy ground or weaker plant stands. Mow plants and narrow the rows first, so the Sinbar is applied uniformly to the soil. Irrigate to rinse the herbicide off the plants and into the soil. Michigan has a Section 18 label for the preemergent herbicide Spartan. Spartan is effective on common groundsel, field pansy, mayweed, white campion (white cockle) and pigweeds. Apply 4 to 8 oz. Spartan 4F per acre after plants have been mowed.

Fertilizing. Another step in renovation is to fertilize the planting to encourage new growth and runnering. On heavier loamy soils, apply enough fertilizer to supply 50 lb. N per acre. On sandy soils, apply 30 to 40 lb. N at renovation and again in early August.

Irrigating. Do not neglect watering the field at renovation and during the remainder of the summer. Plants need water to grow and all your other efforts are wasted if the renovated plants do not get off to an early strong start. Runner-plants that develop during July and August need adequate moisture to root and maintain a healthy leaf canopy to store food reserves for next year's crop. The amount of water available to strawberries is the product of the water holding capacity and the rooting depth, usually considered 8 to 12 inches (Table 1). Irrigate when about half of the available water has been used. During hot weather, this means strawberries may need irrigation every two to three days (sandy soils) to every four to five days (heavier soils).

Table 1. Available water in a strawberry root zone as affected by soil texture.

	Available water In root zone (inches)	
Soil texture	**Per inch of depth**	**(8-12 inch depth)**
Loamy sand	0.07	0.6 – 0.8
Sandy loam	0.13	1.0 – 1.6
Loam	0.17	1.4 – 2.0
Silt and clay loams	0.18	1.5 – 2.2

Pest control. Normal care should be taken to protect the new growth from leaf diseases. Renovation also allows the treatment of some root diseases such as red stele. Growers should be prepared to control potato leafhoppers. This insect causes hopper burn on the leaves and stunts strawberry growth.

Potato leafhoppers burn on strawberry leaves. Healthy leaf on the left and affected leaf in
the center. Note the yellowing at the margin of the leaf and the yellow streaks spreading
out to the leaf edge marking the sites of feeding where the insect injected a toxin into the
plant.

Dr. Hanson's work is funded in part by MSU's AgBioResearch.

COMPARISON OF FRUIT SAMPLING METHODS FOR SWD IN BLUEBERRY

Rufus Isaacs
Department of Entomology, Michigan State University

Spotted wing Drosophila (SWD) is a new invasive insect pest of fruit crops that was first detected in Michigan in September 2010. At the time of this article, there have been no detections of SWD in traps in Michigan during 2011. Fields are being monitored carefully, and the fruit industries are preparing multiple approaches to ensure that there is no economic impact of this insect. One important component of an SWD Management Plan is the ability of processors and buyers to detect larvae and pupae in fruit samples so that infested fruit is not marketed. This study compared the effectiveness of four sampling methods for detecting SWD larvae and pupae in fruit, including a boil method currently used to detect blueberry maggot infestation of blueberries in the eastern US.

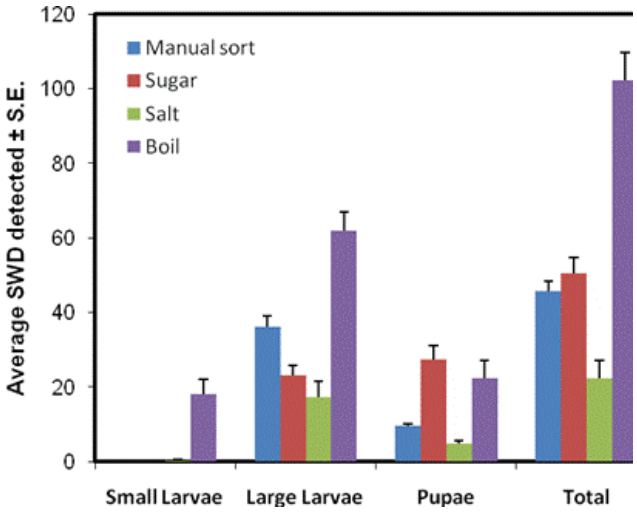
Methods: Organic, store-bought blueberry fruit were exposed for 12 days to SWD adult flies, using insects from a colony maintained at Michigan State University. Adult flies were then anaesthetized with CO2 and removed from the containers, and then the berries were mixed and sorted into 100 berry samples. Sixteen replicates were set up, with each experimental unit consisting of 100 berries. These were sampled using one of the following four methods:

Manual sort: careful manual sampling through each berry under a microscope to detect all larvae and pupae of SWD.

Sugar: mashing fruit manually in a Ziploc bag followed by suspension in 1.5 cups of sugar water (quarter of a cup of sugar in a quart of water) and searching for SWD in the liquid.

Salt: covering berries with 100 ml of a salt solution (quarter of a cup of salt in a quart of water) and examination after 15 minutes for larvae and pupae on the berry surfaces.

Boil: boiling the berries in 150 ml of water for 3 mins 20 seconds (=1 minute boiling) and then crushing berries over a 4 mesh/inch screen with the back of a spoon and rinsing the fruit with cold water over a dark colored tray to collect the juice and larvae.



Results: The boil method was the most effective for detecting larvae in berries, providing significantly greater ability to detect small larvae, and being 2-3 times more effective than the sugar or salt methods for detecting large SWD larvae. Even though the manual sorting was done using a microscope and careful examination of the berries, it failed to detect small larvae and the fruit pulp hampered detection of the large larvae and pupae. The sugar method was effective for detecting pupae because they all floated on the liquid surface, but the cloudy liquid obscured some of the larvae, and smaller larvae were not detected. The salt method was the least effective, detecting the lowest number of each stage of SWD.

Summary: From the results of this study, the boil method is recommended for use by Michigan producers and processors that are sampling fruit to detect contamination by this insect. This method provided high sensitivity to large and small larvae, gave rapid results and could be implemented at a receiving station to determine the infestation status of berries. Further research is needed to determine the sensitivity of this method for low infestation situations, and to optimize the sampling to ensure the highest possibility of detecting berries infested with SWD.

Thanks to Katie O'Donnell and Noel Hahn for technical assistance. Funding provided by Project GREEEN

Other

MANAGING JAPANESE BEETLES IN FRUIT CROPS

View the different control methods and insecticide, including organic, options for minimizing Japanese beetles on your farm.

Published July 12, 2011, MSU-E News for Agriculture - Fruit

Rufus Isaacs and John Wise, Michigan State University Extension, Department of Entomology

Japanese beetles have only one generation per year, but these beetles emerge over a long period from late June through August and they live for over 30 days. They feed on the foliage and fruit of various fruit crops grown in Michigan, causing damage to the plant and increasing the risk of fungal diseases. Their emergence during mid-summer can also result in their presence during harvest of some fruit crops, creating a risk of contamination. They are also highly mobile insects and can fly into fields from surrounding areas. This article provides information on insecticide options based on tests over the past few years conducted at the Trevor Nichols Research Complex and at grower's farms.

Japanese beetles are about 12 mm long.
Photo credit: Rufus Isaacs, MSUE

Making your farm less attractive to beetles

Many farms have sodded row middles and perimeters around fields, with irrigation being broadcast during the summer months. This is done for good farm management reasons, but it also creates ideal conditions for Japanese beetles to lay eggs since they prefer to lay eggs in mown grass and in moist soil. While it may not make sense to do this in all farm situations, removing the grass or using a non-grass cover crop in row middles, or restricting irrigation to the crop row through a drip system are all approaches to reduce the suitability of sites for reproduction of this pest.

Certain weeds are another magnet for Japanese beetles. Beetles are much more abundant in crop fields where there is poor control of wild raspberry, blackberry, Virginia creeper, wild grape or sassafras. These weeds are highly attractive and beetles will aggregate on these plants and then lay eggs in the soil nearby. Plan now for a fall application of herbicide to control these plants and reduce the attractiveness of your fields.

While growers select their fruit crop cultivars based on many criteria other than insect susceptibility, there are some cultivars of apple, blueberry and raspberry that are highly attractive to Japanese beetles and are more likely to have feeding injury. These include Honeycrisp apples, Bluecrop blueberries and Chinook and Heritage raspberries. However, it is difficult to generalize about this issue of susceptibility because Japanese beetles will select the most susceptible of the cultivars available in a field. So, a low-ranked cultivar could be attacked more if it is the most attractive of the cultivars present.

High tunnels

A recent trend in fruit production is the increasing use of high tunnels to protect fruit from rain. We have also observed that this approach to fruit growing can significantly reduce the activity of Japanese beetles on fruit. While they may move into plantings at the end of tunnels where there is direct sunlight, densities are much lower compared with plantings out in full sunlight.

A few thoughts about trapping

Traps are sold widely for Japanese beetle monitoring and control. However, these insects are very easy to see so they can be monitored by looking directly at the crop – you will know when they are present from the feeding damage and by seeing the beetles. Traps are highly attractive and draw beetles to them over large distances, so putting a trap near your crop fields will draw beetles from the surrounding landscape.

Many of the attracted female beetles do not get trapped and end up landing on foliage nearby and feeding or mating then laying eggs in the soil near the trap, so this creates a hot-spot for next season. Mass trapping of beetles is also not economically feasible in commercial fruit plantings and there is little evidence that this strategy will work to reduce beetle populations and crop injury. The take-home message is that traps should be avoided because they will not help reduce Japanese beetle damage in fruit crops.

Broad-spectrum insecticide options

The carbamates Sevin and Lannate provide immediate control of beetles present during the application. They are also stomach poisons, so if beetles eat treated foliage they will also receive a higher dose. This can be a good property for control of Japanese beetles since they eat so much that a strong dose of insecticide is taken up. Lannate has a short residual activity of a few days, whereas Sevin provides a week or more of protection. Sevin has a three- or seven-day pre-harvest interval (PHI), depending on the crop, and Lannate ranges from 3- to 14-days.

The organophosphates Guthion and Imidan (buffer Imidan to pH 6.0 in the spray tank) both provide excellent lethal activity on adult beetles, although it can take a few days for their effects on Japanese beetles to be seen as the beetles take up the insecticide. If considering Guthion, beware of the 2011 restrictions on the total amount of this insecticide allowed this season as part of the EPA phase-out – see the label for details. These organophosphates provide 10 to 14 days of activity, with a 3- to 21-day PHI, depending on the crop.

The pyrethroids Danitol, Asana, Brigade, Baythroid, Mustang Max, Warrior and Capture give instant knockdown and mortality of adult beetles, with 7 to 10 days of activity. Beetles that do not receive a lethal dose of pyrethroid may also be repelled from treated fields, providing an additional mode for reducing infestation of crops at harvest. PHI's for pyrethroid insecticides vary from 1 to 14 days and can be different in different crops, so check the label before use or consult the table at the back of the 2011 edition of the MSU Fruit Management Guide to compare PHI's.

Reduced-risk insecticides

The labeling of the neonicotinoids Provado, Actara, Assail, Belay, Scorpion and Clutch for use in some fruit crops provides selective options for Japanese beetle management. These insecticides provide two to five days of lethal activity from the surface residues before being absorbed into the foliage. Thereafter, beetles must eat treated foliage to get a dose of the insecticide. Once inside the foliage, these locally-systemic insecticides are rainfast and provide repellency and knockdown activity, but with much less direct mortality from the residues. These neonicotinoids will also provide some control over aphids and leafhoppers. The rate of these insecticides allowed in different crops will have a large impact on their effectiveness, and growers should consider the higher end of the rate range to achieve some lasting control of Japanese beetles. Most labels will provide guidance on the rate that is appropriate for control of this pest.

Avaunt is now labeled for use in grapes with Japanese beetle, grape berry moths and leafhoppers (suppression only) on the label. Pre-mixed insecticides such as Voliam Flexi may contain one active ingredient targeting moth pests and another that is active on Japanese beetles. In the case of this insecticides, the same active ingredient as Actara is present in Voliam Flexi to provide some control of beetle feeding. It is prudent to examine the rates of each active ingredient in these pre-mixes to determine whether a pre-mix is right for your insect pest control needs.

Short PHI and organic options

For growers looking for beetle control immediately before harvest or in organically grown fruit crops, some selective insecticides with zero day PHI's can provide a tool to repel beetles and help achieve beetle-free fruit during harvest. Compounds containing neem (Azadirect, Neemix) have a zero-day PHI and pyrethrum (Pyganic) has a 12-hour PHI. These compounds are labeled for organic use, and have a short but effective impact on adult Japanese beetles with some mortality, some knockdown off the crop and some repellent activity.

Typically, there is only one to two days of activity against beetles because the residues do not remain active for long. The non-organic form of Pyganic, called Evergreen, also has a 12-hour PHI and is much more effective against Japanese beetle than Pyganic due to the addition of a chemical that inhibits the beetle's ability to break down the insecticide. A final option for protection against Japanese beetle is SURROUND WP, a white clay material applied to create a white coating on the surface of foliage and fruit to provide protection against insects. When applied to provide a good coating (typically requiring two or more applications), SURROUND has performed very well against Japanese beetles in trials conducted in blueberry and grape. If considering this approach to Japanese beetle control, be aware that the white coating on the fruit may require some removal after harvest to make the fruit marketable. This may be challenging for some types of fruit. For example, in blueberries, the white residue was removed well from the surface during processing, but deposits in the calyx cup were not removed even after running berries through a typical wet processing line with food grade detergents.

Soil-applied insecticides

Japanese beetles typically lay their eggs in moist, grassy areas and many fruit farms have a large amount of this highly suitable habitat. An additional approach to reducing the impact of Japanese beetles in a farm is to reduce the overall population by targeting the grub stage of this pest to reduce the abundance of beetles in the following year. If the location of high grub densities near fruit fields is known, these areas could be treated with a soil insecticide to get maximum return on this treatment. Our experience in Michigan blueberry fields has been that application of Admire (16 oz/acre) to grassy field perimeters in late June and early July reduced the abundance of beetles on bushes for the first few weeks of their flight period in the next growing season. After that, beetles flying into the area from outside swamped out this effect, so there is only a short-lived benefit from targeting the grubs in fields surrounded by infested grassy areas. However, as part of an overall IPM program to minimize the impact of Japanese beetles, this approach can help reduce the number of beetles growers must control. Platinum is another soil-applied insecticide that can be used for this grub-control strategy.

The work of Dr. Isaacs and Dr. Wise is funded in part by MSU's AgBioResearch.

REMINDER - SURE DEADLINE APPROACHING

Producers need to sign up for the 2009 crop year for Supplemental Revenue Assistance Payments by **July 29.** *Producers considered socially disadvantaged, a beginning farmer, or a limited resource farmer may be eligible for SURE without a policy or plan of insurance or NAP coverage.*

For more information on the 2009 SURE program, visit any USDA Service Center or FSA county office or http://www.fsa.usda.gov/sure.

WEBSITES OF INTEREST

CIAB Weekly Raw Product Report – Week 1
http://www.cherryboard.org/Week12011.pdf

Insect and disease predictive information is available at:
http://enviroweather.msu.edu/homeMap.php

60 Hour Forecast
http://www.agweather.geo.msu.edu/agwx/forecasts/fcst.asp?fileid=fous46ktvc

Information on cherries is available at the new cherry website:
http://www.cherries.msu.edu/

Fruit CAT Alert Reports
http://www.ipmnews.msu.edu/fruit/

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

ACTUAL AND PREDICTED DEGREE-DAY ACCUMULATIONS SINCE MARCH 1, 2011

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

Last Revised: 7-14-11

Home
Background & Projects
Calendar
Directions
InfoVideos
Links
Extension Expert Search
Publications
Staff

Northern Michigan FruitNet 2011
Special 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

July 15, 2011

SAP BEETLES FOUND IN SWEET CHERRIES
N.L. Rothwell and E.M. Lizotte, MSU-E

Sap beetles have been found in ripening sweet cherries—these insects have been only observed in cherries infected with American brown rot or bacterial canker. We have not seen these insects in intact cherries. These insects overwinter as adults in protected places such as decaying vegetation, debris or fruit buried in the ground. In the spring, adults come out of hibernation and mate. Egg-laying begins in May and June, and females lay near decomposing plant material. Larvae develop in food material in contact with the soil, and full-grown larvae leave their food when mature, wander through the soil and molt into the pupal stage. Adults emerge in June and July, and there is usually only one generation per year.

Sap beetle can be a problem in cherry if branches are low hanging and the fruit comes in contact with the ground or tall grass in the row middles. However, we had high populations of sap beetles in 2010 where these insects have been particularly problematic on trees with branches pruned up high. Last year, we hypothesized that the large populations of these occasional pests are a result of the fruit left in the orchard/shaken on the ground in 2009. Populations have likely decreased during this season as we did not leave much fruit in the orchard in 2010.

However, based on our observations today, growers should be on the lookout for sap beetles in fruit that is ripening or damaged as they are attracted to ripe or overly ripe fruit. Control of these insects will likely be difficult as the adult beetles burrow into fruit to feed. Additionally, we are at or approaching harvest, so growers will need to pay special attention to the PHI's of the materials. Pyrethroids have good knockdown and short PHI's, Sevin and malation also have 3-day PHI's.

WEBSITES OF INTEREST

CIAB Weekly Raw Product Report – Week 1
http://www.cherryboard.org/Week12011.pdf

Insect and disease predictive information is available at:
http://enviroweather.msu.edu/homeMap.php

60 Hour Forecast
http://www.agweather.geo.msu.edu/agwx/forecasts/fcst.asp?fileid=fous46ktvc

Information on cherries is available at the new cherry website:
http://www.cherries.msu.edu/

Fruit CAT Alert Reports
http://www.ipmnews.msu.edu/fruit/

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

ACTUAL AND PREDICTED DEGREE-DAY ACCUMULATIONS SINCE MARCH 1, 2011

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

Last Revised: 7-15-11

Home
Background & Projects
Calendar
Directions
InfoVideos
Links
Extension Expert Search
Publications
Staff

Northern Michigan FruitNet 2011
Weekly Update
NW Michigan Horticultural Research Station

Nikki Rothwell, District Horticulturist
Erin Lizotte, District Fruit IPM/IFP Agent
Bill Klein, Farm Mgr, NWMHRS
Duke Elsner, Agricultural & Regional Viticulture Agent

July 19, 2011

GROWING DEGREE DAY ACCUMULATIONS through July 18th at the NWMHRS

Year	2011	2010	2009	2008	2007	2006	21 yr. Avg.
GDD42	1755	2160	1601	1721	2037	2030	1823.4
GDD50	1098	1362	922	1049	1297	1274	1130.9

Growth Stages at NWMHRS (July 18 – 4:00 p.m.)

Apple: Red Delicious – 45 mm fruit
Gala – 36 mm fruit
Yellow Delicious – 38 mm fruit
Pear: Bartlett: 29 mm fruit
Sweet Cherry: Hedelfingen: Harvested
Napoleon: Harvested
Gold: Harvested
Montmorency: 19 mm fruit
Balaton: 16 mm fruit
Apricot: 33 mm fruit
Plum: 23 mm fruit
Grapes: Buckshot berries

Weather Report

The weather has been extremely hot in the last few days, with daytime temperatures in the 90's. The heat is expected to last throughout the week. With these high temperatures, we have gained quite a few degree days: 1755 base 42 and 1098 base 50. We are very close to our 21-year average, which is a bit of a surprise with the cool start to the season. We had some rain, our first since the beginning of July, early Monday morning. Rainfall varied over the region, and some areas received over an inch of rain while others had 0.25-0.3" of rain. Total July rainfall at the NW Station is 0.53" and since June 24, 0.61".

Crop Report

Cherry harvest is in full swing, and growers are shaking both sweets and tarts now. With the cold temperatures, many growers thought we would be harvesting later than usual. The season also seemed to move along very quickly, and fruit seemed to be ready to harvest overnight. Strawberry growers are renovating their fields, and red raspberries harvest is underway. In winegrapes, many growers and vineyard managers are tucking vines. Vine growth is excellent with all the recent heat and moisture earlier in the season. Most varieties are at the buckshot berry stage.

SIGHTS IN MONTMORENCY THIS WEEK
Erin Lizotte, Extension Educator, MSU-E

A) Cherry fruit fly, B) plum curculio feeding damage, C) American brown rot.

FIRST CAPTURE OF SPOTTED WING DROSOPHILA

Deploy and check traps now to enable early detection of this pest.

Published July 15, 2011, MSU-E News for Agriculture - Fruit

Rufus Isaacs, Michigan State University Extension, Department of Entomology

The first capture of spotted wing Drosophila for 2011 in Michigan has been confirmed. This is a new invasive insect pest of several tree and small fruit crops grown in this region, and it was first trapped in this state in late 2010. It was confirmed this week that we have caught this pest in a trap that was collected on July 7 in Allegan County, south of Grand Rapids, Mich. On Wednesday afternoon (July 13), the USDA-APHIS taxonomist confirmed that this specimen is a male spotted wing Drosophila fly. This was suspected at the time of trap checking, but we wanted to be sure for this first catch of the year. The specific trap in which the fly was trapped is located 50 feet into the woods adjacent to a crop field that had high catches in fall 2010. Subsequent checking of the same trap, and of traps in the vicinity, have not found any more spotted wing Drosophila this week.

It is important to highlight that **we have not detected SWD in any traps placed in fruit crops, or in any fruit** this season. Monitoring is underway in multiple crops and multiple counties will continue and we will continue to update growers through MSU Extension News for Agriculture and through our MSU IPM spotted wing Drosophila website as this situation develops.

This first detection of spotted wing Drosophila for 2011 is a wake-up call to make sure traps are well positioned in the shade in the fruit zone, checked regularly and maintained with fresh apple cider vinegar. Directions on trap design, placement, checking, and also information on management of this insect in blueberries and other fruit crops are all available at www.ipm.msu.edu/SWD.htm

TABLE OF TRAP CATCHES FROM THE NW MI HORTICULTURAL RESEARCH STATION

by Erin Lizotte

TEMPERATURES ARE PREDICTED TO KEEP CLIMBING

The 6-10 and 8-14 day outlook call for above normal temperatures and above normal precipitation.

Published July 13, 2011, MSU-E News for Agriculture - Fruit

Aaron Pollyea, Michigan State University Extension, Department of Geography

The calm and sunny weather we are experiencing is from the upper air zonal wind pattern that is holding above the state of Michigan. This upper air pattern helps make any low pressure systems in its area weaker, thus bringing fairer weather overall. This pattern will persist until around Thursday afternoon (July 14), where the upper air will begin to shift, moving from northwest to southeast, forming an upper air ridge that we will be on the trailing side of. We will see some light precipitation on the Lake Michigan coast starting around Friday afternoon (July 15). This precipitation will be mostly confined to the northern Lower Peninsula through the weekend. Totals could be up to a half inch or so through the weekend.

As this ridge strengthens on Sunday into Monday (July 16-17), we could begin to see more wide spread precipitation across the state with the largest amounts on Tuesday (July 18). A surface low pressure system will form to our north and move eastward and a cold front will develop that will cause this precipitation. Long range forecasts suggest that this precipitation will continue to Wednesday morning.

Because of this, ridge temperatures should steadily warm through the rest of the week, with highs today (July 13) in the upper 70s, by Friday in the mid 80s, Saturday in the high 80s, Sunday could be near 90°F and Monday in the low 90s. Be wary of hot and dry conditions until early next week when the precipitation begins.

The **6-10 day outlook** for July 18-22 shows very above normal temperatures and also above normal precipitation. The **8-14 day outlook** for the July 20-26 also shows very above normal temperatures and above normal chances for precipitation.

WELL WATER SCREENING

The MDA is no longer doing the well water screening for Nitrates, Nitrites, and Triazine herbicide during AgExpo held at MSU in mid-July. The MDA has trained the Water Stewardship/MAEAP Technicians on how to properly administer a proper water test program including explaining the proper sample technique and protocol, filing out info sheets and how to take, read, record, and interpret the sample results.

Michigan conservation districts will screen drinking water well samples for nitrate during 2011. The screening is sponsored by the Michigan Agriculture Environmental Assurance Program (MAEAP) and is paid for by funds generated from Michigan pesticide and fertilizer registration and tonnage fees. There is **no** *fee* to participants for this service. The screening is open to everyone who uses a personal well for drinking water; however, the number of samples that can be tested may be limited. All results are confidential. You will receive results from the screening in 8 to 10 weeks, with information about what to do if the concentration of nitrate or nitrite is too high.

For more information on this year's well water screening, contact your local SCD office or Dan Busby at the Grand Traverse Conservation District at 941-0960, ext. 22. Information and forms are also available at www.michigan.gov/waterstewardship.

WEBSITES OF INTEREST

CIAB Weekly Raw Product Report – Week 2
http://www.cherryboard.org/Week22011.pdf

Trapline Counts from the NW Michigan Horticultural Research Station
http://agbioresearch.msu.edu/nwmihort/trapcount.htm

Insect and disease predictive information is available at:
http://enviroweather.msu.edu/homeMap.php

60 Hour Forecast
http://www.agweather.geo.msu.edu/agwx/forecasts/fcst.asp?fileid=fous46ktvc

Information on cherries is available at the new cherry website:
http://www.cherries.msu.edu/

Fruit CAT Alert Reports
http://www.ipmnews.msu.edu/fruit/

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

ACTUAL AND PREDICTED DEGREE-DAY
ACCUMULATIONS SINCE MARCH 1, 2011

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

Last Revised: 7-19-11

Home
Background & Projects
Calendar
Directions
InfoVideos
Links
Extension Expert Search
Publications
Staff

Northern Michigan FruitNet 2011
Weekly Update
NW Michigan Horticultural Research Station

Nikki Rothwell, District Horticulturist
Erin Lizotte, District Fruit IPM/IFP Agent
Bill Klein, Farm Mgr, NWMHRS
Duke Elsner, Agricultural & Regional Viticulture Agent

July 26, 2011

GROWING DEGREE DAY ACCUMULATIONS through July 25th at the NWMHRS

Year	2011	2010	2009	2008	2007	2006	21 yr. Avg.
GDD42	2001	2367	1769	1916	2225	2237	2017.0
GDD50	1288	1513	1034	1188	1430	1425	1268.9

Growth Stages at NWMHRS (July 25 – 9:00 a.m.)

Apple: Red Delicious – 48 mm fruit
Gala – 40 mm fruit
Yellow Delicious – 43 mm fruit
Pear: Bartlett: 44 mm fruit
Montmorency: Harvested
Balaton: 18 mm fruit
Apricot: Early varities harvested
Plum: 23 mm fruit
Grapes: Berry touch

Weather

Despite our cold wet spring, we have accumulated degree days that are almost spot on with our 21-year average. So far this season, we have accumulated 2001GDD base 42, and our average is 2017GDD base 42. For base 50, we have accumulated 1288GDD this season, and the 21-year average is 1269. The temperatures so far this week are much cooler than last week. We hit a few records in the north with the high temperatures, and we stayed in the high 80's and low 90's during the day. Nighttime temperatures also were pretty high last week: high 60's and low 70's. Rainfall has been variable across the region. At the NWMHRS, we have not had substantial rain in a few weeks, and we have had only 0.61" of rain since 24 June. Weather stations north of the NWMHRS had a bit more rainfall, but conditions remain very dry throughout the region.

Crop Report

Tart cherry harvest is in full swing here in the north. Quality of the tart cherry crop looks surprisingly good, particularly with the heat last week. In the past, we have observed soft fruit with high temperatures at harvest, but this season, fruit is firm. Cherries are smaller than usual, which is likely due to the lack of rainfall in the past few weeks. Sweet cherry harvest is wrapping up, and the hot and dry temperatures really helped keep disease at bay. Red raspberry harvest has started, and fruit looks good.

Pest Report
Apples
Minimal apple scab lesions have been reported around the region, particularly on highly susceptible varieties. Given the warm weather, growers in the north will be keeping an eye out for sooty blotch flyspeck. Sooty blotch flyspeck is more common further south where more moisture is present in the season. Sooty blotch flyspeck is caused by a fungal disease complex (Gloeodes and Leptodontidium and Schizothyrium) of apple in humid fruit growing regions of the United States. The diseases can cause significant economic losses due to the unsightly appearance of affected fruit. Both pathogens colonize the waxy surface of pome fruit, but do not penetrate lower layers.
Though we have not caught apple maggot at the Research Station, area scouts are reporting trap catches as early as last week. Apple maggot management should be targeted 7-10 days after detection for most insecticides. For more information on apple maggot management refer to the article, Managing Apple Maggot with Insecticides. Codling moth emergence continues at a slow pace. Second generation codling moth treatment will not begin until approximately 1200 DD50 after first generation sustained catch (though detecting second generation adult biofix and predicting egg hatch is a more accurate gauge of the ideal treatment window for second generation). Growers can track their site-specific progression using the codling moth model. Green apple aphid numbers on foliage and fruit have increased with the warm

weather and succulent growth of apple. Obliquebanded leafrollers continue to emerge as adults, and adult moth trap catches are up again this week after two weeks of minimal activity. Growers can scout for multiple life stages of obliquebanded leafrollers; adults moths are easily trapped with pheromone-baited delta traps, and larvae or pupae are also likely present at this time in rolled leaves. Growers looking to treat for the summer generation of obliquebanded leafroller larvae can use the obliquebanded leafroller model as a reference.

Cherries

Obliquebanded leafroller activity continues in cherry, with adults, larvae, and pupae present in area orchards at this time. Adult obliquebanded leafroller trap catch was up in most traps sites this week. For growers that were not able to make an application targeting overwintering larvae earlier this season, a second management window is open , but growers should keep in mind the PHI's of the target materials. Obliquebanded leafrollers have been observed more commonly in both sweet and tart cherry during the past seasons. These insects are not internal feeders in the fruit, and although they can cause some damage from defoliation, the greater concern is their threat as a contamination pest if they are found in cherry tanks at harvest. Growers with problem orchards risk having tank-loads rejected at the processor if obliquebanded leafroller larvae are present. Organophosphate resistance (and pyrethroid cross-resistance) in obliquebanded leafrollers is likely one of the factors contributing to larvae in cherry tanks at harvest. Fortunately, there are several new insecticides that have been efficacious against summer generation obliquebanded leafroller larvae. Tart and sweet cherry obliquebanded leafroller larvicides include Delegate, Belt, Altacor, Voliam flexi or Entrust. The pre-harvest interval should be a primary consideration when selecting an insecticide a this point in the season. The larvae have a distinct black head capsule that is slightly flattened. Obliquebanded leafroller larvae vary from light yellow to green and grow to 1 inch. Growers can also monitor for the adult moths using pheromone baited stick traps. Treatments should be applied if average trap catches approach or exceed 20 moths per trap or two to three active larvae per tree are observed.
Plum curculio activity is surprisingly continuing with adults back in the traps this week. Second generation American plum borer emergence continues– delineating between generations can be difficult as trap catches often never stop completely. However, as trap numbers begin to climb, the increased catch of moths indicate the flush of second generation emergence will likely occur in the coming weeks. Lesser peach tree borer emergence has rebounded with an average of three per trap. Peach tree borer numbers also continued to rise this week.
The first cherry fruit flies of the season were detected in the NWMHRS trap line on July 5. Positive trap catches have continued since and may growers will be applying post harvest sprays in the coming weeks. Numbers were up again this week with more than 80 flies caught in some trap locations. Cherry fruit flies emerge for about a month, with peak emergence in late June and into early July. Seven to 10 days after emergence, females deposit eggs in the fruit where hatching larvae immediately burrow in and feed. Most control strategies employ insecticides that target the adult stage during that 7- to 10- day window with subsequent applications as needed. If flies are trapped on-farm, but a regional trap catch was recorded earlier, the treatment should be timed based on the earlier regional capture to minimize the risk of larvae in the fruit. However, because population size influences trap catch, it is critically important that growers monitor their own farms for cherry fruit flies to help predict population size as well as duration of activity. Larvae mature in the fruit and then drop to the soil where they enter the ground, pupate and start the next generation's life cycle the following season.
Recent work has shown that a great deal of cherry fruit fly activity occurs after harvest, and this pest behavior provides a postharvest opportunity for management in sites with high populations. Preliminary research has shown that imidacloprid products, such as Prey and Provado work well at the post-harvest application timing seven days after harvest. This spray could be tank-mixed with the post-harvest chlorothalonil application for cherry leaf spot. Refer to MSU Extension Bulletin E-154 Fruit Management Guide for more information and always carefully read and follow pesticide labels.
Black cherry aphids are also visible in significant numbers on the terminals of sweet cherry branches. Black cherry aphid feeding curls and stunts leaves and deforms shoot growth. Highly susceptible varieties include Black Tartarian, Napoleon, Schmidt and Windsor. Young cherry trees are especially susceptible to injury and can be killed if infestations are heavy. Severe infestations may also reduce the quantity and quality of the crop on mature trees. Overwintering black cherry aphids eggs hatch as cherry buds begin to open in April. Two to three generations are usually completed on cherry. Several summer generations are produced on alternate hosts, with winged adults returning to cherry orchards in September and October to mate and lay overwintering eggs. There are a number of effective insecticides for the management of black cherry aphids in sweet and tart cherry, including Provado, Actara, Assail, Beleaf, Voliam flexi, Movento and Leverage (management may be delayed until postharvest). As we approach harvest, growers should be aware of the pre-harvest intervals of various materials and always read and follow pesticide labels carefully.
The potential for epidemic levels of cherry leaf spot remains a concern this season. We began seeing significant cherry leaf spot infections early this season and defoliation is already underway in some blocks, particularly those with foliar bacterial canker infections from this spring. Growers should look closely to determine if it is cherry leaf spot, bacterial canker, virus or phytotoxicity causing defoliation as all are present this season. Cherry leaf spot is resistant to sterol inhibitor fungicides (Indar, Elite, Orbit) in all the major fruit producing areas of Michigan. As cover treatments are applied, remember to alternate the use of fungicide classes and tank-mix dodine and strobilurin fungicides with a full rate of Captan to manage against resistance development. Under cool conditions, copper is an excellent cherry leaf spot material and a good strategy for resistance management; copper rates of 1.2 lbs. metallic copper are recommended. Lime is also recommended as a safener for copper applications, but Imidan cannot be used in this tank-mix due to changes in pH.
Early bacterial canker symptoms allowed American brown rot infections to become established on green fruit early and hail damage and sites with a history of American brown rot are also at risk at this time with weather conditions highly favorable for disease development. Indar should be applied at a 6 fl oz/A rate, a 8 fl oz/A application rate should only be used if a shift in fungal sensitivity is suspected (only Indar 2F is labeled for increased rates). Surfactants, high water application volumes, full covers and slow speeds are important strategies for American brown rot management. Growers looking to treat for cherry leaf spot and hedge their bets against American brown rot could utilize Pristine at this time.

Grapes
Duke Elsner, Grand Traverse County MSUE

The crop load looks very good in most NW vineyards. Abnormally hot weather has pushed vines along quickly. Berry growth has been rapid, and tight clustered cultivars are well past berry touch. Some growers have started to hedge vines, which has resulted in many lateral shoots already. It looks like we'll have another year with a need for several rounds of hedging. **Powdery mildew** was not seen on leaves or berries of any cultivars at the Horticultural Station on July 25. Five other Leelanau County vineyards visited on the same day also showed no powdery mildew. A private scout reported seeing just a little powdery mildew in a few Old Mission vineyards.

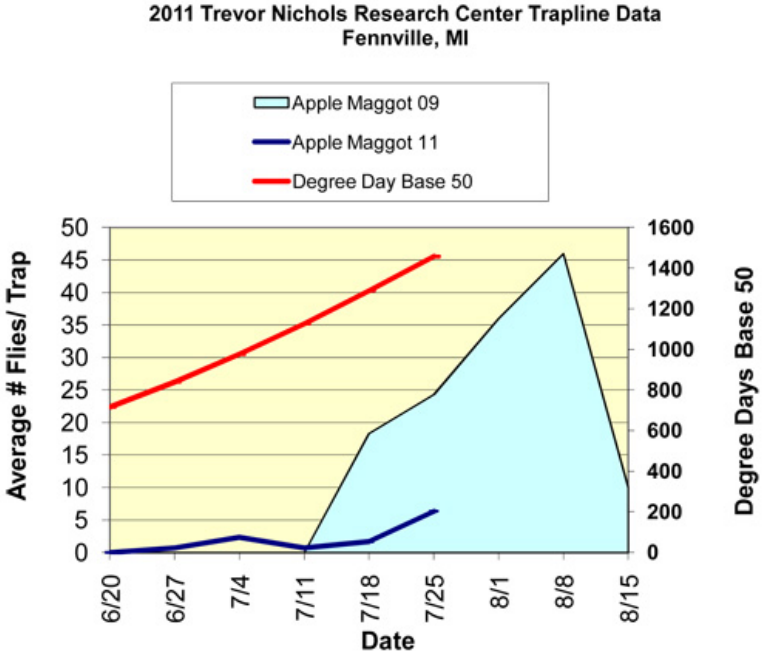
Grape berry moth is the primary insect pest at this time, as adult flight and egg laying activity continues. **Potato leafhopper** pressure is still light in treated vineyards, and really not very significant on the unsprayed vines at the Horticultural Station. The first adult **Japanese beetles** were seen on July 25. **Hornworm** larvae are over one inch in length and beginning to feed rapidly. These are of little concern in established vineyards, but they can be very serious defoliators in young vines.

Weed growth under the trellis has been quite a problem in some vineyards this year, probably due to heavy spring rains reducing herbicide residues at the soil surface.

Saskatoons
Fruit is ripening and harvest should be underway. There have been a few reports of rust fungus infections to leaves, stems and berries in the last two weeks.

MANAGING APPLE MAGGOTS WITH INSECTICIDES
Apple maggot adult flight may increase over the next few weeks due to recent weather conditions and moist soils.
Published July 25, 2011, MSU-E News for Agriculture - Fruit
John Wise, Michigan State University Extension, Department of Entomology

Low levels of apple maggot adult emergence have been detected at the MSU Trevor Nichols Research Center in Fennville, Mich., for the last five weeks. But with the hot weather conditions and moist soils, we can expect increased flight in future weeks.



Control of apple maggots have been traditionally achieved with organophosphate (OP) insecticides, like Guthion and Imidan, but some label and processor restrictions may limit their use near harvest. Synthetic pyrethroid compounds, like Asana, Warrior, Danitol, Battalion, Mustang Max and Baythroid XL, are also toxic to adult fruit flies, but are generally viewed to be moderately effective because they have a shorter field residual. There are several new reduced-risk and OP-replacement insecticide products that include apple maggot on their labels. The neonicotinoids Calypso, Belay, Provado and Assail are labeled for apple maggot control. They have limited lethal action on adult apple maggots, but provide strong curative activity on eggs and larvae. The Spinosyn compounds Delegate and Entrust are highly active on apple maggots when ingested, but have shown to be only fair control materials in field trials with high pest pressure, thus are labeled for apple maggot suppression only. The new Diamide material Altacor is similarly active on apple maggots, and is labeled for population suppression. Leverage is a pre-mix compound that is labeled for apple maggot control.
GF120 NF Fruit Fly Bait (spinosad) is registered on pome fruits for control of apple maggots and is listed by the Organic Materials Review Institute (OMRI) for use in organic production. Because the primary route of entry is through ingestion, applying this product during the fruit fly pre-oviposition period is important for optimal performance. GF120 must be applied with specialized equipment, and is designed for low-volume application. Field efficacy data is encouraging, but we have limited experience with this novel tool to date.

Compound Trade Name	**Chemical Class**	**Life-stage Activity**	**Optimal Spray Timing for apple maggots**	**Residual Activity**	**** Mite Flaring Potential**	**Effectiveness rating*****
Guthion, Imidan, Malathion	OP	Adults & Curative	7-10 days after the first fly is captured	14+ days	S - M	E
Asana, Warrior, Danitol, Mustang Max, Baythroid, Battalion	Pyrethroid	Adults	7-10 days after the first fly is captured	7-10 days	H	F-G
Delegate, Entrust*, GF120 NF*	Spinosyn	Adults	Immediately after the first fly has been captured	7-10 days	M	F

Assail, Calypso, Belay, Provado	Neonicotinoid	Adults & Curative	7-10 days after the first fly is captured	10-14 days	S - M	G-E
Altacor	Diamide	Adults	Immediately after the first fly has been captured	10-14 days	S	F
Leverage	Premix (pyrehtoird + neonicotinoid)	Adults & Curative	7-10 days after the first fly is captured	10-14 days	H	E

*** OMRI approved for organic production**
**** Parasitoid Toxicity rating; S – relatively safe, M – moderate toxicity, H – Highly Toxic.**
***** Effectiveness rating of insecticides (2011 Fruit Management Guide, MSUE bulletin E-154); E – excellent, G – good, F – fair.**

MID-SUMMER LEAF SAMPLES FOR NUTRIENT ANALYSIS
Now is the time to collect leaf samples for nutrient analysis, which is the best way to assess the nutritional health of perennial fruit plantings.
Published July 19, 2011, MSU-E News for Agriculture - Fruit
Eric Hanson, Michigan State University Extension, Department of Horticulture

As shoots grow and leaves age, nutrient concentrations change. Mid-summer is the standard time to sample because levels of most nutrients are relatively stable and are most easy to interpret by comparing them to known values. Sampling tissues at other times can also be useful to diagnose specific problems. In this case, samples from affected and healthy plants are needed for comparison since desired values at non-standard sampling times are less well-defined.
Many growers rely too heavily on soil testing to guide fertilization practices. Although soil tests provide a useful measure of pH, soil phosphorus (P), potassium (K), calcium (Ca) and magnesium (Mg) levels are often misleading because they do not closely reflect levels in perennial fruit plants. This may be due to several factors, but the bottom line is that basing fertilizer choices on soil nutrient levels only is inadequate. Most importantly, there is no effective means of monitoring soil nitrogen (N) availability to perennial crops, so soil tests are of no value in guiding fertilization decisions for this key nutrient.
Leaf analyses can be used to diagnose nutritional problems and to identify developing problems before growth or yield is affected. Sample young plantings every one to two years and established plantings every two to three years. The whole farm can be sampled in the same years, or portions sampled more frequently.
Define sampling units. Divide the farm into sampling units or areas that have uniform soil types, management history and variety. Farms with variable soils or history will require more sampling units to provide an accurate picture of the nutritional health. If the farm is very uniform, with large blocks of the same age and varieties, units can be as large as 15 acres.
Sampling. Sample leaves in late July to early August. Collect **at least** 50 leaves from different plants throughout the sampling unit. Select healthy leaves from the middle of this year's shoots. If the leaves are dusty, rinse briefly in tap water and lay leaves out on a table top until they are dry to the touch. For vineyards, only the petioles, or leaf stems, are collected.
Submitting samples. Package leaves in clearly labeled paper bags and send them to a reputable laboratory.
Diagnosing nutritional problems. If you wish to diagnose a suspected nutritional problem, collect one sample from plants beginning to develop symptoms of the problem and a second from nearby healthy plants. These samples can be collected at anytime during the season.
The total cost tissue analysis (sampling labor, postage, laboratory fees) can be as high as $40. However, if the sample represents 10 acres, per acre cost is $4. This small input can readily be covered if results show that fertilizer rates can be reduced. Test costs are incidental if fruit yields or quality are improved due to fertilization changes.
Some Midwest labs offering tissue analysis (no endorsement is implied)

MSU Soil and Plant Nutrient Lab, A84 PSSB, MSU, East Lansing, Mich. (517 355-0218)
A & L Great Lakes Laboratories, Fort Wayne, Ind. (260-483-4759)
Brookside Labs, New Knoxville, Ohio (419-753-2448)
Midwest Labs, Omaha, Neb. (402-334-7770)
Spectrum Analytic, Washington Court House, Ohio (800-321-1562)

ONLINE IPM EDUCATIONAL SESSIONS NOW AVAILABLE
IPM3 is now offering online educational session in a number of IPM related topic areas.
Published July 18, 2011, MSU-E News for Agriculture - Fruit
Erin Lizotte, Michigan State University Extension

IPM3 is a consortium of federal agencies and land-grant institutions devoted to the delivery of practical integrated pest information to people responsible for developing and practicing Integrated Pest Management (IPM).
"IPM3 provides a web-based opportunity for individuals interested in IPM to become proficient in the principles and application of IPM as taught by leading IPM authorities in diverse disciplines from various United States universities." -University of Minnesota
The following course modules are available

Core Concepts Module
Facility Managers and Supervisors Module
Invasive Species Module
Pest Biology Weeds Module
Pest Biology Plant Diseases Module
Imported Fire Ant Module
Visit the IPM3 website for more information or contact Heather Dorr, College of Continuing Education,University of

Minnesota at 612-625-5267.

THE HEAT IS ON

With temperatures in the high 90s and the heat index well above 100°F, many are wondering how long this heatwave will last.

Published July 21, 2011, MSU-E News for Agriculture - Fruit
Jeff Andresen, Michigan State University Extension, Department of Geography

The most widespread heat wave in several years was in full swing across the central and eastern USA on Wednesday (July 20), with excessive heat warnings, watches and advisories covering portions of at least 30 states. High temperatures in Michigan during the past two days ranged from the upper 80s along lakeshore areas to the mid-90s in many other sections of the state. Combined with unusually high humidity readings – dew point temperatures have been running in the 70s during the same time frame – heat index values, or what the air temperature really "feels" like given the combination of heat and humidity, have soared above 100°F during the afternoon hours, stressing humans, livestock and crops.

The heat wave conditions are the result of a massive ridge of subtropical high pressure entrenched across much of the country since last week (Photo 1). With this pattern, the jet stream has generally retreated northward into Canada, leaving most of the lower 48 states under the influence of high pressure and fair weather. One notable exception has been the Pacific Northwest region, located beyond the periphery of the ridge, where weather has been persistently cool and wet. Given the recent upper air pattern, precipitation totals in most sections of Michigan have fallen below normal since late June, which is resulting in increasing levels of moisture stress for many crops, especially those on coarse-textured soils.

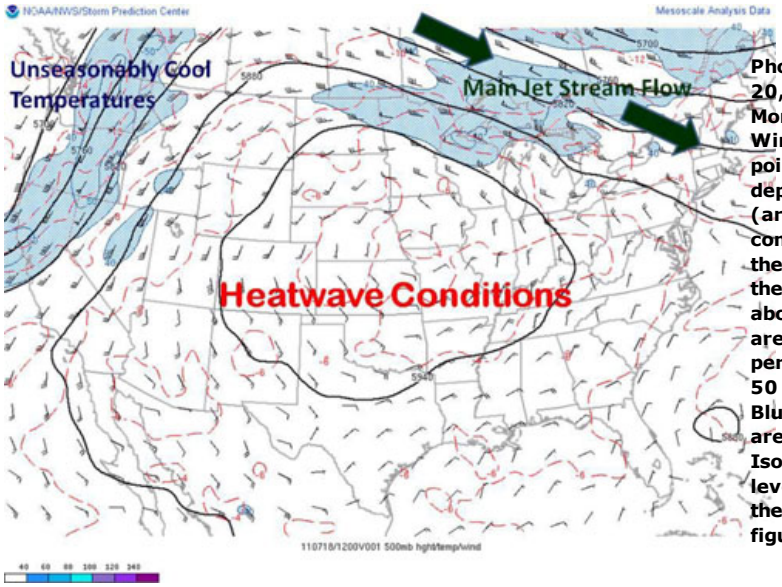


Photo 1. Air flow at approximately 20,000 feet above sea level, 8:00 EDT Monday July 18, 2011. Winds are given at each of the grid points in terms of a wind arrow, which depicts both wind direction (arrow points in the direction wind is coming from) and wind speed (add up the notches on each arrow: the short notches are 5 knots (just above 5 miles per hour), long notches are 10 knots (about 11 miles per hour), and black triangles are each 50 knots (about 55 miles per hour). Blue shading indicates areas with winds in excess of 50 knots. Isotherms depicting temperatures at this level are given by the dashed red lines (°C). Background figure courtesy of NOAA Storm Prediction Center, Norman, Okla.

So, how long will this pattern last? Current indications are that the main axis of the upper air ridge will very slowly edge eastward during the next few days, further intensifying heat wave conditions across the eastern USA. In Michigan, we will likely see the heat wave peak Wednesday (July 20) and Thursday (July 21), with maximum temperatures reaching the mid- and upper 90s in many areas of the state. Slightly cooler (although still well above normal) temperatures are likely this weekend. In terms of rainfall, we can expect a chance for scattered showers and thunderstorms on an almost daily basis through the weekend. Unfortunately, areal coverage with any rainfall will likely be limited, with highly variable rainfall totals. Some areas will remain dry, with ever-increasing levels of moisture-related stress.

The next best chance for more widespread rainfall will be late this weekend in association with a weak, cool front forecast to move through the state. That front should also bring temperatures back to more seasonable levels by early next week (upper 70s north to low and mid-80s south). Further ahead, current medium range forecast guidance is suggesting that after a short break early next week, there will be a reestablishment of the upper air ridging pattern across the central USA. NOAA Climate Prediction Center 6-10 and 8-14 day outlooks (covering July 25-29 and July 27-August 2) both call for a continuation of above normal temperatures. Precipitation totals are forecast to range from near normal levels across Lower Michigan to above normal levels across the Upper Peninsula. With this type of upper air pattern, my personal guess is that precipitation totals during both periods will remain in the normal or even below normal category.

TREVOR NICHOLS RESEARCH CENTER FIELD DAY

Join us September 20 at the Trevor Nichols Research Center to learn about insect and disease research and efficacy trials carried out this 2011 season.

Published July 20, 2011, MSU-E News for Agriculture - Fruit
John Wise, Michigan State University Extension, Department of Entomology

We will be having a research field day at the Trevor Nichols Research Center on Tuesday, **September 20**, from 1:00 to 4:00 p.m. The field day will focus on insect and disease research and efficacy trials that were carried out this season by Larry Gut, Rufus Isaacs, Annemiek Schilder, George Sundin, Mark Whalon and John Wise.

The Trevor Nichols Research Center is located at 6237 124th Ave. in Fennville, Mich. For directions, visit the Trevor Nichols Research Center website.

Dr. Wise's work is funded in part by MSU's AgBioResearch.

WEBSITES OF INTEREST

CIAB Weekly Raw Product Report – Week 3
http://www.cherryboard.org/Week32011.pdf

Trapline Counts from the NW Michigan Horticultural Research Station
http://agbioresearch.msu.edu/nwmihort/trapcount.htm

Insect and disease predictive information is available at:
http://enviroweather.msu.edu/homeMap.php

60 Hour Forecast
http://www.agweather.geo.msu.edu/agwx/forecasts/fcst.asp?fileid=fous46ktvc

Information on cherries is available at the new cherry website:
http://www.cherries.msu.edu/

Fruit CAT Alert Reports
http://www.ipmnews.msu.edu/fruit/

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

ACTUAL AND PREDICTED DEGREE-DAY
ACCUMULATIONS SINCE MARCH 1, 2011

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

Last Revised: 7-26-11