Northern Michigan FruitNet 2013
Northwest Michigan Horticultural Research Center

Weekly Update

July 30, 2013

CALENDAR OF EVENTS

7/31	**SW Viticulture Field Day** SWMREC – Benton Harbor
8/2	**Parallel 45/MSUE Viticulture Update** Ground Floor Management/Cover Crops with Dr. Matt Grieshop Chateau Chantal – Old Mission
8/7	**Hop Production 201 – Beyond the Basics Workshop** SWMREC
8/8	**RidgeFest** West Michigan Fruit Grower Tour
8/9	**Hops Field Day & Tour**
8/15	**2013 Soil Seminar – Educational Workshop** Sears, MI **See attached flyer for more details and registration form**
8/22	**NWMHRC Open House**
8/22	**Parallel 45/MSUE Viticulture Update** New wine cultivars with Dr. Paolo Sabbatini NWMHRC
8/27	**Peach and Plum Variety Showcase** SWMREC

GROWING DEGREE DAY ACCUMULATIONS AS OF July 29 AT THE NWMHRC

Year	2013	2012	2011	2010	2009	2008	23yr. Avg.
GDD42	2136	2680	2115	2492	1870	2032	2152.2
GDD50	1413	1785	1452	1606	1103	1272	1371.9

Growth Stages at NWMHRC (July 29, 11:30 a.m.)

Apple: Red Delicious – 50 mm
Gala – 46 mm
Yellow Delicious – 45 mm
Pear: Bartlett: 36 mm
Tart Cherry: Harvested
Balaton: 20 mm
Apricot: 32 mm
Grapes: Green fruit

Northwest Michigan Regional Report
N.L. Rothwell, NWMHRC

Tart cherry continues across northwest Michigan, and the quality is still looking good

Tart cherry harvest continues this week across all of northwest Michigan. Tart cherry quality is good, and the very cool temperatures will maintain fruit quality as harvest is expected to last for at least another 1-2 weeks. Temperatures have cooled off dramatically, and it seems more like fall than the end of July. Daytime temperatures over the weekend peaked out in the low 60s and following the 90 degree days a week ago, it feels downright cold. The cool temperatures have been coupled with rain, and the NWMHRC received 0.43" of rain over the weekend. We have accumulated 2136 GDD base 42 and 1413 GDD base 50 so far this season.

Apple. Insect catch in apples is low again this week, and **codling moth** (CM) numbers have been low across the region. Some growers have commented that these CM numbers are the lowest they have seen in many years. **Spotted tentiform leafminer** numbers are still in the hundreds, and we still have not caught **apple maggots** at the NWMHRC. **Obliquebanded leafroller** adult numbers are also down again this week, and some small larvae are visible in terminals.

Cherry. With the cool temperatures, both **leaf spot** and **powdery mildew** have slowed down. Growers are busy harvesting and will likely be putting on post harvest leaf spot sprays after they

move out of a block. **Obliqubanded leafroller** (OBLR) larvae have been difficult to find in tart cherry, and we caught no adults in pheromone traps this week. We have identified OBLR larvae in tanks of tart cherries. As we expected, the larvae would be showing up at the same time as tart cherry harvest. Growers should be keeping an eye out for these caterpillars as they harvest. **American plum borer** moth second generation flight began last week, and we trapped an average of 19 moths this week. **Cherry fruit fly** numbers are up from last week, and we trapped a total of 22 flies at the NWMHRC this week. Consultants have also reported high CFF catches at many farms in the region.

We continue to catch **spotted wing drosophila** (SWD) at multiple sites across northwest Michigan. Our first catch was last week here at the NWMHRC, and a second fly was trapped on Old Mission Peninsula. At the end of last week, we also trapped SWD flies in Antrim County and Grand Traverse County near the Williamsburg area. A SWD was caught in Benzie County late last week as well. We have also found tart cherries infested with SWD eggs and larvae in a block that has received minimal sprays this season. This insect will be challenging to control as it shows up so close to harvest. Delegate and Entrust are both rated excellent on SWD in cherry, and both have a 7D pre-harvest interval (PHI). Imidan and Mustang Max are also rated excellent but have a 14D PHI. Danitol (3D PHI) and Baythroid (7D PHI) are rated good against SWD.

Wine Grapes

Duke Elsner, Grand Traverse County MSUE

Many cultivars have reached the point of berry touch, and some tight-clustered cultivars like Vignoles and Pinot Noir now have completely closed clusters. Some Vignoles berries at the research center have seeds pushing through the flesh of the berry, which is not uncommon for this cultivar. Topping or side-hedging will soon be needed in many vineyards.

Powdery mildew berry infections are starting to show up in many sites, although foliar infections are still very light. Good canopy management, including leaf removal in the fruiting zone is going to be important from here out to limit the progress of mildew diseases.

No **Japanese beetles** have been reported in Grand Traverse are vineyards as of yet. Shoot defoliation by the larger **sphinx moth** larvae has started to become noticeable.

MICHIGAN SWD REPORT - July 30, 2013

Sharp increase in spotted wing drosophila captures in the past week in southern Michigan counties, and first detection of infestation in unsprayed cherries.

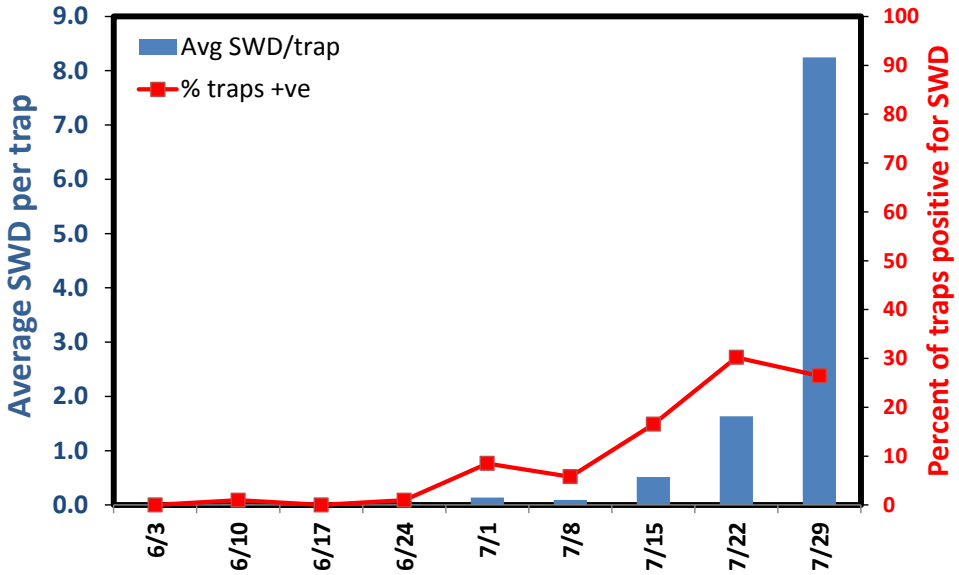
Nikki Rothwell, Karen Powers, and Statewide SWD Monitoring Team

Adult spotted wing drosophila (SWD) catch has increased over the past week, from an average of 1.6 flies per trap to 8.2 flies per trap. These are the averages across all of the 120 traps in our MSU Extension SWD Monitoring Network over the past week, where 26.4% of the traps were positive for SWD, down slightly from 30.2% last week. However, these summary numbers do

not reflect the much higher levels of SWD activity observed in the southern part of the monitoring network, particularly in SW Michigan. This can be seen by the average catch in NW Michigan traps being 0.2 SWD per trap compared with 13.5 SWD per trap in those traps located in rest of the state, mainly SW and West Central Michigan. In these regions we are also observing a switch in the number of male and female flies captured in the traps, with 2-3 times more females than males. In some traps this was even more extreme (for example one trap caught 1 male and 9 females). This highlights the need for scouts and consultants to be trained to identify female SWD accurately. Additionally, Drosophila larvae were detected in fruit from an unprotected cherry orchard in NW Michigan this past week.

In Berrien county over the past week, most sites have been trapping higher numbers of SWD. In general, the grape, blueberry, raspberry, and strawberry sites have had much higher counts than the peach and cherry orchards. Many of these sites have had 2x to 10x increases in catches over the past week, with the highest recording 34 males and 175 female SWD at a tree line in a mixed berry and tree fruit farm. In Van Buren county, catches range from 0 SWD at a number of tart cherry orchards to 95 flies at a strawberry farm that is well past harvest. Raspberry and plum monitoring sites also recorded over 10 flies in the traps at those locations. Southeast Michigan has also seen some low levels of SWD activity at the sites that we are monitoring, with 1-2 SWD per trap at sites in Macomb and Livingston counties. In Allegan county, traps ranged from sites with 0 SWD captures (tart cherry and some blueberry sites) to some blueberry and raspberry locations with 30-50 per trap. A sweet cherry site in Ottawa county had zero SWD flies, whereas blueberry, strawberry, and raspberry sites all caught SWD and had 2-24 of those flies captured. In the west central region north of Ottawa County and in the Northwest region of the Southern Peninsula, captures were markedly lower. Only 23% of traps were positive for SWD in Leelanau, Antrim, and Benzie counties, with 0.16 flies per trap on average. However, SWD was detected in traps in all three counties, and as mentioned above there has been a single report from one farm of Drosophila larvae detected in unprotected fruit. While it is not yet clear whether this was SWD or some native species, the report highlights the need for growers to have an active monitoring program and to be checking fruit quality as harvest progresses.

The sharp increase in the abundance of SWD and the frequency of captures in the past week indicates that growers with ripe and susceptible fruit should take precautions to prevent SWD infestation. With the continuing moderate temperatures, rain showers, and abundant ripe fruit present across the Michigan fruit belt, growers need to be sure to keep this fruit protected through the harvest period. The decision to spray should be based on the presence of SWD flies and ripening or ripe fruit that are susceptible, plus the history of pest management inputs to each field. A monitoring program in these crops is recommended throughout the harvest season. From preliminary tests conducted at MSU, ripening and coloring sweet and tart cherry fruits are susceptible to SWD infestation.



PERDICTED 2013 APPLE HARVEST DATES

The roller coaster-like spring weather still results in 2013 apple harvest dates near normal averages.

Posted on **July 23, 2013, MSUE News,** by **Phil Schwallier**, and Amy Irish-Brown, Michigan State University Extension

The 2013 season began with a roller coaster of weather across Michigan. A late-starting winter and extended cool period delayed spring and was then followed by alternate periods of warm and cold weather that surged tree development forward and backward. Some areas experienced a severe frost. This unusual spring was also characterized by considerable, seemingly unending, record precipitation in some state locations. At times, apple tree development was two to three weeks behind normal, but in the end most of the state bloomed near normal to slightly behind normal dates. Southwest and southeast Michigan bloomed two to three days behind normal and the rest of the state bloomed near normal to slightly late. In some parts of the state, the severe frost killed some primary bloom (bloom on 2-year-old wood and older), but the later primary and secondary bloom (bloom on 1-year old-wood) was not hurt and a heavy fruit set resulted.

Last year's early bloom (about 30 days early) resulted in record early predicted harvest, about 20 to 30 days ahead of normal. The 2013 predicted harvest dates (Table 1) are between one to seven days behind normal depending on the area. These predicted harvest dates are for the center or peak harvest of these varieties for CA storage. 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 triggered by cold temperatures occurring near harvest time. Michigan State University Extension advises growers to keep in mind that heavy crops will mature a few days later than average fruit set.

Table 1. 2013 predicted peak harvest dates.

Full bloom date				Predicted harvest date			
Enviro-weather station	McIntosh	Jonathans	Reds	McIntosh	Jonathans	Reds	Observer
SWMREC	9-May	13-May	14-May	11-Sep	27-Sep	3-Oct	Shane
Deerfield	8-May	9-May	10-May	9-Sep	26-Sep	4-Oct	Tritten
Romeo	15-May	16-May	16-May	15-Sep	2-Oct	8-Oct	Tritten
Peach Ridge	15-May	16-May	17-May	15-Sep	29-Sep	5-Oct	Schwallier
Hart	19-May	20-May	20-May	20-Sep	5-Oct	11-Oct	Schwallier
NWMHRS	21-May	21-May	22-May	23-Sep	8-Oct	16-Oct	Rothwell

Table 2. 2013 predicted peak harvest dates compared to normal and last year.

Days compared to normal (- = before, + = after)				Days compared to last year (- = before, + = after)		
Enviro-weather station	McIntosh	Jonathans	Reds	McIntosh	Jonathans	Reds
SWMREC	+4	6	+5	+34	+29	+28
Deerfield	+1	+5	+2	+27	+16	+16
Romeo	+2	+7	+5	+25	+17	+17
Peach Ridge	+1	+3	+1	+27	+18	+16
Ludington	+2	+2	-3	+28	+16	+17

NWMHRS	+1	+2	-1	+25	+20	+19

The normal harvest dates for other varieties are listed in Table 3 for the Grand Rapids, Mich., area. This year's 2013 predicted dates and adjusted 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. Use 30 days before 2013 predicted harvest dates to time applications of ReTain for stop drop management.

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

Variety	Normal date	2013 predicted date
Paulared	8/24	8/24
Gingergold	8/26	8/26
Gala	9/10	9/10
McIntosh	9/14	9/15
Honeycrisp	9/18	9/18
Empire	9/22	9/22
Jonathan	9/26	9/29
Jonagold	9/28	9/28
Golden Delicious	10/2	10/2
Red Delicious	10/4	10/5
Idared	10/10	10/10
Rome	10/15	10/15
Fuji	10/25	10/25
Braeburn	10/25	10/25
Goldrush	11/1	11/1

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ReTAIN AND NAA AS A STANDARD PRACTICE FOR APPLES

Dissecting the use of harvest management tools for apple growers.

Posted on **July 23, 2013, MSUE News,** by **Phil Schwallier**, and Amy Irish-Brown, Michigan State University Extension

Harvest management is a primary reason growers use ReTain on apples. However, there are many other benefits that ReTain can offer apple growers. The ReTain effect on improving storage quality is a major desire for shippers and processors. ReTain stops the production of ethylene in the apple fruit and thus delays maturity and lengthens shelf life. Michigan State University Extension's best recommendation is to use ReTain at full rate split into two sprays at 30 and 14 days before harvest. Add NAA at 20 ppm with the 14-day before harvest application. This will give you maximum stop drop and good harvest management. Remember, some sensitive varieties like Gala and Jonagold should only receive a seasonal rate of half the full rate.

ReTain will delay apple maturity, thus allowing harvest management of large blocks of one variety. ReTain is also dose-dependent, that is, a full rate will give maximum delay of maturity, say, 14 days. Half rate will only give half of the delay of maturity, say, seven days. This allows growers to better plan harvest. For example, one-third of your Galas could be treated with a half rate of ReTain and one-third of your Galas could be treated with one-quarter rate and thus the grower could harvest untreated Galas one week, the one-quarter rate treated Galas the next week, and the half rate treated Galas the third week. All the Galas would be picked at prime maturity over a three-week period.

ReTain is dose-dependent and time-dependent. The standard recommendation of ReTain use is to apply full rate at 30 DBH (days before harvest). However, a grower can apply the ReTain 14 DBH or even in split applications. There can be some complications from delaying ReTain applications closer to harvest, but it also allows for more grower flexibility of ReTain use. Later applications of ReTain tend to have less impact on red color development and allow for combinations with NAA. Typically, NAA is applied about 14 DBH of any variety. Waiting to apply ReTain 14 DBH allows growers to make one application of the combination ReTain + NAA instead of two trips (ReTain at 30 DBH followed by NAA at 14 DBH).

Other major benefits of ReTain include its stop drop impact on apples. ReTain stops ethylene production, which stops the ethylene ripening effect and, thus, dropping fruit – a ripening effect. NAA does this as well, but by a different effect, that is delaying the formation of the fruit abscission zone. Unfortunately, NAA also turns on ethylene which, in turn, will ripen fruit and after NAA wears off, fruit drop will be enhanced. ReTain, however, will eliminate the NAA-induced ethylene. So in using the combination of ReTain + NAA you get the best of both worlds, improved stop drop from both materials and ReTain's control of the NAA induced ethylene ripening.

ReTain also reduces watercore, greasiness, cracking and improves fruit size. Shippers and processors like the improved storage quality and longer shelf life of ReTain-treated fruit, especially the greater fruit firmness from ReTain. The combination of ReTain + NAA is an

improvement over using either material alone. We still have to work out what is the lower rate of ReTain that will work with NAA and more work on the timing of each material.

Overall ReTain + NAA has performed well in the past four years of trials on all varieties.

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MICHIGAN HOP UPDATE – July 26, 2013

Potato leafhopper populations have decreased dramatically in treated hopyard, and Japanese beetles are causing significant damage in some central and southern Michigan hopyards.

Posted on **July 26, 2013, MSUE News,** by **Erin Lizotte**, Michigan State University Extension

So far this season, the Benton Harbor Enviro-weather station has accumulated 1,597 GDD50 with 0.09 inches of rain over the past week; the Clarksville Enviro-weather station has recorded 1,447 GDD50 and 1.45 inches of rain this past week; and the Northwest Michigan Horticultural Research Center accumulated 1,331 GDD50 with 0.61 inches of rain over the last week.

Downy mildew infections have been reigned-in for the most part, but should remain a concern for growers with early initial infections continuing to fuel significant inoculum potential in some hopyards. Downy mildew is caused by *Pseudoperonospora humuli* and can cause significant yield and quality losses, depending on variety and when infection becomes established. It is important that growers do not mistake downy mildew for powdery mildew (see photos below for clarification) as the effective pesticide classes are completely different. According to Michigan State University Extension, powdery mildew has not been confirmed in Michigan and is caused by *Podosphaera macularis*, a completely different pathogen than what causes downy mildew.


Left, The variety Centennial with downy mildew infections sporulating on the underside of the leaf. Right, Powdery mildew on hop. Photo credits: (Left image) Erin Lizotte, MSU Extension, and (Right image) David Gent, USDA Agricultural Research Service, Bugwood.org

Typically, downy mildew appears early in the season on emerging basal spikes. Spikes then appear stunted, brittle and distorted. Asexual spore masses appear fuzzy and black on the underside of infected leaves. As bines continue to expand, new tissue becomes infected and bines fail to climb the string. Growers can retrain new shoots, but often incur yield loss as a result.

This season, symptoms have appeared more readily on expanded leaves as small, angular lesions that are yellow and chlorotic in appearance. These small lesions expand over time and eventually sporulate on the underside of leaves when warm and moist conditions occur.

It takes a multipronged approach to manage successfully for downy mildew. Growers should maintain a protectant fungicide management strategy to mitigate the risks of early and severe infections. Keep in mind that varieties vary widely in their susceptibility to downy mildew and select the more tolerant varieties when possible. Clean planting materials should be selected when establishing new hopyards since this disease is readily spread via nursery stock.

Cultural practices alone are not enough to manage downy mildew. Protectant fungicide strategies are particularly important during the year of planting to minimize crown infection and limit disease levels in the future. Fungicide applications should be made in response to environmental conditions that favor disease. Fungicides containing copper, boscalid, pyraclostrobin, phosphorous acids and a number of biopesticides have varying activity against downy mildew (see Table 1 below). For organic growers, OMRI-approved copper formulations are the most effective. Sulfur is **not** an effective downy mildew material.

Table 1. Fungicides registered for hop production with activity against downy mildew

Activity	Active ingredient (FRAC code)	Product
Broad spectrum	Phosphorous acid, mono- and dibasic sodium, potassium, and ammonium salts(33)	Phostrol
	Phosphorous acid, mono- and dipotassium salts(33)	Confine Extra, K-Phite 7LP AG
	Basic Copper sulfate (M1)	Cuprofix-Ultra 40 Disperss
	Copper diammonia diacetate complex	Copper-Count-N
	Copper hydroxide(M1)	Champ DP Dry Prill, Champ Formula 2 Flowable, Champ WG[1], Kentan DF, Kocide 3000, Kocide-2000, NU-COP 3 L, NU-COP 50 DF[1], NU-COP HB
	Copper hydroxide(M1); Copper oxychloride(M1)	Badge SC, Badge X2[1]
	Copper octanoate(M1)	Cueva[1]
	Copper oxychloride sulfate(M1)	C-O-C-S WDG

	Copper sulfate pentahydrate(M1)	Mastercop
	Cuprous oxide(M1)	Nordox 75 WG[1]
Single site-premix	Boscalid(7); Pyraclostrobin(11)	Pristine
Biopesticides	*Bacillus pumilus* strain QST 2808(44)	Sonata[1]
	Extract of *Reynoutria sachalinensis*(P5)	Regalia[1]
	Neem oil	Trilogy[1]

[1]These product labels are OMRI-approved for organic production.

Japanese beetle populations are high in some areas. Japanese beetle adults are a generalist pest and affect many crops found on or near grassy areas, particularly irrigated turf. Japanese beetle grubs feed on grass roots in early spring and again in the fall and can cause significant damage to turf. Larvae prefer moist soil conditions and do not survive prolonged periods of drought. Given the intense dry season Michigan experienced in 2012, we hope to see lower populations in most areas for 2013.

Adult Japanese beetles emerge in early July and feed on the top surface of leaves, skeletonizing the tissue. If populations are high, they can remove all of the green leaf material from a plant. Japanese beetle adults measure 0.375 to 0.5 inches long with a green thorax and copper-colored wing covers. There are five tufts of white hairs on both sides of the abdomen and a pair of tufts on the end of the abdomen that can help distinguish the Japanese beetle from other look-alike species. Visual observation of adults or feeding damage is an effective scouting technique. Because of their aggregating behavior, they tend to be found in larger groups and are typically relatively easy to spot.

Adult Japanese beetle. Photo credit: David Cappaert, Michigan State University, Bugwood.org

There are no established treatment thresholds or data on how much Japanese beetle damage a hop plant can sustain, but growers should consider that well-established and vigorous bines will likely not require 100 percent protection. If treatment is necessary, growers will find a number of

products labeled for Japanese beetles (Table 2). Organophosphates take longer to take effect (up to three days), but provide 10 to 14 days of residual control. Pyrethroids have good knockdown activity and seven to 10 days of residual control, but can be a concern in hopyards where mites are a problem. Pyrethroid use has been shown to flare mite populations as a result of its toxicity to beneficial predatory mites. Neonicitinoids act initially as a contact poison for two to five days, and then have a longer residual period of plant protection during which they have anti-feedant effects on adult beetles. OMRI-approved organic options include neem-based products (azadirachtin) which have a one- to two-day residual and good knockdown activity, as well as Surround (kaolin clay) which has had good results in blueberries and grapes and acts as a physical barrier and irritant.

Table 2. Insecticides labeled for hop production with activity against Japanese beetles, 2013

Chemical class (IRAC#)	Active ingredient	Label names
Biopesticide	Kaolin	Surround-WP[2]
IGR+Pyrethroids(3A)	Azadirachtin; Pyrethrins	Azera
Insect growth regulator or inhibitor	Azadirachtin	Aza-Direct[2], Azatin XL, Ecozin Plus 1.2% ME[2]
Neonicotinoid(4A)	Imidacloprid	Admire Pro, Advise 2 FL, Alias 2F, Amtide Imidacloprid 2F, Couraze 2F Insecticide, Couraze 4F, Macho 2.0 FL, Macho 4.0, Malice 75 WSP Insecticide, Mana Alais 4F, Midash 2SC AG, Midash Forte, Montana 2F, Montana 4F, Nuprid 1.6 F, Nuprid 2F, Nuprid 2SC, Nuprid 4.6F PRO, Pasada 1.6 F, Pasada 1.6F, Prey 1.6, Provado 1.6 F, Sherpa, Widow, Wrangler
	Thiamethoxam	Platinum, Platinum 75 SG
Organophsophate(1B)	Malathion	Cheminova Malathion 57%, Malathion 5, Malathion 57 EC, Malathion 5EC, Malathion 8 Aquamul, Malathion 8 Flowable
Pyrethroids(3A)	Beta-cyfluthrin[1]	Baythroid XL
	Bifenthrin[1]	Bifen 2 AG Gold, Bifenture 10DF, Bifenture EC, Brigade 2EC, Brigade WSB Insecticide, Discipline 2EC, Fanfare 2EC, Fanfare ES, Sniper Tailgunner, Tundra EC
	Cyfluthrin[1]	Renounce 20WP, Tombstone, Tombstone Helios

	Pyrethrins	Pyganic EC 1.4 II[2], Pyganic EC 5.0 II[2]
Pyrethroids(3A) + Neonicotinoids(4A)	Beta-cyfluthrin[1]; Imidacloprid	Leverage 360
	Bifenthrin[1]; Imidacloprid	Brigadier
	Bifenthrin[1]; Imidacloprid	Swagger
	Cyfluthrin[1]; Imidacloprid	Leverage 2.7 Insecticide
Unclassified + Pyrethroids(3A)	Piperonyl butoxide; Pyrethrins	Evergreen EC 60-6

[1]Products containing these active ingredients are classified as a restricted use pesticide and require the applicator to retain a pesticide applicator license.
[2]These product labels are OMRI-approved for organic production.

Growers should continue to monitor their hops for **potato leafhopper** populations as significant outbreaks are possible yet this season. Potato leafhoppers move in all directions when disturbed, unlike some leafhoppers that have a distinct pattern of movement. Right now the adults and nymphs appear a fluorescent green color. Some very small nymphs are actually clear, but have the characteristic shape of the larger nymphs when viewed using a hand lens.

Potato leafhoppers can't survive Michigan's winter and survive in the Gulf States until adults migrate north in the spring on storm systems. Although hop plants are susceptible to potato leafhoppers, they can tolerate some level of feeding and growers should be conservative in the application of insecticides. Potato leafhoppers causes what growers have termed "hopper burn," which causes necrosis of the leaf margin in a v-shaped pattern and may cause a yellowed or stunted appearance as well. The easiest way to observe potato leafhoppers is by flipping the shoots or leaves over and looking for adults and nymphs on the underside of leaves.

Multiple nymph stages of potato leafhopper and the associated hopper burn symptoms around

the leaf margin. Note that leafhoppers can be very small and clear at some leaf stages. Photo credit: Erin Lizotte, MSU Extension

Growers needing to treat for potato leafhoppers can utilize products containing neonicitinoids, pyrethroids, organophosphates or spinosyns. Organic growers can utilize Entrust (spinosad) or Pyganic (pyrethrin) formulations that are OMRI-approved for potato leafhopper management.

As temperatures remain warm and the weather dries out for the summer, growers should also remain vigilant in scouting for **two-spotted spider mites** that are being reported at densities of around two mites per leaf in southern hopyards and a little less than one per leaf in northwest Michigan. Two-spotted spider mites are a significant pest of hops in Michigan and can cause complete economic crop loss when high numbers occur by decreasing the photosynthetic ability of the leaves and causing direct mechanical damage to the hop cones.

Two-spotted spider mites feed on the liquid in plant cells eventually causing visible symptoms. Leaves take on a white appearance and will eventually defoliate under high pressure conditions. 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 contaminate issue for brewers.

Two-spotted spider mite like it hot, with the pace of development increasing until an upper threshold around 100 F is reached. Conversely, cold and wet weather is not conducive to development which may explain the low pressure thus far this season.

Two-spotted spider mites are very small, but can be observed on the underside of leaves using a hand lens. The eggs look like tiny, clear spheres and are most commonly found in close proximity to adults and larvae. The larvae themselves are small, translucent versions of the adults, which begin the season with a distinctly orange hue that changes over to translucent, yellow or green as they feed. Adults also have two dark spots.

When you are observing the underside of leaves, keep an eye out for beneficial, predatory mites that actually feed on two-spotted spider mites. Predatory mites are often translucent, larger than two-spotted spider mites and move at a much faster speed across the leaf surface. Predatory mites play an important role in balancing the two-spotted spider mite population and should be protected when possible.

Growers should be scouting for **mites** now and remember that only when mites reach an economically significant level should cultural and chemical intervention be considered. Use a hand lens to evaluate two leaves from 20 plants per yard. Thresholds developed in the Pacific Northwest have established that 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. Remember that if cones are not infested, hop plants can tolerate a good deal of damage from mites.

Hop **aphids** continue to be observed at levels well below the eight to 10 per leaf threshold established in the eastern United States. Hop aphids can reduce plant productivity and excrete

"honeydew" that makes an excellent growth medium for sooty mold and can greatly reduce the quality and salability of a crop. Symptoms of hop aphid feeding include leaf cupping and the appearance of honeydew – a sugary frass – and the associated black sooty mold.

Hop aphids overwinter as eggs on Prunus species. In early spring, eggs hatch into stem mothers that give birth to wingless females that feed on the Prunus host. In May, winged females are produced and travel to hop plants where additional generations of wingless females are produced. As cold weather approaches, winged females and males are produced, move back onto a Prunus host, mate and lay eggs before winter.

Wingless hop aphid on the underside of a hop leaf. Photo credit: Erin Lizotte, MSU Extension

Control before the flowering stage is important to protect crop quality when populations are high. Insecticides containing neem (some of which are organic), neonicitinoids including products containing imidacloprid or thiamethoxam, flonicamid (labeled as Beleaf) or spirotetramat (labeled as Movento) all have activity against hop aphid.

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MICHIGAN CHESTNUT UPDATE – July 26, 2013

European red mite numbers have hit treatment thresholds of seven mites per leaf in many chestnut orchards. Growers should be scouting for this potentially damaging pest and managing if necessary.

Posted on **July 26, 2013, MSUE News,** by **Erin Lizotte**, Michigan State University Extension, and Mario Mandujano and Dennis Fulbright, Michigan State University Extension, Department of Plant, Soil and Microbial Sciences

So far this season, the East Lansing Enviro-weather station has accumulated 1,536 GDD50 with 0.37 inches of rain over the past week; the Clarksville Enviro-weather station has recorded 1,447 GDD50 and 1.45 inches of rain this past week; and the Northwest Michigan Horticultural Research Center accumulated 1,331 GDD50 with 0.61 inches of rain over the last week. Small burs are forming in northwest Michigan chestnuts.

Burr formation on July 24, 2013 in northwest Michigan.
Photo credit: Erin Lizotte, MSU Extension

Potato leafhopper populations are down overall, particularly on farms where insecticide applications have been made to control the pest. All life stages of potato leafhoppers are being observed in significant numbers across the state. Like many plants, chestnuts are sensitive to the saliva of potato leafhoppers that is injected by the insect while feeding. Damage to leaf tissue can cause reduced photosynthesis which can impact production and quality, and damage the tree. Heavily damaged leaves are cupped with necrotic and chlorotic edges and eventually fall from the tree. Severely infested shoots produce small, bunched leaves with reduced photosynthetic capacity.

The most common classes of insecticides recommended for potato leafhopper control include the pyrethroids, carbamates, neonicotinoids and organophosphates. See the additional Michigan State University Extension article "Potato leafhopper management in chestnuts" for more information. Remember, even growers who believe they may have experienced crop losses due to the frost and freeze events this spring will still need to treat for potato leafhoppers to maintain tree health.

Left, Wingless potato leafhopper nymphs on the back of a chestnut leaf. Right, Symptoms of potato leafhopper feeding. Photo credits: (Left image) Mario Mandujano, MSU, and (Right image) Erin Lizotte, MSU Extension

Japanese beetle populations are high in some areas. Japanese beetle adults are also considered a generalist pest and affect many crops found on or near grassy areas, particularly irrigated turf. Japanese beetle grubs feed on grass roots in early spring and again in the fall and can cause significant damage to turf. Larvae prefer moist soil conditions and do not survive

prolonged periods of drought. Given the intense dry season Michigan experienced in 2012, we hope to see lower populations in most areas for 2013.

Adult Japanese beetles emerge in early July and feed on the top surface of leaves, skeletonizing the tissue. If populations are high, they can remove all of the green leaf material from a plant. Adults measure 0.375 to 0.5 inches long with a green thorax and copper-colored wing covers. There are five tufts of white hairs on both sides of the abdomen and a pair of tufts on the end of the abdomen that can help distinguish the Japanese beetle from other look-alike species.

Visual observation of adults or feeding damage is an effective scouting technique. Growers should scout along a transect through orchards at least weekly until detection, paying special attention to the tops of trees. Because of their aggregating behavior, they tend to be found in larger groups and are typically relatively easy to spot.

Japanese beetles mating. Chestnut leaves show typical feeding damage. Photo credit: Mario Mandujano, MSU

There are no established treatment thresholds or data on how much Japanese beetle damage a healthy chestnut tree can sustain, but growers should consider that well-established and vigorous orchards will likely not require 100 percent protection. Carbamate (carbaryl) insecticides can provide immediate knockdown and seven days of residual activity against Japanese beetle adults. Organophosphates (Malathion and phosmet) can take longer to take effect (up to three days), but provides 10 to 14 days of residual control.

Pyrethroids (bifenthrin, beta-cyfluthrin, cyfluthrin, gamma-cyhalothrin, lambdacyhalothrin, pyrethrins, zeta-cypermethrin, deltamethrin and fenpropathrin) have good knockdown activity, and seven to 10 days of residual control, but can be a concern in orchards where mites are a problem. Pyrethroid use has been shown to flare mite populations as a result of its toxicity to beneficial predatory mites.

Neonicitinoids (imidacloprid, thiamethoxam, acetamiprid and clothianidin) act initially as a contact poison for two to five days, and then have a longer residual period of plant protection during which they have anti-feedant effects on adult beetles.

OMRI-approved organic options include neem-based products (azadirachtin) which have a one- to two-day residual and good knockdown activity as well as Surround (kaolin clay), which has had good results in blueberries and grapes and acts as a physical barrier and irritant. For more information on Japanese beetle management in chestnuts, refer to the article "Managing Japanese beetles in Chestnut for 2013."

European red mites have reached high levels in some area orchards. European red mites overwinter in egg-form; growers can locate egg masses in crevices, rough bark, crotches usually in folds of bark inclusion, on branches and in the bud scales with the aid of a hand lens. Summer eggs are found on the leaves along the veins on both sides of the leaf, but mainly on the underside. Eggs are orange-red and resemble turbans.

After eggs hatch, nymphs move onto the young leaves and start feeding on the underside. First generation takes a bit longer to develop – about three weeks – since it has to battle cool temperatures in the early season. Summer generations, driven by the hot and dry weather, complete lifecycles in about 10 days. Under favorable weather conditions (hot and dry) they can have eight or more generations in one season. Adults are often found on the upper leaf surfaces.

Left, Early bronzing of chestnut caused by European red mite. Right, Adult European red mite viewed under dissecting microscope. Photo credits: (Left image) Erin Lizotte, MSU Extension, and (Right image) Scott Justice

European red mite feeding damage increases as populations increase. Leaves appear mottled, stippled, and in more severe cases, bronzed. Injured leaves have reduced photosynthetic activity leading to reduced nut size, and return crop load potential as well as increased sensitivity to winter injury. Severe feeding damage can lead to early defoliation.

Orchards battling populations season-long or with high levels at the end of the year should plan to apply preventative measure to control higher overwintering populations in the spring of 2014. Dormant or delayed dormant oil applications are the most treatment timing to control mites. Summer mite management is based on monitoring or scouting procedure and use of miticides. Monitoring involves examination of 10 leaves off of 10 trees for a total of 100 leaves, randomly selected throughout the orchard. Leaves should be collected from four sides of the tree. With the help of hand lens (10X or 20X), all stages of pest and predatory mites need to be counted. Determine average mite count per leaf (total number of mites per 100 leaves).

Thresholds for treatment increase as the season progresses. At this point in the year (August-September), the leaves are larger, more mature and more tolerant to mite injury. Growers should consider treatment if they are approaching seven mites per leaf. There are a number of chestnut pesticides labeled to control mites. See the table below.

Chestnut insecticides with activity against mites

Chemical class (IRAC insecticide group)	**Active ingredient**	**Products labeled**
Avermectins(6)	Abamectin**	Eip-mek 0.15 EC, Reaper 0.15 EC, Reaper Advance, Abacus, Abba 0.15EC, Abba Ultra, Abamectin, Agri-Mek SC, Agri-Mek S.15
METI(21A)	Fenpyroximate	Portal
	Pyridaben	Nexter
Pyrethroids(3)	Bifenthrin**	Bifenture 10DF, Bifenture EC, Brigade WSB, Fanfare 2 EC, Sniper
	Fenpropathrin**	Danitol 2.4EC Spray
Pyrethroid(3) + Pyrethroid(3)	Bifenthrin** + Zetacypermethrin**	Hero EW, Steed
	Bifentrhin** + Imidacloprid	Brigadier, Swagger
Tetramic acids(23)	Spirodiclofen	Envidor 2SC
	Potassium salts of fatty accids*[1]	M-Pede
	Chromobacterium subtsugae[1]	Grandevo*
	Extract of *Chenopodium ambrosioide*[1]	Requiem 25EC, Requiem EC
Insect growth regulators or inhibitors	Etoxazole	Zeal Miticide 1
	Hexythiazox(10A)	Onager, Savey 50DF
	Azadirachtin (IGR)	Aza-Direct*, Azatin XL, Ecozin Plus 1.2% ME*, Neemazad 1% EC*, Neemix 4.5*, Azaguard*

Not classified or unknown	Acequinocyl	Kanemite 15 SC
	Bifenazate	Acramite 50WS

***OMRI-approved for organic production.**
****Products containing these active ingredients are classified as a restricted use pesticide and require the applicator to retain a pesticide applicator license.**
[1]Not classified by the Insecticide Resistance Action Committee (IRAC).

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

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

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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 has moved to MSU News http://news.msue.msu.edu

Tart Cherry Raw Product Reports – 2013

http://www.cherryboard.org/Week42013.pdf