WISCONSIN UNIVERSITY OF WISCONSIN-MADISON
UW Extension University of Wisconsin-Extension

Wisconsin Fruit News

Volume 2, Issue 7 – July 7, 2017

In This Issue:

General Information

Follow up on the article on the reduced risk insecticide Intrepid

By: Christelle Guédot

In the last issue of this newsletter, I discussed the insecticide Intrepid, which contains the active ingredient methoxyfenozide. Luckily, our DATCP specialist Otto Oemig reads the newsletter and he brought to my attention that there are some restrictions on where in the state this active ingredient can be applied due to the risk to endangered species. Otto Oemig and Mike Murray from DATCP kindly wrote the following article to provide some information about the restrictions and provide some context for the reasons behind the restrictions. Fortunately, this is the only active ingredient in Wisconsin with this kind of restriction and we will do our best to keep you posted should other active ingredient labels be affected by similar restrictions in the future.

Endangered Species Protection Bulletins and Methoxyfenozide Containing Pesticides

By: Otto Oemig and Mike Murray, Wisconsin DATCP

Did you realize that pesticides labels can require you to check a website for specific limitations related to endangered species protection? During the pesticide registration process, the Environmental Protection Agency (EPA) evaluates uses and potential impacts of a product. Approved pesticide labels can include geographically specific use limitations designed to limit negative impacts on federally listed endangered species and their critical habitat. Currently in Wisconsin, methoxyfenozide is the only active ingredient with specific endangered species use limitations. This active ingredient targets Lepidoptera, butterflies and moths, and therefore can harm the endangered Karner Blue Butterfly.

Registered methoxyfenozide pesticide products in Wisconsin are:

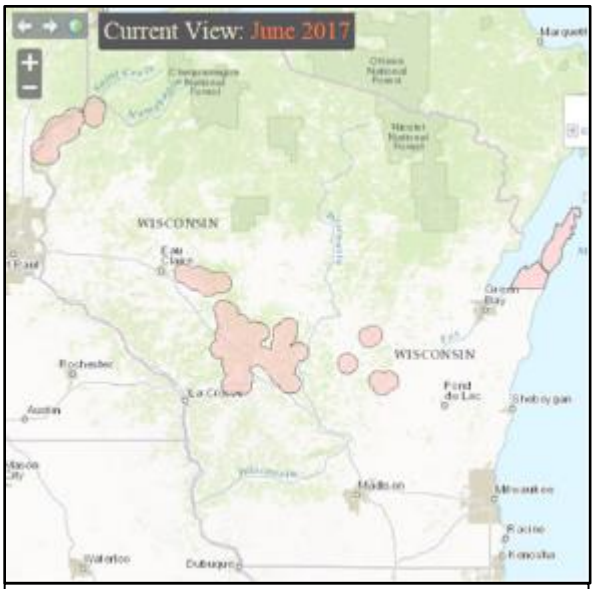
WithStand Insecticide	EPA Reg. No. 62719-442
Intrepid 2F Insecticide	EPA Reg. No. 62719-442
Troubadour 2F Insecticide	EPA Reg. No. 62719-442-5905
Intrepid Edge Insecticide	EPA Reg. No. 62719-666
Turnstyle Insecticide	EPA Reg. no. 70506-332

These pesticide labels currently have the following endangered species protection language:

"Endangered Species"

The following applies to use of this product in Michigan (Allegan, Monroe, Montcalm, Muskegon, Newaygo, or Oceana counties) or Wisconsin (Adams, Burnett, Chippewa, Clark, Door, Eau Claire, Green Lake, Jackson, Juneau, Marquette, Monroe, Polk, Portage, Waupaca, Waushara, or Wood counties). This product may have effects on endangered species. When using this product, you must follow the measures contained in the Endangered Species Protection Bulletin for the county in which you are applying the product. To obtain Bulletins, no more than six months before using this product, consult http://www.epa.gov/espp/ or call 1-844-447-3813. You must use the Bulletin valid for the month in which you will apply the product."

The map on the EPA website (see at right) shows in red highlights the areas of Wisconsin where methoxyfenozide pesticide use restrictions for endangered species protection are in place.



This map (from the EPA website) shows areas on Wisconsin where endangered species protections are in place, restricting use of the pesticide methoxyfenozide.

Selecting one of the pesticide use limitation areas will bring up a table with restrictions for the various methoxyfenozide-containing products. In Wisconsin, all uses of methoxyfenozide-containing pesticides within these red highlighted areas are prohibited except for limited use in cranberries.

The use of methoxyfenozide on cranberries is allowed in some of the pesticide use limitation areas and carries added restrictions such as allowable droplet size and application wind speed. The Bulletin states in part that for cranberry applications, "Ground applications must be made using a drift retardant and nozzles that produce an American Society of Agricultural Engineers (ASAE) coarse droplet size distribution (median droplet size of 450-500 microns), and when the wind speed is between 2-10 mph. Chemigation must be conducted consistent with the instructions on the current chemigation label AND must be made using a solid-set sprinkler system producing a minimum median droplet size of 500 microns (median droplet size of 450-550 microns) or larger, and when the wind speed is between 2-10 mph."

Any other use of methoxyfenozide-containing products within these pesticide use limitation areas is prohibited.

Because the Endangered Species Protection bulletins are referenced on the pesticide label, the restrictions are mandatory and enforceable just as any other label statement is.

These restrictions were put in place to remove previously confusing restrictions on the label.

New endangered species bulletins may be added to pesticide labes by the EPA as older chemistries are reevalutated, new active ingredients enter the market, and new species are listed as endangered. Be sure to check the label for endangered species restricitions.

Mating Disruption

By: Annie Deutsch and and Christelle Guédot

The goal of any integrated pest management program is to use a variety of techniques to control a targeted pest. This helps limit problems with developing pesticide resistance and often is more effective. One specific, non-insecticidal technique that can be used for insect control is mating disruption.

Figure 1. Twist tie containing insect pheromone used for mating disruption. (Eugene E. Nelson, Bugwood.org).

Many insects communicate with each other using pheromones: scents released by one insect to communicate with another insect of the same species. With moths in particular, female moths release a pheromone plume that male moths of the same species follow until they locate the female. Scientists have been able to identify the exact scent (pheromone) composition and have copied it to make a synthetic version that can be mass-produced. Large amounts of insect pheromone are then applied to a field through a dispenser like rubber tubing, plastic wafers, hollow fibers, puffers, wax matrices or sprays. This is essentially like saturating the field with the scent of a female moth, thereby preventing the male moth from determining the location of the female, which disrupts mating. This is also beneficial because any insect or other organism in the field is not affected by this species-specific pheromone; only the targeted species.

The goal of mating disruption is to decrease the probability of successful mate finding, thus reducing the number of offspring in the subsequent generation. Mating disruption is most efficient in areas of relatively low pest density, since in high pest density areas there is a greater probability that males and females will find each other by chance or by using visual cues. Often this limitation is addressed by using a preliminary insecticide spray to reduce the pest population before mating disruption is employed. Mating disruption is also most effective when applied over very large areas or isolated populations since that limits the number of the pest that can enter the area from off-site. Therefore, mating disruption is usually not practical for small-scale agriculture (less than ten acres) or for a backyard gardener.

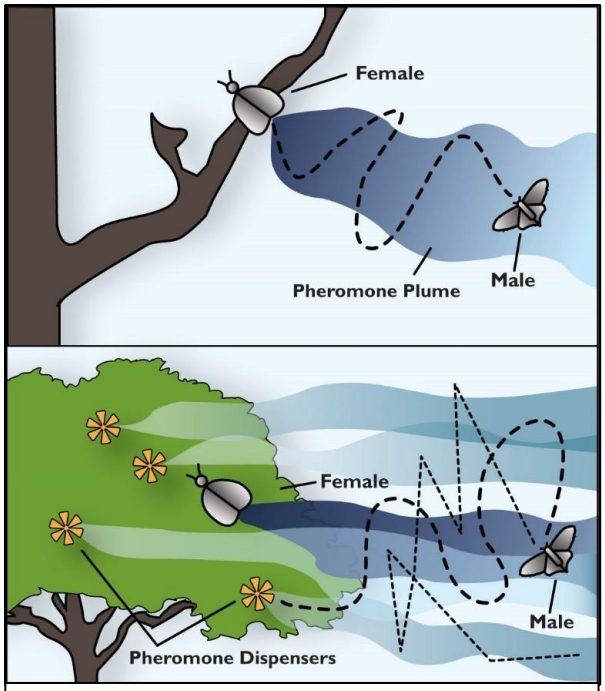


Figure 2. A male moth normally finds a female moth by following the female's pheromone trail (top). Two possible mechanisms of mating disruption (lower) include the male following a false trail (long dashed line) and the male being overwhelmed by the volume of pheromone so that he is unable to respond to any of the pheromone signals (short dashed line). Diagram credit: Utah State University Extension IPM Program.

A key consideration for successful mating disruption is the proper means of dispensing the pheromone. Different pheromone dispensers have been developed for different species so that they release the appropriate amount of pheromone for a certain length of time (i.e., the pheromone must be present for the full duration of time when the adult insects may be mating). Also, since pheromones are airborne signals, the dispenser must be placed in an area of the field where the pheromone will not rapidly blow off the field. Lures are commonly placed inside tree canopies where the insects mate or above crops where the insects fly when searching for a mate.

There have been many success stories using mating disruption, and it is a staple in many pest management programs in conventional as well as organic production systems. In Wisconsin, currently, the only product commercially available for mating disruption in fruit crops is for the codling moth, however there are many other products commercialized in other states or in development for other species.

UW-Madison/Extension Plant Disease Diagnostic Clinic (PDDC) update

By: Brian Hudelson, Sean Toporek, and Ann Joy

The PDDC receives samples of many plant and soil samples from around the state. The following diseases/disorders have been identified at the PDDC from June 17, 2017 through June 30, 2017.

PLANT/ SAMPLE TYPE	DISEASE/ DISORDER	PATHOGEN	COUNTY
FRUIT CROPS			
Apple	Anthracnose Apple Scab Coniothyrium Leaf Spot Discosia Leaf Spot Phomopsis Canker Root/Crown Rot	*Colletotrichum* sp. *Venturia inaequalis* *Coniothyrium* sp. *Discosia* sp. *Phomopsis* sp. *Cylindrocarpon* sp.	Dane Dane, Portage Dane Dane Winona (MN) Iowa
Apricot (Manchurian)	Bacterial Canker Brown Rot	*Pseudomonas syringae* *Monilinia* sp.	Brown Brown
Blueberry	Phomopsis Canker Root/Crown Rot	*Phomopsis* sp. *Rhizoctonia* sp.	Columbia Columbia
Cherry	Phomopsis Canker	*Phomopsis* sp.	Dane
Cherry ('Carmine Jewel')	Bacterial Canker Brown Rot	*Pseudomonas syringae* *Monilinia* sp.	Brown, Dane Brown
Cherry (Nanking)	Brown Rot	*Monilinia* sp.	Brown
Pear	Pear Scab	*Venturia pirina*	Outagamie
Plum (Red)	Bacterial Canker Brown Rot	*Pseudomonas syringae* *Monilinia* sp.	Brown Brown
Plum (Yellow)	Bacterial Canker Brown Rot	*Pseudomonas syringae* *Monilinia* sp.	Brown Brown
Strawberry	Botrytis Fruit Rot Tan-Brown Rot	*Botrytis cinerea* *Hainesia lythri*	Clark Clark

For additional information on plant diseases and their control, visit the PDDC website at pddc.wisc.edu.

UW Insect Diagnostic Lab—Fruit Insect Report: July 6th, 2017

By: PJ Liesch

Fruit insect reports to the UW Insect Diagnostic Lab have been steady the past two weeks. The biggest stories would be the continued pressure from **rose chafers**, the emergence of **Japanese beetles**, and the first report of juvenile **brown marmorated stink bugs** for the year.

Aphid reports continue to trickle in from both fruit crops and landscape trees/shrubs, curled leaves and sticky honeydew are common signs of aphid infestations. Overall, 2017 seems to be a good year for aphids throughout the state, although high rates of parasitism (i.e., aphid mummies) and predation have been noticed in many cases. Growers with aphid issues should scout for evidence of beneficials before choosing to apply treatments for aphids.

Thrips have been reported on both fruit trees and landscape trees/shrubs in several spots in the state.

Pearslug sawfly has recently been reported and larvae are typically active for ~3 weeks after emerging from eggs. This species can feed on a wide variety of fruit trees and landscape plants. The larva feed on the upper surface of leaves, leaving a lace-like pattern behind. Despite their somewhat caterpillar-like appearance, these are not true caterpillars and cannot be controlled with *Bacillus thuringiensis* treatments.

Japanese beetle adult. Photo by Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org.

Rose chafers have continued to be a major issue for fruit trees, grapes, and landscape plants the past two weeks in parts of the state with sandy soil. Luckily, rose chafers are only active for approximately one month and populations should be declining in the near future.

Japanese beetles have been reported earlier in June in a few places (as documented in the WI Pest Bulletin), but adult emergence has begun in force in the past two weeks. Japanese beetles feed on a wide variety of fruit crops ranging from fruit trees, to grapes and cane berries. Beetle pressure is often high from early July until mid-to-late September. Early reports have suggested that beetle populations are strong this year.

Brown marmorated stink bug adults have already been spotted this year in many cases, but the first juvenile BMSB was spotted in Middleton, WI on July 2nd. The juvenile was a small 2nd instar nymph with "tick-like" coloration and crawling behavior. Those with a history of BMSB adults or juveniles in your area should keep an eye out for BMSB juveniles. A recent BMSB adult was also found in a trap in Door County, marking the first confirmed find of that insect in the county.

Brown marmorated stink bug – 1st and 2nd instar nymphs. Gary Bernon, USDA APHIS, Bugwood.org.

Honeyberries, Haskaps, Blue Honeysuckle:
Is There Commercial Potential For Wisconsin?

By: Brian R. Smith, Extension Commercial Fruit Specialist, UW-River Falls

Many of you have read or heard a few references to this group of species used as a commercial crop around the world but there are many questions left unanswered as to what the potential is in the Midwest, and specifically, Wisconsin. The subject of Honeyberries will be divided into two articles covering a total of six sections: 1. What are honeyberries and where do they come from? 2. Interesting facts about honeyberries. 3. Uses/products made from honeyberries. 4. Yields, profitability and marketing. 5. Site and growing requirements. 6. Cultivars and nursery sources.

1. What are honeyberries and where do they come from? Honeyberries are found within the rather large Honeysuckle family Caprifoliaceae, which encompasses about 14 genera and 400+ species of shrubs, woody climbers and a few herbaceous types. Of the 14+ genera, only the genus *Lonicera* contains the edible and commercial honeyberries/haskaps. Within the *Lonicera* genus, the species *caerulea* is the primary source of importance. There are several subspecies of *caerulea; edulis and kamtschatica*, which are at the foundation of what is currently called the true honeyberry (found in eastern Siberia/Mongolia) and *emphyllocalyx*, which is called the haskap and found on Hokkaida Island in Japan. Russian and Japanese selections (and more recently, some North American wild selections) of these subspecies of *Lonicera caerulea* have served as the basis for breeding new adapted cultivars for North America. As one might expect, there is considerable variability in this germplasm from so many different geographic locations. For this article, I will use the term "honeyberry" from here on to simplify things.

Honeyberries are long-lived, very winter-hardy, multi-stemmed shrubs ranging from 2-7 feet with grayish-green foliage, yellow to white flowers and typically fruit that can be anywhere from round to oblong, but typically resembles a tubular blueberry and can vary from blue to reddish-purple, or even black. The ½-2"+ fruit usually weigh about 1.3-2.5 grams and are very edible, straight from the bush (unlike our Aronia friends) and can have widely different flavor mixes that would include hints of sweet blueberry, raspberry, plum or black currants and various small doses of bland, bitter, sour or astringent overtones. Considerable variation also exists in bloom time and harvest; some honeyberries ripen with strawberries and a few do not ripen until almost aronia season (mid-late August).

Dr. Maxine Thompson at Oregon State University and Dr. Robert Bors from the University of Saskatchewan have initiated breeding programs to improve the honeyberry for growing in North America. They have already released a series of cultivars that have greatly improved fruit size, flavor, adaptation and even some specifically for machine harvesting. It would appear that the University of Saskatchewan breeding program is introducing cultivars more adapted to our climate.

2. Interesting facts about honeyberries:

- Honeyberries are not at all invasive like other members of the honeysuckle family
- Many honeyberries are winter-hardy to between -40^{0}F and -50^{0}F

- Honeyberries can live 50 years or more
- Honeyberries have 2-3X the level of antioxidants of highbush blueberries
- Honeyberries can grow in soils ranging from clay to sand
- Honeyberries have more vitamin C than an orange
- Honeyberries do not appear to be susceptible to many pests and could be good candidates for organic production
- Over 200 cultivars of honeyberries have been released in the last 60 years
- There are already about 1,200 acres of honeyberries planted in Canada, with estimated 75% of this in Quebec
- Some Russian cultivars were deliberately bred to be bitter-tasting for adding to Vodka and have hurt the reputation of the "good-tasting" cultivars
- Small, cream-colored blossoms can withstand spring frosts down to 21°F.

Fruit Comparison Table (per 100g)

Fruit	Potassium mg	Calcium mg	Phosphorus mg	Iron mg	Vitamin A ug	Vitamin C mg	Vitamin E mg	Energy kcal
Haskap	190	38	25	0.6	130	44	1.1	53
Pomegranate	236	10	36	0.6	0	10	0.6	n/a
Blueberry	70	8	9	0.2	55	9	1.7	49
Orange	130	17	12	0.1	60	35	0.4	39
Grape	130	6	13	0.2	15	4	0.3	56
Apple	110	3	8	0.1	11	3	0.2	50

Five revised standard tables of Food composition in Japan (Resources Council of Science and Technology Edition)

3. Uses/products made from honeyberries:

Honeyberries can be used as a fresh 'dessert fruit' or can be frozen en masse or as IQF. Honeyberries can be dried into honey "raisins" or used in any typical drink or dessert, including smoothies, jams and dessert toppings, pies and cakes, ice cream, muffins, juice and yogurt. Honeyberries can even be made into wine or blended in wine coolers.

4. Yields, profitability and marketing:

Honeyberry plants are somewhat slow to reach full fruit production but should have some decent harvestable yields (2-5 lb. /bush) by year 3 or 4. By year 6, they should be close to full production and range anywhere from 5-12 lb. /bush. Mechanical harvesting can be used on certain upright cultivars like 'Tundra'. Growers in Quebec seem to prefer the Oxbo/Korvan 9000 harvester. It can run at about 1 mph and will harvest 10 A/day. Most growers feel that a mechanical harvester is economically feasible with a 10 acre+ orchard and can be used for up to a 40-acre orchard. Smaller, tractor-drawn versions run about $80,000. Growers that rent harvesters in the larger acreage areas pay around $3,500 per 400 hours of use. For individual hand harvesting, a seasoned picker can harvest 6.5-11lb/hr. It would take 28 people working 8 hr./day for 4 days to harvest an acre by hand. The cost/lb. for hand harvest is about $1-$1.20, which would add up to about $9,000. Honeyberries in the U.S. are selling for between $5 and $8/lb retail. Machine-harvested berries typically run $3-$4/lb.

The following is a Cost of Production/Returns table for Haskaps/Honeyberries that I have modified more accurately for the U.S. and describes two scenarios (hand and machine harvests) from Years 0-8. Sections have been summarized and converted to US dollars. Yields assumed are 750, 1,500, 2,250 and 3,375 lb/A, respectively, for Years 3, 4, 5 & 6. Years 7 and beyond assume a yield of 3,750 lb/A. Although it is difficult to confirm accuracy, it would appear based on the research that I have conducted for this article, that the following should be quite conservative figures.

Costs and Returns for Honeyberries

Est.	Variables $/A	YR 0	YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8
Costs	Land costs*	1,087	290	290	290	290	290	290	290	290
	Plants incl. royalty*	700	257	206	206	206	206	206	206	206
	Bird netting*	0	0	0	714	191	191	191	191	191
	Posts and wires for netting*	0	0	0	341	91	91	91	91	91
	Labor netting	0	0	0	610	610	610	610	610	610
	Labor Establishment	681	68	0	478	0	0	0	0	0
	Weed control and mowing	501	501	501	501	501	501	501	501	501
	Pruning	0	105	205	205	319	319	319	319	319
	Pesticides	69	69	69	69	69	69	69	69	69
	Bumblebee colonies	0	0	0	228	228	228	228	228	228
	Fertilization	50	50	100	146	196	196	196	196	196
	Hand harvest (scenario 1)	0	0	0	1,047	2,048	3,185	3,185	3,185	3,185
	Machine Harvest (Scenario 2)	0	0	0	446	887	1,338	2,007	2,230	2,230
	Total Costs Scenario 1	3,088	1,340	1,371	4,835	4,749	5,886	5,886	5,886	5,886
	Total Costs Scenario 2	3,088	1,340	1,371	4,234	3,588	4,039	4,708	4,931	4,931
Revenue	Scenario 1 $5.46/lb	0	0	0	4,095	8,190	12,285	18,428	20,475	20,475
	Scenario 2 $3.19/lb	0	0	0	2,393	4 ,785	7,178	10,766	11,963	11,963
Net Income	Scenario 1	-3,088	-1,340	-1,371	-740	3,441	6,399	12,542	14,589	14,589
	Scenario 2	-3,088	-1,340	-1,371	-1,841	1,197	3,139	6,058	7,032	7,032

*AMORTIZATION (25% DOWN PAYMENT, 4% INTEREST RATE, 10 YEARS PAYBACK PERIOD).
Based on Haskap Permaculture: A New Opportunity for Commercial Producers. Cost of Production Study 2014. Atlantic Canada and Northern Canadian Regions. Phytocultures Ltd.

Brown stink bugs in berries and BMSB

By: Christelle Guédot, UW-Madison Department of Entomology

I have received several reports of the presence of brown-colored stink bugs in strawberry and cranberry plantings. The populations seem to be higher than usual so PJ Liesch, our insect diagnostician, looked at some specimens and identified them as the one-spotted stink bug, *Euschistus variolarius* (Palisot de Beauvois). One-spotted stink bug is brown, with pointy shoulders and a pale green abdomen on the ventral side. Males have a single dark spot towards the tip of the abdomen on the ventral side, hence the name one-spotted stink bug.

One-spotted stink bug male. Tom Klein, BugGuide.

This stink bug occurs throughout the upper Midwest, down to Florida, all the way west to Oregon and Utah, and into Canada. It is highly polyphagous and feeds on numerous cultivated plants, including soybean, corn, alfalfa, and other crops.

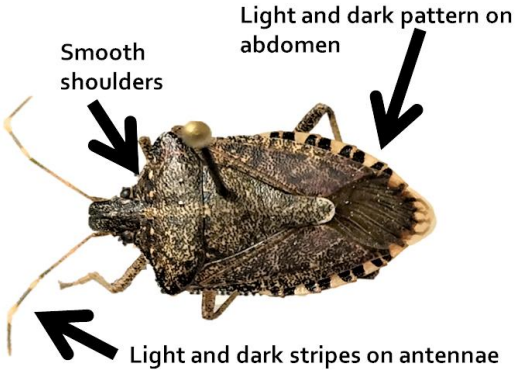
One spotted stink bug adult dorsal view. Photo by John Rosenfeld, BugGuide.

One spotted stink bug adult ventral view. Photo by John Rosenfeld, BugGuide.

One-spotted stink bugs overwinter as adults in vegetation in or near cultivated fields, and may have one to two generations per year. As they feed with their piercing/sucking mouthparts, the adults and nymphs inject saliva containing digestive enzymes into the stems of plants, which may cause phytotoxicity.

These stink bugs are not likely to cause any real damage to strawberries or other berries, **but should not be confused with the brown marmorated stink bug (BMSB, *Halyomorpha halys*).** BMSB is an invasive species from Asia that can cause serious damage to small fruit, including brambles and strawberry. It is highly polyphagous and has caused major economic losses in tree fruit in the Mid-Atlantic region and other parts of the country.

BMSB has been the subject of several issues in this newsletter and we are currently monitoring its distribution and seasonal patterns to determine its spread in the state and risk to economic crops. We have trapped overwintering adults in traps sporadically so far this season and we had the first report from PJ Liesch that the first juveniles were spotted in Dane county last week. We have already detected BMSB adults in apple orchards this season and we advise growers to pay special attention to stink bugs this year and send a high-resolution picture or specimens to Christelle Guédot or PJ Liesch for further identification. Please refer back to Volume 2, issue 1 of this newsletter on how to identify, monitor, and manage the brown marmorated stink bug.



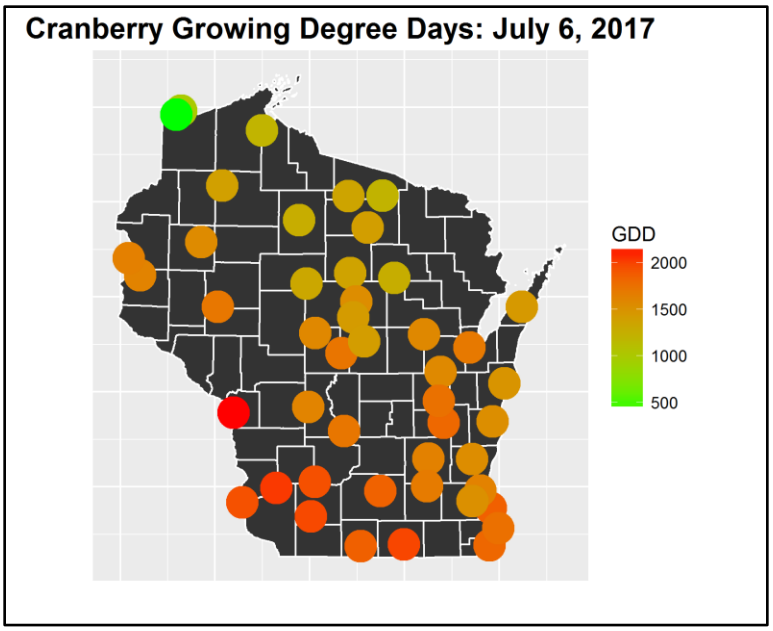
Identification characteristics of the brown marmorated stink bug. Photo by John Joutras.

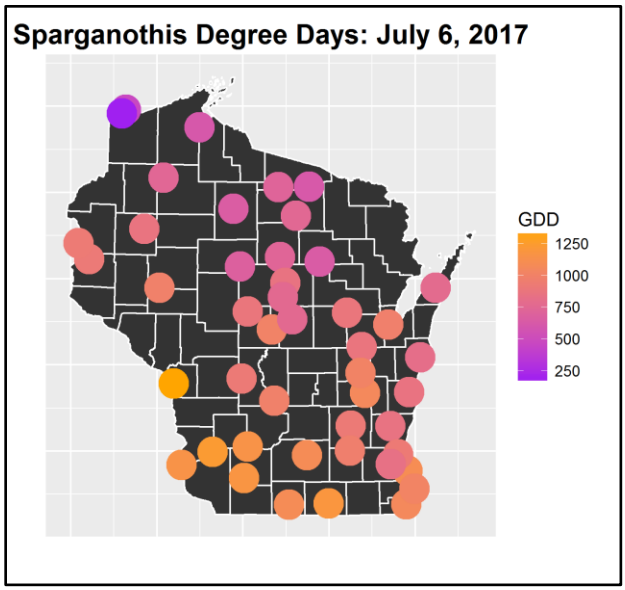
Cranberries

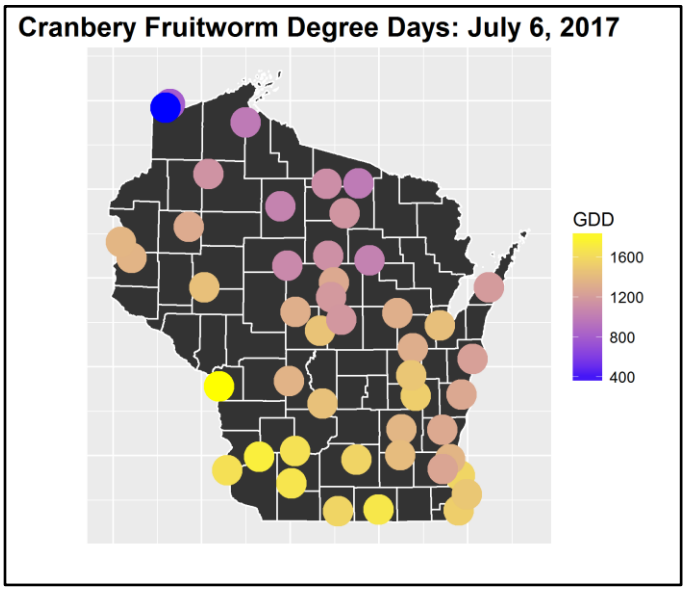
Cranberry plant and pest degree-days: July 6, 2017

By: Elissa Chasen and Shawn Steffan, USDA-ARS and UW Entomology

See the maps below for the degree-days of the cranberry plant and associated pests. Developmental thresholds for each species are: cranberry plant - 41 and 85°F; sparganothis fruitworm - 50 and 86°F; and cranberry fruitworm - 44 and 87°F. Interactive maps are posted online. The interactive feature allows you to click on the map locations, prompting a pop-up that names the location and gives exact degree-days. These are available through the Steffan lab website (http://labs.russell.wisc.edu/steffan/cranberry-growing-degree-days/). Once on the website, follow the link to the interactive maps.







The table below allows for comparison of degree-days over the last three years.

July 6	Cranberry DDs			Sparg DDs			CFW DDs		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
Northern WI (Minocqua)	1415.1	1455.7	1352.5	761.5	813.8	724.7	1177	1221.9	1121.6
Central WI (Wisconsin Rapids)	1824.8	1833.8	1736.1	1075.8	1096.5	1009.4	1557.6	1564.6	1473.5

The table below shows the predicted life benchmarks and their associated Sparg DDs.

Event	DDs from March 1 (approximate)
Flight initiation	595.7
First eggs laid	681.0
Peak flight	884.12
First egg hatched*	895.4
End of egg laying	1,634
Last egg hatched*	1,890

* Egg hatch window: 895 – 1,890 DDs

Grapes

Wine and Table Grape Developmental Stages for July 6, 2017

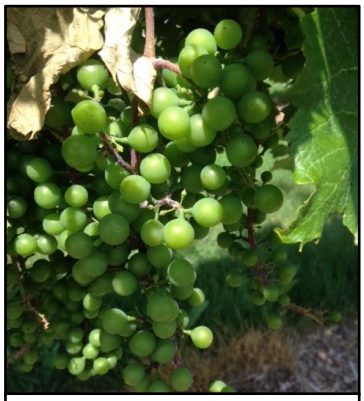
By: Janet van Zoeren, Annie Deutsch, Jean Riesterer-loper and Amaya Atucha, UW-Extension

At the West Madison Agricultural Research Station (WMARS) berries are filling out, and vary from stage E-L* developmental number 31 ("pea sized berries") to 33 ("bunch closure, berries still hard and green") depending on the cultivars. At the Peninsular Agricultural Research Station (PARS), inflorescences are just beginning to open. The vines at PARS are between E-L* developmental number 25 ("80% caps off") to 29 ("berries peppercorn-size, bunches tending downward"). With the wet weather recently, diseases, especially black rot, have begun to show up across both the vineyards.

* *Eichhorn-Lorenz Phenological stages to describe grapevine development*

Following photos taken on July 3rd at West Madison Agricultural Research Station.

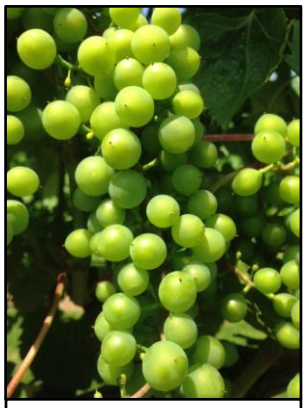
Brianna at WMARS; "bunch closure" E-L number = 33



La Crescent at WMARS; "berries touching" E-L number = 32

La Crosse at WMARS; "pea sized berries" E-L number = 31

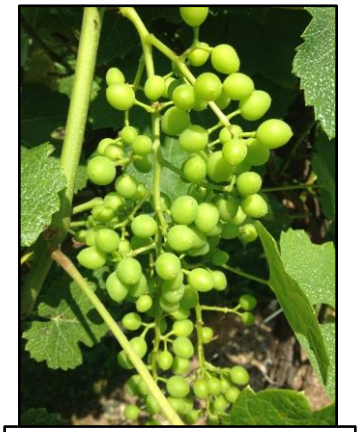
Marquette at WMARS; "berries touching" E-L number = 32



Frontenac at WMARS; "berries touching" E-L number = 32

St. Croix at WMARS; "pea sized berries" E-L number = 31

Somerset at WMARS; "bunch closure" E-L number = 33



Einset at WMARS; "pea sized berries" E-L number = 31

Following photos taken on July 5th at the Peninsular Agricultural Research Station.

Brianna at PARS; "setting, bunch at right angle to stem" E-L number = 27

La Crescent at PARS; "setting, bunch at right angle to stem" E-L number = 27

La Crosse at PARS; "80% caps off" E-L number = 25

Marquette at PARS; "setting, bunch at right angle to stem" E-L number = 27

Frontenac at PARS; "bunches tending downward" E-L number = 29

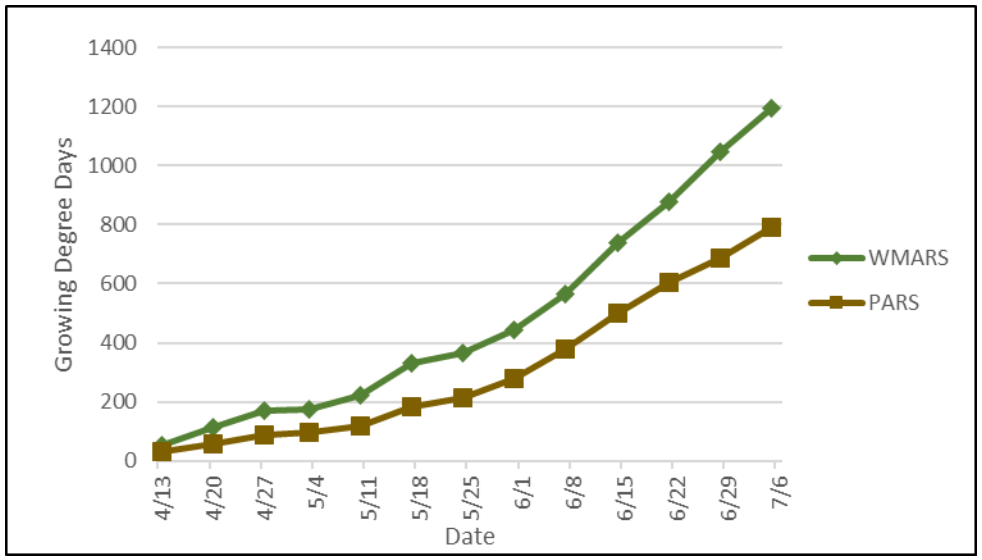
St Croix at PARS; "setting, bunch at right angle to stem" E-L number = 27

Grape Growing Degree Days

April 1 - July 6, 2017

	2107	2016
WMARS	1195	1162
PARS	793	813

The growing degree-day accumulations as of July 6th for this year are: 1,195 GDD at WMARS and 793 GDD at PARS. PARS is a little more than two weeks behind WMARS in terms of both growing degree-days and developmentally. Degree-days are calculated using a base of 50°F, starting on April 1st as a biofix.



Grape scouting report – Japanese beetle and leafhoppers

By: Janet van Zoeren and Christelle Guédot, UW- Extension and Entomology

Japanese beetles

Few insect pests have been seen on the grape vines these past few weeks, probably mainly because the cool, wet weather is less than ideal for most sun-loving summer grape pests. However, even in the rain, we have seen some Japanese beetles (JB) at the West Madison Agricultural Research Station (WMARS). This pernicious summer pest of grapes in Wisconsin begins to show up in our crops in late June - early July after overwintering as a larva and pupating in the spring in moist, grassy areas. The adults will continue to feed on grape leaves from now until around September, by which time they will have laid eggs in the soil in turf grasses to begin the next generation. There is only one generation of JB in Wisconsin per year.

Typical Japanese beetle damage, showing "skeletonized" grape leaf.

For more information about Japanese beetle in grapes, please refer to the article we wrote on the subject last year, in Volume 1 Issue 8 of this newsletter. You can aslso read more generally about their identification and life cycle in the berry section of that same newsletter issue.

A list of available insecticides for Japanese beetle in grape is provided below. Inclusion in this table does not imply that we recommend these above other options. All product recommendations can be found in the 2017 Midwest Fruit Pest Management Guide. You should always fully read and follow the label before spraying any pesticide.

Class (IRAC code)	Tradename	Active ingredient	PHI (days)	Effectiveness
Sodium channel blockers (22)	Avaunt **(Reduced Risk)**	Indoxacarb	7	Good
Butenolides (4D)	Altacor **(Reduced Risk)**	Chlorantraniliprole	14	Good
Organophosphates (1B)	Imidan	Phosmet	7-14	Good
Neonicotinoids (4A)	Assail	Acetamiprid	3	Good
	Belay (foliar)	Clothianidin	0	Good
Physical deterrent (n/a)	Surround **(Reduced Risk, OMRI Organic)**	Kaolin clay	0	Fair

IRAC Code = Insecticide Resistance Action Committee Mode of Action group

Leafhoppers

Although we have not seen any at WMARS or at the Peninsular Agricultuarl Research Station (PARS) yet this year, leafhoppers are another pest of potential significance in grape production at this time of year. The most important leafhopper pests of grapes in the midwest are the potato leafhopper and the grape leafhopper.

Potato leafhoppers cannot survive Wisconsin winters and overwinter in the gulf coast states. The adults are brought up on wind currents into Wisconsin in May and June. This first generation of adults may cause damage in vineyards around the pre-bloom period. A second generation of potato leafhopper is born and may feed on grape foliage from around now through veraison. Although less abundant than potato leafhoppr, grape leafhopper may be present in the vineyard from now until harvest.

Potato leafhopper adult. Photo by Steve L. Brown, University of Georgia, Bugwood.org.

Both leafhoppers feed on the underside of foliage using piercing/sucking mouthparts, and inject a toxin into the plant's vasculature that slows water and nutrient movement. This can cause the edges of the leaves to turn yellow and roll upwards. You can monitor for leafhopper by looking for these curled-up leaves. If leafhopper damage is suspected, turn over the leaf slowly to be able to identify and count the leafhoppers on the bottom side of the leaf. Potato leafhopper is a light green color and often moves in a crab-like sideways motion, while grape leafhopper is an orange-yellow color and moves only forwards.

These is no single economic threshold for leafhopper numbers in grapes, as different cultivars react very differently to leafhopper damage. However, it has been suggested that 25% of shoots showing leafhopper damage is sufficient to warrant chemical control. A list of available insecticides to control potato leafhopper in grape is below. All product recommendations can be found in the 2017 Midwest Fruit Pest Management Guide. You should always fully read and follow the label before spraying any pesticide.

Class (IRAC code)	Tradename	Active ingredient	PHI (days)	Effectiveness
Sodium channel blockers (22)	Avaunt **(Reduced Risk)**	Indoxacarb	7	Good
Butenolides (4D)	Sivanto (foliar) **(Reduced Risk)**	Flupyradifurone	0	Excellent
Pyrethroids (3A)	Baythroid	beta-Cyfluthrin	3	Excellent
Organophosphates (1B)	Imidan	Phosmet	7-14	Good
Neonicotinoids (4A)	Assail	Acetamiprid	3	Excellent
	Admire Pro (foliar) **(Reduced Risk)**	Imidacloprid	0	Good

IRAC Code = Insecticide Resistance Action Committee Mode of Action group

Tree Fruits

Apple maggot

By: Janet van Zoeren and Christelle Guédot, UW- Extension and Entomology

Common Name: Apple maggot
Order: Diptera
Family: Tephritidae
Scientific Name: *Rhagoletis pomonella* (Walsh)

Apple maggot adult. Photo by Joseph Berger, Bugwood.org.

Apple maggot flies begins to emerge in Wisconsin in early July, and will soon begin laying eggs inside our apples, causing the characteristic "worm in the apple" damage if left untreated. We recommend you monitor for apple maggot beginning in late June, using extra diligence in orchards which are surrounded by untreated apple, hawthorn, dogwood, or crabapple trees.

Identification and Life Cycle

The adult apple maggot fly is approximately the size of a house fly, with an "F"-shaped pattern on the wings. Apple maggots overwinter in Wiscosnin as pupae, and adults emerge beginning in late June or early July. These adults begin by feeding for 7-10 days (on honeydew or another sweet substance), sometime in the orchard but often in nearby landscapes. By mid-July the first adults will most likely begin laying eggs under the skin of apple trees. Each female will lay around 300 eggs over the course of her lifespan. Because not all adults emerge immediately in July, some apple maggot adults will continue to lay eggs in apple fruit through August or even September.

The eggs hatch into to larval stage, known as maggots or "worms", inside the fruit. This is the life stage that does the damage, as each larva will feed within the fruit throughout its lifespan. Unlike caterpillar pests, such as codling moth (which feed mainly on the seeds and within the apple core), apple maggot larvae feed throughout the apple flesh by breaking open the cells then absorbing up the sugary juice. Each larva will feed for two to six weeks, and often this damage causes the fruit

to fall prematurely from the tree. After growth is complete, the larva will crawl out of the fruit and pupate in the soil. There is only one generation in Wisconsin, and in fact some larvae may take over a year to develop, not emerging as adults until after spending two winters in the soil.

Apple maggot damage. Photo by H.J. Larsen, Bugwood.org.

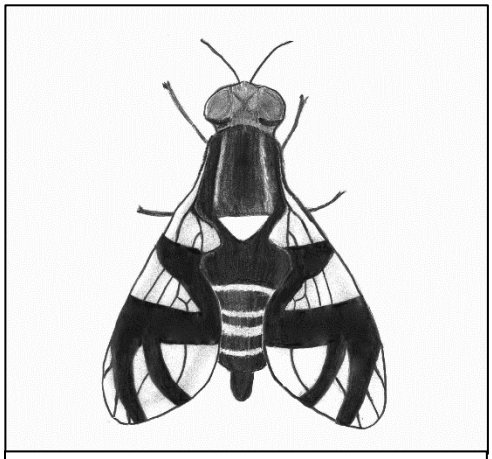
Damage Symptoms

Apple maggot is most predominantly a pest of apple, but has been known to also feed on crab apple, cherry, plum and peach. A similar looking pest, the blueberry maggot, feeds on blueberries and other related berries, and was covered in Volume 2, Issue 1 of this newsletter.

Damage to apple fruit occurs from the maggots' feeding within the fruit, causing browning and rotting tunnels in the flesh of the apple. After cutting the apple open, damage symptoms of apple maggot can be distinguished from other apple pests in that the brown tunnels are found throughout the flesh of the fruit, instead of being mainly in the central core of the apple. On the outside of the fruit, the egg-laying holes appear as minute dimples. Infested fruit may fall off the tree and fail to develop fully.

Monitoring and Control

Monitoring for apple maggot should begin in late June, to be sure to catch the first adults moving into our orchards. The most up-to-date recommendations are to use red sticky ball traps baited with an apple fruit volatile at a rate of three traps per 15-acre orchard. The traps will work best if they are placed near the edge of the orchard, either nearest to woodland or an abandoned orchard, or on the south side of the orchard. An insecticide application is recommended once a total of five flies per trap have been caught in volatile-baited traps, or after a single fly has been caught in a non-baited red sticky ball trap. It is important to examine the wings of trapped flies carefully, as other species are similar in size and color.



Apple maggot distinguishing features include the "F" shaped black markings on wings, 3-4 light stripes on abdomen, and a while triangle on the thorax. Drawing by Janet van Zoeren.

Cultural control

Abandoned orchards or alternate hosts (such as crabapple and hawthorn) often serve as a reservoir to build up apple maggot populations. It is best to remove those alternate hosts from the landscape surrounding an orchard.

Biological control

Native egg and larval parasitoids of apple maggot are present in North America. However, because the egg and larval stages of this pest are both protected in the apple, biological control has not been shown to be an economically important pest control method.

Chemical control

It is recommended to monitor for apple maggot (see above), and to spray within a few days of reaching the economic threshold (one fly in a trap when using non-baited traps or five total flies per trap when using volatile-baited traps). Following the first application, it is recommended to spray every two- to three-weeks until mid-August if using conventional insecticides, or to maintain continual thorough coverage with Kaolin clay.

A list of available insecticides to control apple maggot in apple is provided in the following table. For other affected fruit crops, be sure to read the label to make sure they are registered for that specific crop in Wisconsin. There are many other tradenames available, and we do not recommend these that are listed above other options. All product recommendations can be found in the 2017 Midwest Fruit Pest Management Guide. Additionally, you should always fully read and follow the label before spraying any pesticide.

Class (IRAC code)	Tradename	Active ingredient	PHI (days)	Effectiveness
Physical deterrent (n/a)	Surround **(Reduced Risk, OMRI Organic)**	Kaolin clay	0	Excellent
Diamides (28)	Altacor **(Reduced risk)**	Chlorantraniliprole	5	Fair
	Exirel **(Reduced risk)**	Cyantraniliprole	3	Good
Organophosphates (1B)	Imidan	Phosmet	7	Excellent
Carbamates (1A)	Sevin	Carbaryl	3	Fair
Neonicotinoids (4A)	Assail	Acetamiprid	7	Excellent
	Admire Pro (foliar)	Imidacloprid	7	Good
	Belay	Clothianidin	7	Good

Calendar of Events

July 11-13, 2017 – Wisconsin Farm Technology Days
Ebert Enterprises, E5083 Co Rd K, Algoma, WI

July 18, 2017 – WAGA Summer Apple Field Days
Green's Pleasant Springs Orchard, 2722 Williams Dr, Stoughton, WI

Aug 3, 2017 – PARS Vineyard Walk
Peninsular Agricultural Research Station, 4312 Hwy 42 North, Sturgeon Bay, WI

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