Northern Michigan FruitNet 2014
Northwest Michigan Horticultural Research Center

Weekly Update
June 10, 2014

CALENDAR OF EVENTS

6/10 **IPM Update**
Leelanau Co.– Bardenhagen Farm

6/10 **IPM Update**
Grand Traverse Co. – Wunsch Farm

7/2 **IPM Updates End**

7/3 **RidgeFest 2014**

7/10 **MSU Clarksville Research Center Annual Tree Fruit Research Showcase Field Day**

7/22-24 **35TH Annual Ag Expo**
Michigan State University

9/4 **NWMHRC Open House – 35th Anniversary**
Please note change in date from 8/21 to 9/4

GROWING DEGREE DAY ACCUMULATIONS AS OF June 9 AT THE NWMHRC

Year	2014	2013	2012	2011	2010	2009	24 Yr. Avg.
GDD42	727	751	1130	752	1089	674	816.3
GDD50	397	427	634	405	602	304	432.8

Growth Stages at NWMHRC (June 9, 2014, 9:30 a.m.)

Apple: Red Delicious – 9 mm fruit
Gala – Late petal fall
Yellow Delicious – Late petal fall
Pear: Bartlett: 8 mm fruit
Sweet Cherry: Hedelfingen: 12 mm fruit
Napoleon: 13 mm fruit
Gold: 11 mm fruit
Tart Cherry: 10 mm fruit

Balaton: 10 mm fruit
Apricot: 21 mm fruit
Grapes: 4-8" shoots

NORTHWEST MICHIGAN REGIONAL REPORT
E. Pochubay, N. Rothwell, and D. Elsner, Extension Educators

Preliminary crop load estimates are looking good and growers are continuing to protect fruit from insects and diseases.

Weather Report

Seasonable temperatures were abundant across the region last week. Daytime temperatures ranged from the mid-70s into the low 80s, and nighttime temperatures fell into the high-50s into the 60s. All days in the past week were sunny with low humidity and moderately windy conditions. We have accumulated 727GDD base 42 and 397GDD base 50. The last rainfall was on 3 June when we received just under one inch of precipitation. Soil conditions are dry, and we could use some rain. Although rain is predicted for 11 June, the amount will not be substantial to improve soil moisture. Growers have been running irrigation systems with the lack of rainfall.

Crop Report

The cherry crop is looking good here in northwest Michigan. We had terrific weather for pollinating sweet cherries, and as a result of good pollination, we anticipate a nice sweet crop. The fruit is sizing, and at this time, there is considerable size difference between fruits on the same tree. Tart cherries are out of the shuck and are also sizing well. The pollination window for tart cherries was much condensed due to the hot weather during bloom. Growers are currently estimating their crop size, and initial predictions are that the crop is a good size but not a limb buster.

Many apples are at petal fall or at the 10mm size—we also had good pollinating weather for apples. Some growers are thinning according to the precision orchard management approach, and many thinning sprays began at bloom this year. The carbohydrate model has not shown much stress in the past week, and growers that had a jump on thinning with bloom and petal fall applications may be in a good situation if we do not have stress at the key thinning period (8-12mm). Unfortunately, we are still observing decline of apples due to the severe winter. Again, there is not a distinctive pattern to this decline as we see damage showing up across varieties, rootstocks, and ages of trees. Many of these trees pushed this spring and put out leaves but now are declining. We anticipate further decline of trees as we move into the season.

Strawberries were blooming last week, and growers are likely looking at a season without having to frost protect. Strawberry harvest is anticipated to begin in early July, which is later than in most years. We have seen some damage to peach trees from the winter, but many growers think they will have a crop this season without a lot of thinning efforts.

Pest Report

Many apple varieties are past bloom and not susceptible to the **blossom blight** phase of fire blight at this time. However, if susceptible varieties have open blossoms, they will need to be protected from possible fire blight infection prior to rain predicted on Wednesday 11 June. The Section 18 exemption for Kasumin use in counties where streptomycin resistant fire blight have been detected (i.e. Leelanau,

Grand Traverse, Antrim) ends on ***Sunday 15 June***. The use of Kasumin in not permitted after petal fall and only three sprays of Kasumin are allowed each season.

The biofix date (i.e. the date of green tip on McIntosh) was 9 May at the NWMHRC and according to the **apple scab** model for the NWMHRC, apple scab spores are 99% mature and 81% discharged at this time. Rain that is predicted this week could result in an apple scab infection, and growers should protect tissue prior to rain. We will continue to monitor spore discharge following possible rain this week at the scab monitoring site in Leelanau Co.; we hope this information will assist growers in determining when to call the end of the primary apple scab infection period. We will need a few more rain events with good amounts of precipitation for the remaining apple scab spores to discharge. Other regions of the state have not called an end to primary scab.

At the NWMHRC, we have observed development of **cherry leaf spot** conidia on the undersides of bract leaves in both Balaton and Montmorency tart cherry and sweet cherries. Last week, we received reports that cherry leaf spot lesions were present on bract leaves in many tart cherry orchards in the region, and conidia are rapidly developing on infected leaves in those orchards with our recent warm conditions. Conidia on infected leaves will spread to nearby leaves during wet periods. In orchards where early cherry leaf spot infection has occurred, growers will need to be diligent about adequately covering new tissue throughout the season. Newly expanded leaves are susceptible to cherry leaf spot and should be protected prior to possible rain on Wednesday.

Prior to shuck split, Michigan State University Extension recommends the fungicide chlorothalonil for cherry leaf spot management. Growers need to be sure to check labels for re-application intervals for fungicide sprays. Growers should also check with processors for any additional restrictions on fungicide use, particularly with the 24 (c) for use of Bravo WeatherStik past shuck split. Michigan State University Extension recommends a first cover timing application of Luna Sensation (5 fl oz per acre) + Captan (2.5 lb per acre) or Merivon (5.5 fl oz per acre) + Captan (2.5 lb per acre); these fungicides are excellent for both cherry leaf spot and powdery mildew.

We have received a few isolated reports of **American brown rot** sporulation on sweet cherry fruit that is visible on last year's mummies. Insect feeding, bacterial canker on green fruits, and other damage to developing sweet cherry fruit make those damaged fruit more susceptible to American brown rot infection. Spores developing on mummies have the potential to infect neighboring fruit. We have also seen blossom blight and canker symptoms in sweet cherries.

Codling moth (CM) were detected in the region early last week and the first capture of codling moth at the NWMHRC was this week Monday 9 June. After two consecutive CM capture dates, the biofix for CM should be set for the first date that moths were caught. Degree day accumulation should be set to zero at the biofix date and begin accumulating after the biofix date is set to determine optimal CM management timings. Please refer to the article, "*Codling moth is back with vengeance in 2014*," for more information on codling moth management.

Many growers sprayed for **plum curculio** (PC) last week and PC scars have been observed in apricots, sweet cherries, and tart cherries at the station. Growers should be protecting fruit against PC as this insect can target fruit as its just emerging from the shuck. Growers should check their 'hot spots' for oviposition scars as PC stings are evident in most cherry blocks at this time.

Spotted tentiform leafminer numbers are down this week (30 moths/trap) and the optimal time for managing this pest has almost passed. This is the third consecutive catch of **Oriental fruit moth** (1 moth/trap).

Adult moths of **American plum borer** (APB), **lesser peach tree borer** (LPTB), and **greater peach tree borer** (GPTB) were detected this week. This is our third consecutive week of APB capture (11.7 moths/trap), the second consecutive LPTB capture (11.7 moths/trap), and the first capture of GPTB (1.7 moths/trap). Some growers have sprayed trunks with Lorsban last week to target borers.

We have observed **green fruit worm** larvae and **obliquebanded leafroller** (OBLR) larvae actively feeding on leaves and developing cherries at the station. Adult moths of OBLR have not been caught in pheromone traps at the station at this time. If growers are controlling the overwintering larvae of OBLR, they should make applications as soon as possible—smaller larvae are much easier to kill than larger older caterpillars. MSUE recommends a spray targeting overwintering OBLR larvae at the petal fall timing, which may be too late for most orchards. If growers missed this spring spray, we will have another opportunity to control summer generation OBLR prior to harvest.

Cherry fruit fly (CFF) traps went up on Friday at the station; we have not detected CFF at this time. Here at the station we have accumulated 397 GDD and should begin seeing CFF emergence within the next one to two weeks.

Growers should check with processors for restrictions on insecticide use to avoid possible issues with maximum residue limits.

Wine Grapes

Shoot growth high in the canopy has reached the 6-12 inch growth stage. The crop potential looks very good in some hybrid varieties. **Powdery and downy mildew** are the important diseases at this time. **Potato leafhopper** may show up at any time now, and **rose chafers** are due as well.

Saskatoons

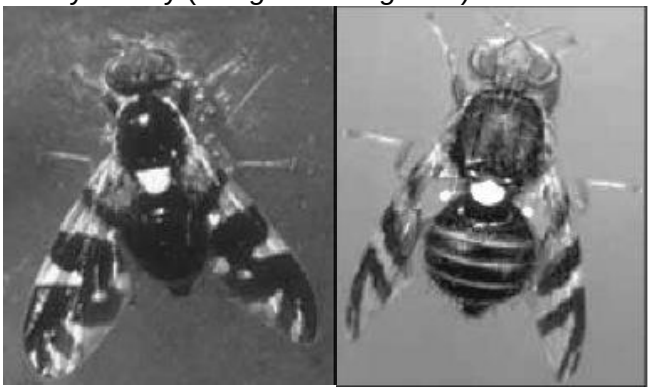
Young larvae of **saskatoon sawfly** have been found during the last week. A number of different **leafroller caterpillars** are also feeding near shoot tips, but they are not likely to a problem for shoot growth.

CHERRY FRUIT FLY MONITORING
Emily Pochubay and Nikki Rothwell, MSU Extension Educators

It's time to monitor for cherry fruit flies in northwest Michigan cherry orchards.

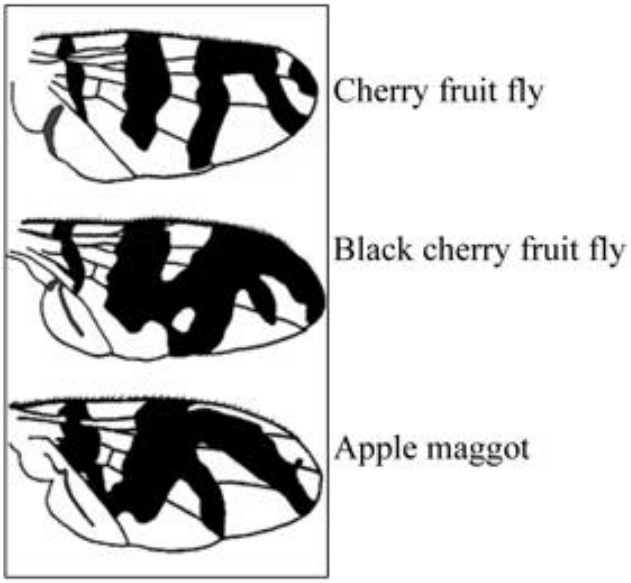
Cherry fruit fly (CFF) traps were deployed at the Northwest Michigan Horticultural Research Station last Friday, 9 June. Here at the station we have accumulated 393 GDD and should begin seeing CFF emergence within the next one to two weeks.

There are two species of true fruit flies in the Tephritidae family that attack sweet and tart cherries, the cherry fruit fly (*Rhagoletis cingulata*) and the black cherry fruit fly (*Rhagoletis fausta*). The former



Black cherry fruit fly **Cherry fruit fly**

species, *R. cingulate,* is typically more common or abundant. Adult flies of both species are approximately 4.5 mm, with black bodies, yellow to brown colored heads and legs, and a light colored dot on the flies' back. Possibly the most prominent characteristic of these flies are the black markings on the flies' wings which can be used to differentiate fruit flies in the Tephritidae family. Wing patterns on cherry fruit fly and black cherry fruit fly are distinct and can be used to separate these species. The cherry fruit fly wing pattern has a black shape that looks like the pi symbol with a black partial circle marking on the tip of the wing, whereas the black cherry fruit fly has thicker black bands that extend to the wing margin.

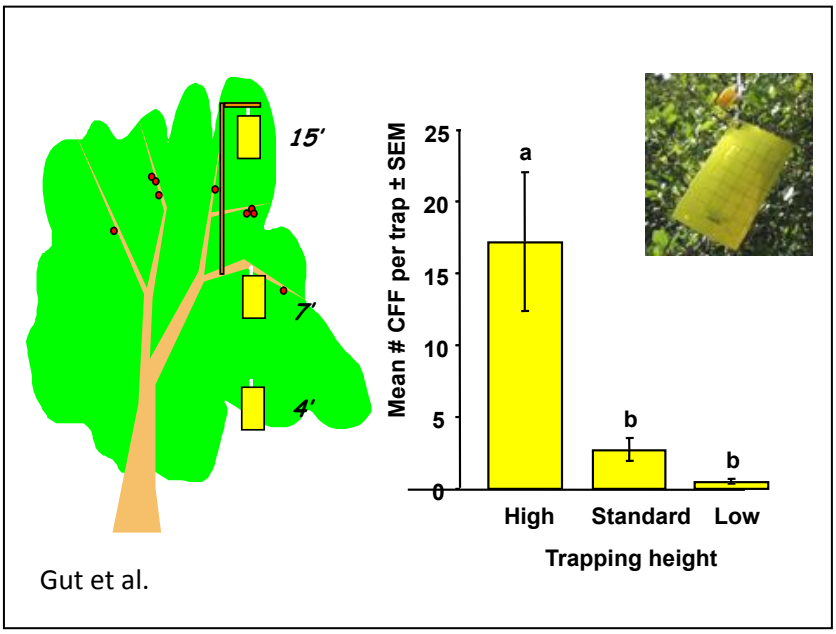


In early summer, adult cherry fruit flies emerge from their puparium where the maturing fruit fly overwintered since the previous fall. After emergence, adults spend approximately 10 days in a pre-egg laying feeding period. After mating, female cherry fruit flies puncture the skin of fruit and lay an egg inside of the fruit. Maggots (or larvae) hatch from eggs and feed inside of the ripening fruit. This is a serious concern in cherries due to the industry standard of zero tolerance for larvae in fruit.

When considering management of these flies, cherry fruit fly and black cherry fruit fly are treated as one species because the flies' life cycles are nearly identical and control measures that are effective for one of the species are effective for both species. Cherry fruit fly control is targeted at the adult flies during the pre-egg laying feeding stage. Therefore, monitoring for the first emergence of cherry fruit flies is critical for determining when to take management action.

Growers, consultants, educators, and researchers use yellow sticky traps baited with ammonia acetate that are attached to a tree branch with a twist-tie to monitor for cherry fruit flies. At the research station, we place one teaspoon of ammonium acetate powder into small containers that have a hole on one side. These containers are attached to the yellow sticky trap with a twist-tie.

Previous research conducted by Michigan State University demonstrated that the number of cherry fruit flies caught in traps increases as the height of trap placement in the tree canopy increases. Here at the station, we attach cherry fruit fly traps to bamboo poles (like the poles used to hang codling moth delta traps) to hang traps high in the tree canopy. The poles have a flexible plastic cage in which we place the baited yellow sticky trap; the cage prevents leaves and branches from getting stuck to the trap. Adding a flexible hooked end to the pole can help to secure the trap high in the tree canopy. Finally, **remove all sticky traps from trees prior to shaking** at harvest time to avoid getting sticky material on cherries.



GIBBERELLIC ACID APPLICATIONS IN CHERRY

Nikki Rothwell and Emily Pochubay, NWMHRC

To help manage crop load in cherries, growers should be applying Pro-Gibb to cherries when 5-7 leaves are expanded.

Gibberellic acid (GA) is a plant hormone that promotes growth and elongation of cells. In tart and sweet cherries, GA has been used successfully to reduce flowering during the early years of an orchard's life. The reduced flowering and subsequent reduced fruiting helps young trees increase vegetative growth. In addition, minimizing flowering in early years slows the transmission of pollen-borne viruses in young trees. We have also shown that GA used in mature tart cherry orchards can increase fruiting capacity by stimulating the formation of lateral shoots and spurs.

When GA is applied to cherry trees in late spring, a percentage of the flower buds forming for the following season will be converted to vegetative buds. Therefore, GA application in 2014 influences flowering in 2015. The effectiveness of GA is dependent on rate, timing and temperature. Surfactants have also been shown to influence GA applications. As a rule of thumb, high GA rates are required to prevent young trees from fruiting, whereas much lower rates are used to keep bearing trees in a good balance between vegetative and fruit production. GA applications should be made when daily high temperatures are expected to be above 70° F for two to three days, if possible. We have observed poor results when applications are made when daily high temperatures are below 60° F as is the case with most growth regulators.

Non-bearing trees

GA is typically applied to non-bearing cherries with a hand gun, so rates are applied on a dilute basis. The best results are generally achieved with two applications of 50 ppm (20 fl. oz. of 4% formulated product per 100 gallons of water). The first application should occur 3 to 3 ½ weeks after full bloom, followed by a second application 2 ½ to 3 weeks later. An alternative method, though slightly less effective, is to apply a single treatment of 100 ppm (40 fl. oz. per 100) at about 3 to 4 weeks after bloom.

GA should not be applied to trees during the year of planting, due to possible phytotoxicity. Vigorously growing trees in their second leaf do not need GA, as these trees naturally produce little fruit the following year. GA application often starts in year three, but may be desirable in year two if trees start off poorly. These high rates should continue until the year prior to first harvest/year of production.

Early bearing trees

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

Bearing trees

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

GA Use on Balaton

Balaton appears to have less need for GA during non-bearing years to maintain good tree growth, but as it matures, the variety produces a lot of blind wood. Therefore, using GA is strongly encouraged on bearing Balaton trees. Figure 1 shows the successful use of GA to increase lateral shoots and spurs in a Balaton orchard at the NWMHRS. However, we cannot conclude that GA applications improve Balaton yields although GA does appear to increase crop load (Figure 2).

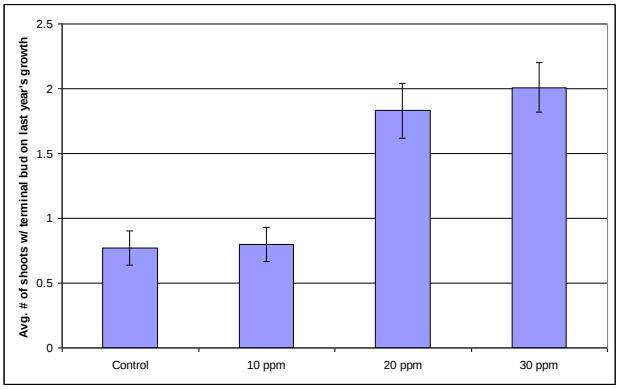


Figure 1. Average number of shoots with terminal buds in a Balaton orchard.

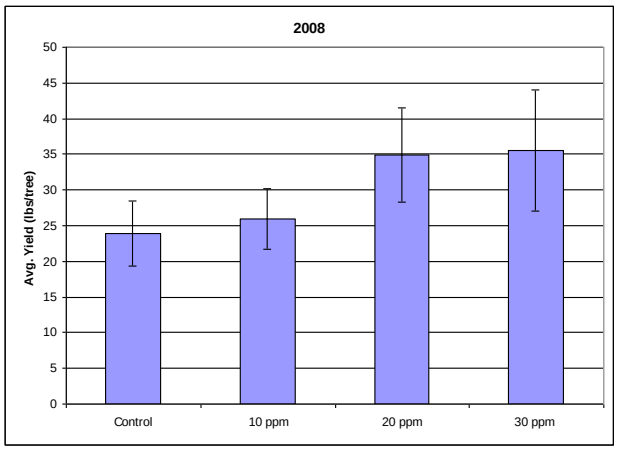


Figure 2. Average Balaton yield with different rates of GA.

SNOW LOADS AND DEVELOPING APPLE TREES FOR TALL SPINDLE SYSTEM IN MICHIGAN

Adjust your pruning as heavy snow-load from this past winter caused many broken branches in tall spindle apple trees.

Posted on **May 29, 2014, MSUE News,** by **Ron Perry**, Michigan State University Extension, Department of Horticulture

Michigan State University Extension educators recently reported that growers are having problems regarding accrued snow-load, which in many cases broke branches this winter. The weight of the snow through this past winter, which extended to heights in some cases above 36 inches, damaged branches on newly planted trees. This situation was made worse where branches, or “feathers,” were left at planting time which originated below 32 inches above ground line.

Feathers, or branches developed in the nursery, are handled by bending below the horizon in a downward angle using rubber bands or floral wire. The benefit of this process is that many of these branches will slow in linear branch growth and dominance. Secondly, spurs and flowering will be encouraged by the process when bent below 45 degree below the horizon.

However, recommendations for training have been clear to encourage growers to not allow branches beginning below about 32-36 inches. If you train branches starting below 32 inches, the distal ends of long feathers, which should not be pruned, will touch the ground and be vulnerable to herbicide damage and pests. After this winter, it is clear that these lower branches are also vulnerable to breakage from snow load.

See the images below where branches from trees established below 32 inches in 2013 were broken by this past winter’s snow-load.


Left, Tall spindle tree with branches started below 32 inches. Right, Tall spindle tree established in 2012 with branches started at 32 inches. Note there is no damage.

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CONTROL OPTIONS FOR FRUITWORMS IN BLUEBERRIES FOR 2014

Performance characteristics of registered control materials for fruitworms can help guide management decisions in blueberry integrated pest management.

Posted on **June 3, 2014, MSUE News,** by **John Wise**, and Rufus Isaacs, Michigan State University Extension, Department of Entomology

Cranberry fruitworm emergence is underway across Southwest Michigan and just starting to be caught this week at the Trevor Nichols Station in Fennville, Michigan. Cherry fruitworms have been flying for a while, and hotspots with petal fall should already be protected against this cherry fruitworm. This highlights that it's time for protecting the new blueberry fruit from fruitworms. Some growers in advanced sites in Van Buren and Berrien counties have already done this starting late last week as petal fall progressed.

Natural enemies provide some suppression of fruitworm populations, and cultural controls such as clean cultivation or removing alternative hosts outside fields can help reduce the pressure from these pests. However, reaching the zero tolerance for infestation demanded by the large-scale food industry requires active management of these pests. If there is a consistent capture of fruitworm moths in your monitoring traps, application of insecticide starting approximately 100 growing degree days (GDD) after the first sustained catch is recommended by Michigan State University Extension. This is likely during bloom, and so it is very important to refrain from using compounds that are toxic to pollinators when these insects are in your fields. Applications early in the day or ideally late in the evening will help reduce the exposure to pollinators.

Products registered for use during bloom or in the presence of pollinators have provided consistent control of fruitworms in trials at the Trevor Nichols Research Center and at grower fields. These are the *B.t.* products such as Dipel or Javelin and the insect growth regulators Intrepid and Confirm. These products must be consumed by fruitworm larvae to be effective, so they are best applied over the top of fruitworm eggs so they are ingested as the larvae emerge. *B.t.* products have short residual activity, typically around five days, so they need regular reapplication. These are best applied when daily temperatures reach 70 degrees Fahrenheit so the larvae will actively feed and ingest the insecticide. Intrepid is more resistant to degradation by sunlight and it is much more waterproof once residues are dry, giving between seven and 14 days activity.

Other options for control of fruitworms during the egglaying period are the growth regulators Rimon and Esteem. These insecticides are highly active ovicides and they also disrupt the adult moth's ability to lay viable eggs, hindering the development of larvae. As with all insecticides, be sure to follow the label restrictions if making applications while bees are foraging in the fields. For all fruitworm control applications, excellent coverage of fruit clusters is required. This can be improved by the addition of a spreader-sticker to the spray water.

After 100 percent petal fall and removal of honey bees from the field, the range of options for fruitworm control increases, with Imidan, Asana, Danitol, Mustang Max, Lannate and Sevin being some of the available broad-spectrum insecticides. With all these products, maintaining good coverage is still important to get residue to the parts of the berry where fruitworms are found. Recent research trials in Michigan have demonstrated that EPA designated Reduced Risk insecticides Intrepid, Assail, Altacor, Entrust and Delegate applied after petal fall can also achieve excellent control of fruitworms, with minimal negative impact on natural enemies such as parasitic wasps, lady beetles and lacewings. Correct timing and coverage are critically important, so regular scouting of fields, use of sufficient spray volume to get good fruit coverage, and selecting appropriate spreader-stickers can increase activity of most insecticides applied for fruitworm control.

The table and figure below are designed to summarize several key factors that can help you select an insecticide for your integrated pest management program for fruitworm control in blueberries.

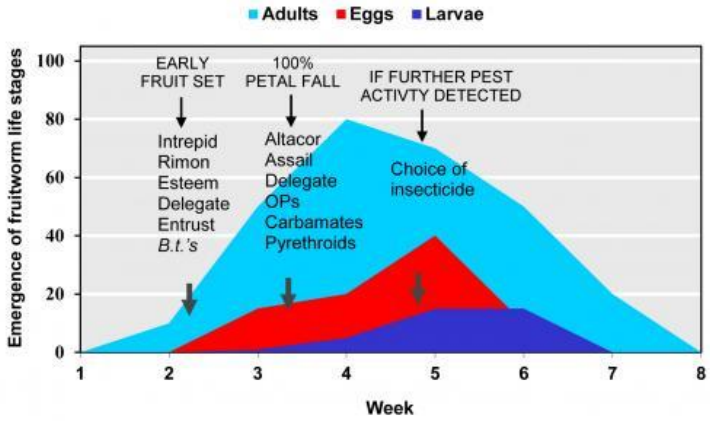
Details of insecticide options and timing for fruitworm control in blueberry

Compound trade name	Chemical class	Life-stage activity	Optimal spray timing	Pollinator/parasitoid toxicity rating *
Imidan	Organophosphate	Eggs, larvae, adults	100% petal fall	H
Lannate/Sevin	Carbamate	Eggs, larvae, adults	100% petal fall	H
Asana/Danitol/ Mustang Max/Hero/Bifenture	Pyrethroid	Eggs, larvae, adults	100% petal fall	H
Altacor	Diamide	Larvae	100% petal fall	S

Assail	Neonicotinoid	Eggs, larvae	100% petal fall	M
Entrust Delegate	Spinosyn	Eggs, larvae	Early fruit set over eggs	M
Dipel	*B.t.*	Larvae	Early fruit set over eggs	S
Intrepid	Growth regulator	Larvae	Early fruit set over eggs	S
Rimon	Growth regulator	Eggs, larvae	Early fruit set under eggs	S
Esteem	Growth regulator	Eggs, larvae	Early fruit set under eggs	S

* Pollinator/Parasitoid Toxicity rating; S – relatively safe, M – moderate toxicity, H – Highly Toxic.

Population emergence of fruitworm adults, eggs and larvae and the optimal timing to begin sprays of different insecticide options. Follow the label caution for bees if making applications during bloom.



Drs. Wise and Isaacs' work is funded in part by MSU's AgBioResearch.

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MICHIGAN HOP UPDATE – June 6, 2014

Growers should be scouting for downy mildew, two-spotted spider mites and potato leafhopper this week. MSU Extension will be tracking hop development this season and providing growers with relevant pest management information.

Posted on **June 6, 2014, MSUE News,** by **Erin Lizotte**, Michigan State University Extension

Hop bines around Michigan are really taking off with the ample rain and some warmer weather. Bines vary in height, but average 5 feet in Northwest Michigan this week. Growing degree day (GDD) accumulation is significantly different along the western portion of the state where the majority of hop acreage is located.

So far this season, the Benton Harbor Enviro-weather station has accumulated 494 GDD50 with 0.21 inches of rain over the past week; the Clarksville Enviro-weather station has recorded 430 GDD50 with 0.3 inches of rain; the Bear Lake Enviro-weather station has accumulated 343 GDD50 with 0.65 inches of rain; and the Northwest Michigan Horticultural Research Center has accumulated 317 GDD50 with just under 0.94 inches of rain. Despite significant rainfall in some locations, growers continue to irrigate to meet the substantial water demands of hops. Some planting, stringing and training is still underway. Cover crops in row middles planted this spring seem to be faring well, likely helped along by the protracted cool and wet spring.


Left, Coconut coir string is hung in a Northwest Michigan hopyard. Right, Rye, peas and clover seeded this spring have germinated well with the cool and wet spring weather. Photo credits: Erin Lizotte, MSU Extension

After seeing significant **downy mildew** infection in 2013, many growers applied early protectant sprays as basal spikes emerged this spring. Despite applying protectant fungicides, some Michigan growers have reported active downy mildew infections. Downy mildew is caused by *Pseudoperonospora humuli* and can cause significant yield and quality losses depending on variety and when infection becomes established. In extreme cases, cones can become infected and the crown may die.

Downy mildew overwinters in dormant buds or crowns, moving into buds during early spring and then into the tissue of the basal spikes as shoots expand. The pathogen produces copious spores on the underside of infected leaves. According to "Field Guide for Integrated Pest Management in Hops," infection is favored by mild to warm temperatures – 60 to 70 degrees Fahrenheit – when free moisture is present for at least 1.5 hours. Leaf infection can occur at temperatures as low as 41 F when wetness persists for 24 hours or longer.

Typically, downy mildew appears early in the season on the emerging basal spikes. Spikes appear stunted, brittle and distorted. Infected leaves have angular, water-soaked lesions that follow leaf venation. The water-soaked lesions turn brown and necrotic with fuzzy and grayish black asexual spore masses developing on the underside of leaf lesions. As bines grow, new tissue becomes infected and fails to climb the string. Growers can attempt to retrain new shoots, but often incur yield loss as a result.

(Left) Angular downy mildew lesions. (Middle) Grayish brown fuzzy appearance of downy mildew fungus on the underside of a hop leaf. (Right) Advanced downy mildew infection on the underside of the leaf.
Photo credits: Erin Lizotte, MSU Extension

It takes a multipronged approach to manage for downy mildew. Although cultural practices alone are not enough to manage downy mildew, plant cultivars more tolerant to downy mildew when possible. Clean planting materials should be selected when establishing new hopyards since this disease is readily spread via nursery stock. Establish good sanitation practices. Pull all basal foliage during spring pruning. Remove it from the hopyard and bury or burn it to reduce inoculum. If you already have downy mildew established in your hopyard, cultural practices will be very important in regaining ground as the season progresses. According to Oregon State University, diseased shoots on the string should be removed by hand and healthy shoots retrained in their place. Remove superfluous basal foliage and lower leaves to promote air movement in the canopy and to reduce the duration of wetting periods. If there is a cover crop, it should be mowed close to the ground. If yards have no cover crop, cultivation can help to dry the soil and minimize humidity. Keep nitrogen applications moderate.

Growers should utilize protectant fungicides to mitigate the risks of early and severe infections. Protectant fungicide strategies are particularly important during the year of planting to minimize crown infection and limit disease levels in the future. Well-timed fungicide applications just after the first spikes emerge and before pruning can significantly reduce infection levels season long. Subsequent fungicide applications should be made in response to favorable environmental conditions for downy mildew, such as temperatures above 41 F and wetting events. Fungicides have varying activity against downy mildew. For organic growers, OMRI-approved copper formulations are the most effective.

Some growers have already spotted downy mildew in Michigan hopyards this season, including those applying protectant applications of Aliette. Washington State University has documented resistance of hop downy mildew to fosetyl-Al, the active ingredient in Aliette. Based on these findings, growers are cautioned from relying solely on Aliette for downy management. For a complete list of fungicides labeled for the control of downy mildew on hop, refer to "Pesticides registered for use on hops in Michigan 2014" from Michigan State University Extension.

It is important that growers do not mistake downy mildew for **powdery mildew** (see photo below for clarification) as the effective pesticide classes are completely different. Powdery mildew has **not** been confirmed in Michigan and is caused by *Podosphaera macularis*, a completely different pathogen than that which causes downy mildew.

Round, white colonies of the powdery mildew fungus on the upper surface of hop leaves.
Photo credit: David Gent, USDA-ARS, Bugwood.org

With significant leaf tissue present, many growers have begun scouting for mites. **Two-spotted spider mites** are a significant pest of hops in Michigan and can cause serious economic crop loss when high numbers occur. Mites decrease the photosynthetic ability of the leaves and cause direct mechanical damage to the hop cones. Two-spotted spider mites feed on the sap in plant cells. Leaves look stippled or bleached, and webbing may also be present; bines will eventually defoliate under high two-spotted spider mite pressure. Intense infestations weaken the plant and reduce yield and quality. Infested cones develop a reddish discoloration, do not hold up to the drying process, and commonly have lower alpha levels and shorter storage potential. Additionally, the mites themselves act as a contaminant issue for brewers.

In the spring, only female two-spotted spider mites are present. They have overwintered in a dormant stage on debris and trellis structures in the hopyard and are already mated and ready to lay fertilized eggs. They may appear particularly orange in color this time of the year. As temperatures warm, the females feed and begin laying eggs. Depending on temperatures, eggs hatch in two to five days and develop into adults in one to three weeks. Two-spotted spider mites like it hot with the pace of development increasing until an upper threshold is reached around 100 F. Conversely, cold and wet weather slows development.

Two-spotted spider mites can be seen on the underside of leaves using a hand lens. As the season progresses, cast skins and old webbing give infested leaves a dusty and dirty appearance. The eggs look like tiny, clear spheres and are found near adults and larvae. The larvae themselves are small, translucent versions of the adults. Adults change from orange to translucent, yellow or green as they feed. Adults also have two dark spots. When scouting, watch for beneficial, predatory mites that feed on two-spotted spider mites. Predatory mites are often translucent, faster moving and larger than two-spotted spider mites. Predatory mites play an important role in balancing the two-spotted spider mite population and should be protected when possible.

Two-spotted spider mite eggs, larvae and adults (the adult females are the largest followed by the males). Photo credit: David Cappaert, Bugwood.org

Growers should be scouting for mites now and consider cultural and chemical intervention only when mites reach an economic threshold. Take leaf samples from all portions of the bines. Use a hand lens to evaluate two leaves from 20 plants per yard. More than two adult mites per leaf in June indicate the need to implement a pest management strategy. By mid-July, the threshold increases to five to 10 mites per leaf. If cones are not infested, hop plants can tolerate a good deal of damage from mites.

Many factors affect two-spotted spider mite levels, including the presence of beneficials, rainfall and temperatures. Select insecticides that conserve beneficial insects and apply pesticides for mite control only when necessary. Specifically, pyrethroid applications flare mite populations in the hopyard due to their negative impact on beneficial insects.

Lastly, be on the lookout for **potato leafhoppers** this week as storm systems move through from the Gulf region. So far, we have not heard reports nor observed potato leafhoppers in the North, but they have been reported in the southern portion of the state on other crops. Potato leafhoppers move sideways when disturbed. Adults and nymphs are wedge-shaped and fluorescent green. Adults have white eyes. Some very small nymphs are colorless, but have the characteristic shape of the larger nymphs when viewed using a hand lens.

Potato leafhopper nymphs and adults on the underside of a hop leaf exhibiting necrotic “hopper burn” symptoms around the leaf margin. Photo credit: Erin Lizotte, MSU Extension

Although hop plants are susceptible to potato leafhoppers, they can tolerate some feeding and growers should use insecticides sparingly. Potato leafhoppers cause “hopper burn.” Symptoms include a necrosis of the leaf margin in a V-shaped pattern and yellowed or stunted leaves. As a

quick spot check, agitate the bines and look for adults to take flight. Confirm their presence and prevalence by looking for adults and wingless nymphs on the underside of leaves. If needed, treat for potato leafhoppers with products containing neonicitinoids, pyrethroids, organophosphates or spinosyns. Organic growers can utilize Entrust (spinosad) or Pyganic (pyrethrin) formulations that are OMRI-approved for potato leafhoppers management. Refer to "Pesticides registered for use on hops in Michigan" for a complete list of registered products.

This article was published by **Michigan State University Extension**. For more information, visit http://www.msue.msu.edu. To contact an expert in your area, visit http://expert.msue.msu.edu, or call 888-MSUE4MI (888-678-3464).

DATE OF TRAINING CAN AFFECT YIELD AND CONE QUALITY

Hops: The importance of selecting the appropriate training date

Posted on **June 6, 2014, MSUE News,** by **Rob Sirrine**, Michigan State University Extension

Many factors affect hop quality and yields including fertility management, proper irrigation and pest and disease control. As Michigan growers continue to refine their production practices to increase the yield and quality of hops, one important aspect that may be overlooked is selecting the appropriate date to train hop bines. The practice of training involves selecting two-four bines and wrapping them around each coir string in a clockwise direction.

The appropriate date of training can be affected by several factors including spring weather, cultivar, bine height and latitude. In the Washington and Oregon, training typically takes place in May, three weeks to a month after pruning. At this time the bines are usually around 2 ft. tall.

A four-year study highlighted in "Hop Production: Developments in Crop Science" looked at the effect of different training dates on hop yield, length of cones, numbers of shoots, density of setting (number cones per 10 cm of shoot) and mean length of shoots. The optimal training date for middle Europe (49 degrees N), was after May 10. The training date that conferred the greatest yield of fresh cones was May 12, followed by May 4, and June 1. Late training reduced fresh hop yields by 38.5 percent, while early training reduced yield by 10.3 percent. The color of cones was the poorest with earliest training. The late training also decreased the length of cones but did increase their setting density.

Jason Perrault of Perrault Farms in Washington State addressed the issue of training at the Great Lakes EXPO in 2012. He suggested that the timing of training is critical and varietal specific, but very difficult to determine.

> "…if we know a variety is late, we know that the later varieties need to be trained later. If the variety is early then we know that it needs to be trained earlier. The problem is, certain varieties fall completely out of that classification all together. Take Cascade for example. That's kind of a medium maturing variety and we would expect that it should be trained the first week of May, the second week of May and it would be fine. But that is not the case. Over the years we find that if we train Cascade at the end of April, we get our best yield. So, a lot of it is really just learning the variety."

What growers should take from this is that accurate record-keeping over time should help Michigan growers begin to develop the knowledge necessary to obtain the best possible yields.

Please visit the Michigan State University Extension hops page or the MSU Hops Facebook page for up to date information on all things hops happening in Michigan.

This article was published by **Michigan State University Extension**. For more information, visit http://www.msue.msu.edu. To contact an expert in your area, visit http://expert.msue.msu.edu, or call 888-MSUE4MI (888-678-3464).

RIDGEFEST 2014

Wanted to give everyone a "save the date" update on RidgeFest. We will be having the event in Traverse City this year on **Thursday, July 3rd**. We will be meeting @ Dietrich Orchards Packing shed on 10 mile and Kenowa to board a bus and will be traveling around the Leelanau Peninsula to a few great farms and the MSU research station. Just wanted to give everyone a forewarning and let you plan accordingly. We will send out another email when we solidify the details.

Thanks,

Michigan Pomesters

MSU CLARKSVILLE RESEARCH CENTER ANNUAL TREE FRUIT RESEARCH SHOWCASE FIELD DAY

The MSU Clarksville Research Center (CRC) will be holding its 2014 tree fruit research showcase and field day on **July 10** from **9AM to 5PM**. Come join us to see the latest, cutting edge research from the MSU tree fruit team. Phil Schwallier and Dr. Ron Perry will discuss and demonstrate hedging systems for high density fruit and discuss new thinners. Dr. Amy Iezzoni will show and discuss some of the latest tart cherry selections being developed and tested at CRC including selections resistant to leaf spot and the strategy for breeding for Armillaria resistance. Dr. Greg Lang will showcase high density training systems for sweet cherry and other stone fruits and the use of protective covering systems, such as high tunnels, for fruit production. Drs. Ron Perry, Matt Grieshop and others will demonstrate Solid Set Canopy Delivery Systems in apples and cherries and highlight the innovative applications of these systems for pest management and microclimate modification. Lunch will be provided and the event is free to the public. More information, an event flyer and a (free) registration form will be released in mid-June.

TREE FRUIT IPM UPDATE SERIES – 2014

Emily Pochubay and Nikki Rothwell
Michigan State University Extension

After a one-year break, Michigan State University is back to offering on-farm IPM workshops in Leelanau, Grand Traverse, Antrim, and Benzie counties in northwest Michigan for the 2014 season. Workshops begin the first week of May in hopes of providing commercial tree fruit growers with a review of good practices for developing sustainable pest management programs as well as key information on early season disease protection. Workshops through the first week of July will highlight management of the season's current potential pest challenges dictated by weather and pest biology. Attendees are encouraged to bring examples of pests and damage found on the farm to these workshops for identification and discussion. These IPM workshops are free and do not require registration. Certified crop advisor continued education credits and pesticide recertification credits will be available. Tree fruit growers are welcome to attend meetings at any location and time that is most convenient. We are looking forward to interacting with you all at these meetings. For more information, please contact Emily Pochubay at pochubay@msu.edu or (231) 946-1510.

IPM Update Locations

Leelanau County
Location: Jim and Jan Bardenhagen, 7881 Pertner Rd, Suttons Bay
Dates: May: 6, 13, 20, 27; June: 3, 10, 17, 24; July: 1
Time: 12PM – 2PM

Grand Traverse County
Location: Wunsch Farms, Phelps Road Packing Shed, Old Mission
Dates: May: 6, 13, 20, 27; June: 3, 10, 17, 24; July: 1
Time: 3PM – 5PM

Antrim County
Location: Jack White Farms, 10877 US-31, Williamsburg
(south of Elk Rapids on the southeast side of US-31)
May: 7, 21; June: 4, 18; July: 2
Time: 10AM – 12PM

Benzie County
Location: Blaine Christian Church
May: 7, 21; June: 4, 18; July: 2
Time: 2PM – 4PM

WEB SITES OF INTEREST:

Insect and disease predictive information is available at:

http://enviroweather.msu.edu/homeMap.php

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

http://agbioresearch.msu.edu/nwmihort/faxnet.htm

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/
Information on apples:

http://apples.msu.edu/

Fruit CAT Alert Reports has moved to MSU News

http://news.msue.msu.edu