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

Wisconsin Fruit News

Volume 3, Issue 8 – July 27, 2018

In This Issue:

General Information

UW-Madison/Extension Insect Diagnostic Lab update

By: PJ Liesch

With all the insect activity recently, the caseload at the UW Insect Diagnostic Lab has been heavy over the past two weeks. A summary of recent insect activity relevant to fruit crops can be found below:

Japanese beetle is one of the top insect pests at the state at the moment. Reports of significant feeding damage (skeletonization) have come in from much of the state on fruit crops including apple, plum, cherry, and grapes. This insect can be found and active in all but the far northern counties in Wisconsin, and activity is expected to continue for at least another month. A few other insects can also cause somewhat similar damage: "lace-like" damage to fruit-tree leaves by the **apple and thorn skeletonizer** (Brown County) and the **pearslug sawfly** (several locations in the state) has recently been reported.

Plum curculio: Several reports of plum curculio activity have recently come in to the UW Insect Diagnostic Lab. Reports on apple from around the state show oviposition scars, from earlier attack. Two cases of stone fruit (plums) from Sauk and Fond du Lac counties had internal feeding from the larvae.

Tarnished Plant Bug: This insect is widespread and common in the state and feeds on a wide range of plants—including fruit. The lab has recently seen two reports of tarnished plant bug damage on peach (Fond du Lac and Rock). Damage consistent with tarnished plant bug feeding activity was noted in a sample from Portage County.

Caterpillar activity: the pale, bristly caterpillars of the **white-marked tussock moth** have been noted recently in many locations around the state, ranging from the SE corner to Wausau and Eau Claire area. Silken "tents" made by the **fall webworm** have also been spotted—reports have primarily been from the central and north central part of the state. While reports have been in landscape trees, fruit trees can be attacked, so growers should keep an eye out for this insect.

Stink bug activity continues in the state. **Brown marmorated stink bug** adults continue to be spotted in south central and southeast Wisconsin. BMSB nymphs have also been spotted recently on several occasions, with two recent reports on raspberries in Dane County. Nymphs of the native **"brown" stink bugs** (*Euschistus* sp.) are also being spotted around the state in commercial and home orchard/garden settings. Sightings of **predatory stink bug nymphs** (Pentatomidae: Asopinae) have also recently been popping up around the state.

Galls on fruit trees caused by microscopic eriophyid mites have recently been reported from scattered location in the state. Recent galls include "**finger galls**" on *Prunus* (plums and cherries) and the **pearleaf blister mite** (*Eriophyes pyri*) on pears.

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

By: Brian Hudelson, Sue Lueloff, John Lake 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 July 14, 2018 through July 27, 2018.

PLANT/ SAMPLE TYPE	DISEASE/ DISORDER	PATHOGEN	COUNTY
FRUIT CROPS			
Apple	*Cedar-Apple Rust*	*Gymnosporangium juniperi-virginianae*	*Dane*
Blueberry (High Bush)	*Phomopsis Canker*	*Phomopsis sp.*	*Eau Claire*
Grape	*Black Rot*	*Phyllosticta ampelicida*	*Waupaca*
Pear	*Pear Scab*	*Venturia pirina*	*Vernon*
Raspberry	*Anthracnose* *Root/Crown Rot*	*Sphaceloma necátor* *Phytophthora sp., Rhizoctonia sp.*	*Portage* *Jefferson*
Strawberry	*Root/Crown Rot*	*Pythium sp., Fusarium sp., Rhizoctonia sp.*	*Bayfield, Clark, Waupaca*

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

Insecticides for organic berry production

By: Janet van Zoeren and Christelle Guédot

Organic berry production has unique challenges, one of them being managing insect pests with limited insecticide options, while continuing to rotate chemical classes to prevent insecticide resistance. In this article, we focus on the insecticide options available for organic production. However, organic insecticides will provide adequate control of insect pests if they are backed up by a solid IPM program. For a reminder of other IPM techniques to complement an organic spray program, please see our series published in 2017 in this newsletter (WFN, Volume 2, issues 3-9) on IPM topics including: monitoring, cultural control, host plant resistance, mating disruption, and biological control.

The table below lists some insecticides which are approved for organic production in Wisconsin, along with their IRAC (Insecticide Resistance Action Committee) chemical class code, re-entry interval (REI), pre-harvest interval (PHI), and efficacy ratings against some of the main insect pests of berry crops, including spotted wing drosophila, Japanese beetle, and tarnished plant bug. We do not provide efficacy for other insects, but these insecticides have efficacy against other insects as well. All of the following insecticides are registered for use on caneberries (raspberries and blackberries), strawberries, and blueberries in Wisconsin. Please refer to the 2018 Midwest Fruit Pest Management Guide for information about other insecticides and other fruit crops, and always read the label prior to use. This is not an exhaustive list and we do not endorse any products.

Class (IRAC code)	Tradename	Active ingredient(s)	REI (hrs)	PHI (days)	Efficacy against spotted wing drosophila (SWD), Japanese beetle (JB), and tarnished plant bug (TPB)
	Surround ***(not registered in strawberry)***	Kaolin clay	4	0	SWD: n/a **JB: Good** TPB: n/a
	DES-X	Insecticidal soap	12	0	SWD: n/a JB: n/a **TPB: Good**
Spinosyns (5)	Entrust SC	Spinosad	4	1	**SWD: Excellent** JB: Poor TPB: n/a **Thrips: Good**
Pyrethroids (3A)	Pyganic EC 1.4	Pyrethrin	12	when dry	SWD: Fair **JB: Good** TPB: n/a
Azadirachtins (unknown) + Pyrethroids (3A)	Azera	Azadirachtin + pyrethrins	12	0	SWD: Fair JB: Poor **TPB: Good**
Azadirachtins (unknown)	AzaGuard	Azadirachtin	4	0	SWD: Poor JB: Fair **TPB: Good**

Biologicals / Biopesticides	Grandevo	*Chromobacterium subtsugae*	4	o	SWD: Fair JB: n/a TPB: n/a
	Venerate XC	*Burkholderia* spp.	4	o	SWD: Fair JB: n/a TPB: n/a
	PFR-97 ***(not registered in raspberry or blueberry)***	*Isaria fumosorosea*	4	o	SWD: n/a **JB: Good** TPB: Fair
		Bacillus popilliae spores	varies	varies	SWD: n/a **JB: Good** TPB: n/a

In general, organic insecticides fall into four IRAC classes: spinosyns, pyrethroids, Neem oils (Azadirachtins), and biologicals.

Spinosyns and ***Pyrethroids*** affect the nervous system of many species of insects. Both have low mammalian toxicity, except interestingly pyrethroids can be toxic to cats. However, they both do have non-target effects on beneficial insects and bees, and so should be used with caution and not be sprayed during bloom.

Azadirachtins are found naturally in the oil of the Neem tree (native to India and surrounding countries). As an insecticide, it works by interfering with the insects' ability to molt (shed their skin), therefore preventing normal development. These insecticides also serve as repellents. . They are considered to be safe to humans and other mammals, and to have minimal non-target effects on beneficial insects.

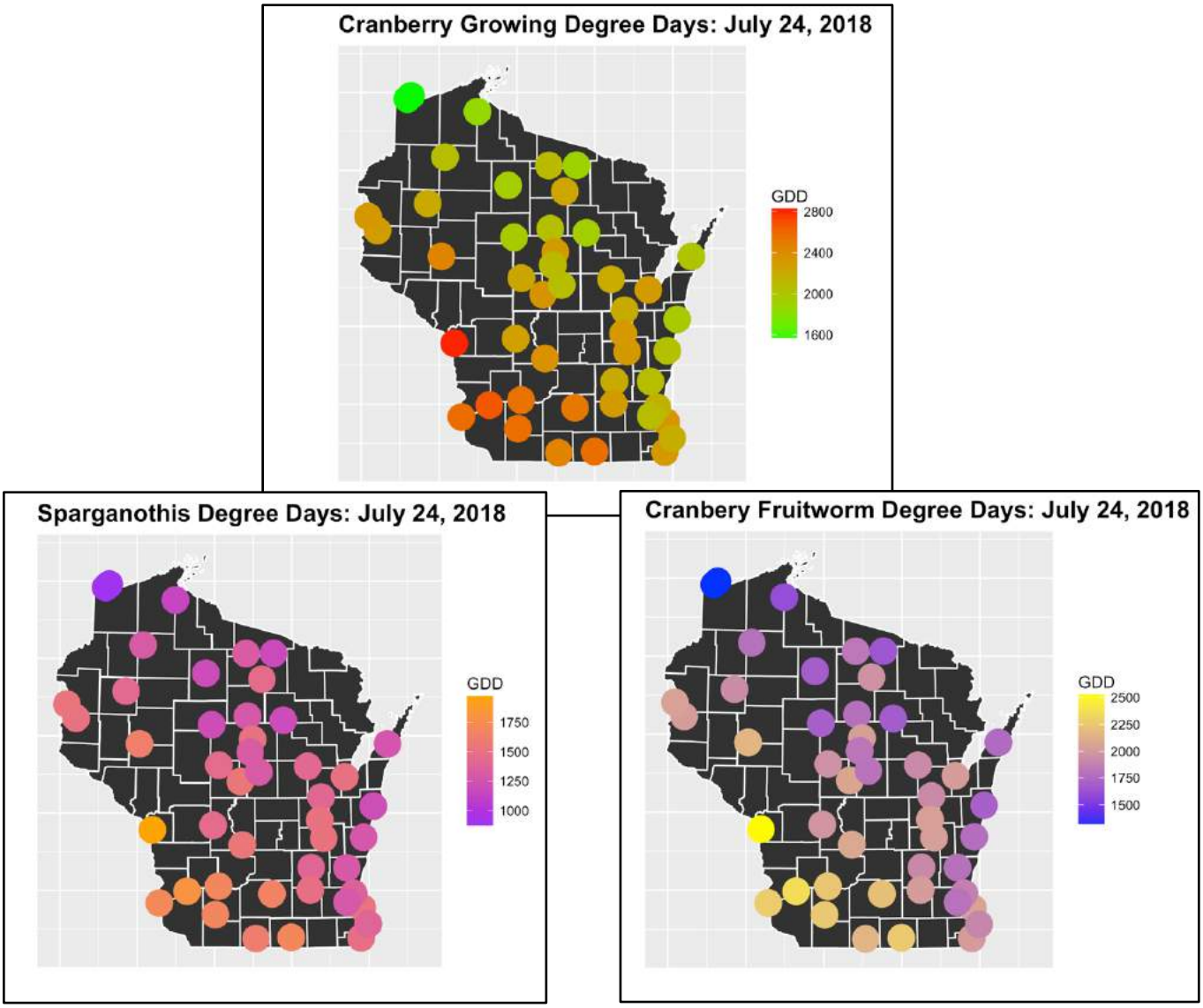
Biologicals are usually targeted to affect only the pest and its related species, and so are considered to be relatively environmentally safe. In many cases, biologicals can effectively help manage pests while maintaining healthy beneficial insect populations. However, they require careful timing to target the correct pest species at the life stage when it is most vulnerable to the insecticide, and are not effective against all pest species.

More information about organic berry production is available in Cornell University's series on Organic Production and IPM Guides for raspberries and blackberries, strawberries, and blueberries, which are available on the Cornell webpage as well as on our Wisconsin Fruit berry pages (http://fruit.wisc.edu). Also, we have a new publication in collaboration with other universities on "Management recommendations for spotted wing drosophila in organic berry crops".

Cranberry plant and pest degree-days: July 24, 2018

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

Check out the maps below for the degree-days of the cranberry plant and associated pests.[1]



[1] Recall that degree-days are calculated based on the daily high and low temperature accumulations and that they vary by species according to species specific temperature thresholds. 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.

Use the table below to compare degree-day accumulations for all three organisms across the last couple of years and between Northern and Central WI.

July 24	Cranberry DDs			Sparg DDs			CFW DDs		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
Northern WI (Minocqua)	1966.7	1809	2130.9	1162.8	1019.3	1359.8	1678.9	1524.1	1863.7
Central WI (Wisconsin Rapids)	2415.3	2295.6	2411.1	1516	1406.9	1598.7	2092.1	1979	2128.5

Based on the predicted life-cycle of sparganothis fruitworm (at right), in central WI, we are nearing the end of egg laying.

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

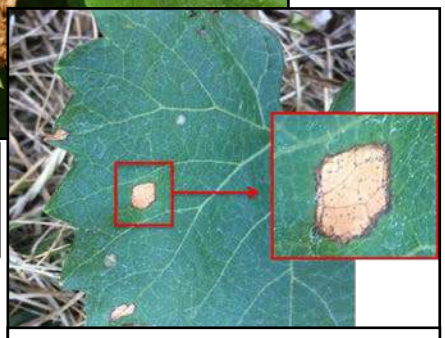
Rupestris Speckle on Grape

By: Patty McManus

Rupestris speckle, also sometimes call "Muscat Spot" is a physiological disorder that causes brown speckles and spots scattered across a leaf surface or concentrated between veins (see photos). The name is given because the disorder occurs on varieties that have *Vitis rupestris* in their background. In the UW-Madison research plots, we notice most on Frontenac and

Rupestris speckle on Frontenac. Spots may appear isolated from one another (left) or coalesce (right) in more severe cases. These spots differ from black rot (see photo below) in that they lack the tiny black "pimples," or pycnidia inside. Photos by D.S. Jones.

Frontenac gris. Although some leaves can become severely speckled, we have never seen it affect a canopy so badly that fruit ripening or winter hardiness was impaired. This is consistent with reports from other regions. The rusty, brown speckles and spots are sometimes confused with black rot spots, but with a little effort you can discern the two. Black rot leaf spots are usually larger than the speckles of Rupestris



Black rot, with close-up on right of pycnidia (black "pimples), which help differentiate black rot from rupestris speckle. Photos by D.S. Jones.

speckle, and black rot spots develop tiny black fungal fruiting bodies (see photos). Unless it's completely out of control, black rot distribution in a canopy is often spotty, being severe in one area and absent on nearby leaves. By contrast, Rupestris speckle usually occurs fairly evenly across a canopy. Finally, Rupestris speckle does not affect fruit, whereas black rot that was not controlled around the time of bloom rots fruit.

Keeping your grape mildews straight!

By: Patty McManus

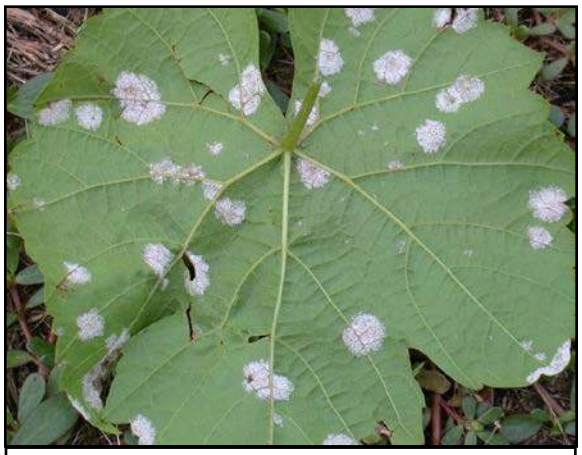
At a recent vineyard walk, there was some discussion of the unfortunate naming of two very different grape diseases with similar names: downy mildew and powdery mildew. While both diseases can cause significant losses to both leaves and fruit, there are important differences to help you identify and manage them. We have found that for downy mildew especially, symptoms on some of the cold-climate varieties look different from photos you find online that are mostly taken on *Vitis vinifera*. For more information, see our photo guide to diseases of cold-climate grapes at https://fruit.wisc.edu/wp-content/uploads/sites/36/2017/04/Photo-guide-diseases-cold-climate-grape.pdf

Here is a cheat sheet and some photos to help you keep these diseases straight.

	Downy mildew	**Powdery mildew**
Cause	Water mold	Fungus
Overwintering site	In leaves on ground and in soil.	On the vine in bark and bud scales.
Early symptoms (May-July)	Pale yellow "oil" spot on upper leaf surface with white, fluffy growth on the underside. Fluffy, white growth on young berries and other green tissues.	Inconspicuous white powdery areas on undersides of leaves near cordon; very difficult to see.
Later symptoms (August and later)	Lesions dry up and turn brown; sometimes develop mosaic of brown, yellow, red discoloration.	Patchy white to gray growth mostly on upper surfaces of leaves. Berries can have whitish growth and cracking, or a gray net-like pattern.
Environment that favors disease	Cool, damp, rainy weather.	Can develop under a range of conditions from cool to hot; does not require rain;
Effective fungicides*	Abound, captan, copper, Forum, Luna Experience, mancozeb, phosphorous acid, Pristine, Quadris Top, Ranman, Revus, Revus Top, Ridomil, Sovran, Tanos, Zampro	Abound, Aprovia, Endura, Flint, Fracture, Inspire Super, JMS Stylet oil, Luna Experience, Mettle, Pristine, Procure, Quadris Top, Quintec, Rally, Reason, Revus Top, Sovran, sulfur, Topsin-M, Torino, Vintage, Vivando
Fungicides for organic production	Copper	Sulfur or oil is best; several other "soft" fungicides have some activity (e.g., potassium bicarb, Serenade, Oxidate).

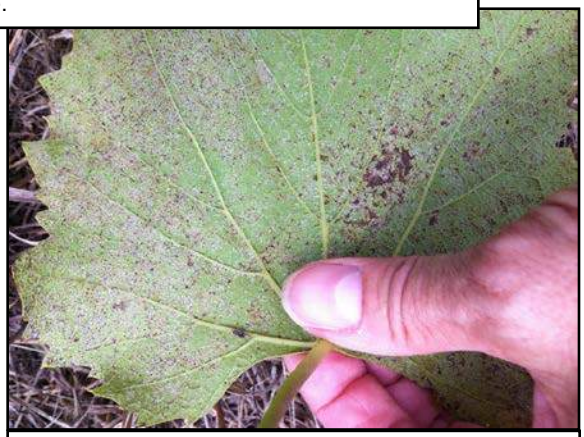
*There are many fungicide options for both diseases. Among commonly used broad-spectrum fungicides, captan and mancozeb are effective on downy mildew but NOT powdery mildew.

Downy mildew can take on various appearances, but the white sporulation is always on the UNDERSIDES of leaves:



Downy mildew: White sporulation on leaf underside that corresponds to yellowish spots on the upper surface.

Powdery mildew: Patches of white, powdery fungal growth appear on either the lower or upper leaf surface. Photos by D.S. Jones.



Downy mildew: Diffuse sporulation on the leaf underside.

Powdery mildew: Fungal growth can cover entire leaves and take on a grey rather than white hue, especially later in the season.

Downy mildew: On fruit there is white growth, but usually not cracking.

Powdery mildew: On fruit there is often white growth accompanied by cracking.

Powdery mildew: Fruit sometimes show no white growth, but rather a rough, gray, russeted surface. Photos by D.S. Jones.

Grape Variety Developmental Stages: July 26, 2018

By: Janet van Zoeren, Annie Deutsch, Jacob Scharfetter, and Amaya Atucha

At the West Madison Agricultural Research Station (WMARS), cultivars vary from developmental stage E-L 34 ("berries begin to soften, sugar starts increasing") to stage 35 ("berries begin to color and enlarge, early veraison"). Next week we will begin collecting berry samples for titratable acidity (TA) and brix measurements, and will begin presenting that information in the next issue of this newsletter.

At the Peninsular Agricultural Research Station (PARS), berries are in the second stage of development referred to as the lag phase, in which berries continue to develop but there is minimal change in berry size. All cultivars are now at developmental stage E-L 33 ("bunch closure, berries still hard and green").

E-L stands for Eichhorn-Lorenz Phenological stages to describe grapevine development

Following photos taken on July 23rd at West Madison Agricultural Research Station.

Brianna at WMARS; "berries begin to color, early veraison" E-L number = 35

La Crescent at WMARS; "berries begin to soften" E-L number = 34

La Crosse at WMARS; "berries begin to soften" E-L number = 34

Itasca at WMARS; "berries begin to soften" E-L number = 34

Marquette at WMARS; "berries begin to color, early veraison" E-L number = 35

Frontenac at WMARS; "berries begin to soften" E-L number = 34

Foch at WMARS; "berries begin to soften" E-L number = 34

Petite Pearl at WMARS; "berries begin to color, early veraison" E-L number = 35

April 1 - July 26	Grape Growing Degree Days (Base 50, BE)	
	2018	2107
WMARS	**1676**	1474
PARS	**1251**	1060

The growing degree-day accumulations as of July 26th for this year are: 1,676 GDD at WMARS and 1,251 GDD at PARS. We continue to be "ahead" of where we were on this date in 2017 at both locations in terms of degree day accumulations. We calculated degree-days using a base of 50°F, starting on April 1st as a biofix. "BE" (Baskerville-Emin) refers to a specific way in which to calculate degree days, using a sine wave instead of a simple average temperature calculation – this gives a somewhat more accurate estimation of degree days. We calculated degree days using the NEWA website, and you can visit their "About degree days" page to learn more about the formulas they use for their calculations (http://newa.cornell.edu/index.php?page=about-degree-days).

Grape insect scouting report – are Japanese beetles over the hump?

By: Janet van Zoeren and Christelle Guédot, UW-Madison Department of Entomology

The key grape insect pests we have been seeing at the West Madison Agricultural Research Station (WMARS) continue to be Japanese beetle and phylloxera. Although we have begun to see an occasional multicolored Asian ladybeetle (MALB) on a vine, they are nowhere near high enough densities to be problematic at this time. MALB is additionally a predator of soft bodied insects such as aphids during the summer, and the occasional MALB we are seeing at this point is more likely to be beneficial than to cause harm, as long as numbers continue to stay low and we are not yet at harvest.

Japanese beetle numbers continue to hold steady, varying from 1-2 per vine on some cultivars, up to 30 per vine on varieties that seem more susceptible (such as Marquette) on the edge rows nearest a grassy field. Based on our data from scouting last year (in 2017), Japanese beetle should be past peak density by now, and is likely to continue to become less of a problem into the fall. However, that does not mean you can let down your guard entirely, just that you are probably past the worst of their season for this year.

We've published information about Japanese beetles previously in this newsletter, so if you would like to read more about their identification, seasonal and spatial distribution or control you can find it in our archives.

We will continue to scout, and expect to see more MALB and wasps as the grapes begin to ripen in the coming weeks.

Apple field day at Oakwood Fruit Farm

By: Janet van Zoeren

The 2018 Wisconsin Apple Growers Association summer field day took place this past week at Oakwood Fruit Farm, with over 150 people in attendance. Morning sessions included information about:

- Fire blight disease management by Dr. Patricia McManus (see article in issue 4 of this newsletter)
- Insect mating disruption by Dr. Christelle Guédot (see article below)
- Cultivar and rootstocks by Tom Callahan (Adams County Nursery) and Steve Louis (Oakwood Fruit Farm)
- Irrigation and trellising in new planting blocks (Oakwood Fruit Farm)
- Precision apple thinning protocol by Dr. Amaya Atucha and Janet van Zoeren (see issues 2 through 4 of this newsletter)

Afternoon sessions included food safety and marketing, and retail. A wealth of experiences were shared during all these sessions both by presenters and the audience, in the informal, field format of the event. If you missed the event, you can read about some of the information presented in this or in previous issues of the newsletter.

For a listing of upcoming events in your region, see the events page of our website, or the final page of this newsletter.

Thanks to Oakwood Fruit Farm for hosting a wonderful event and to everyone who attended and participated in lively discussions.

Mating disruption for management of insect pests in apple

By: Christelle Guédot

Thank you all for attending the WAGA field day, it was a great turn out and I appreciated all the questions, comments, and discussions over the topic of mating disruption for the management of apple insect pests. Here is a summary of what we discussed.

Mating disruption (MD) is a pheromone-based tool where dispensers of artificial sex pheromones from (usually) females are placed in orchards and lead to a reduction in the probability of males finding females (Fig. 1). In turn, mating is reduced, thereby egglaying is reduced to below the economic threshold.

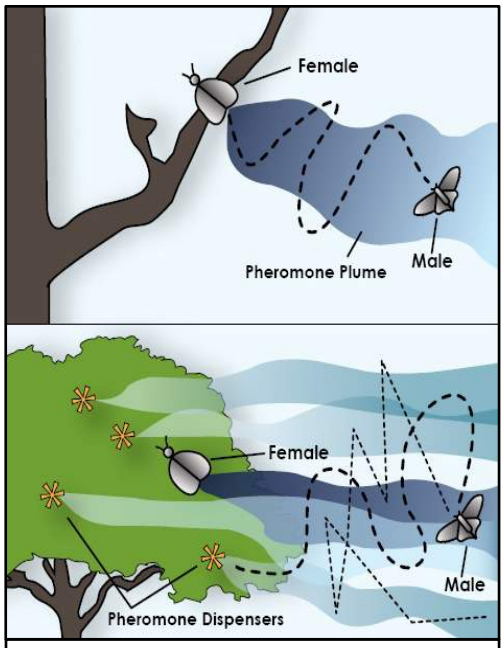


Fig 1: Codling Moth Mating Disruption © 2013 Utah State University

Mating disruption pheromone dispensers are available for codling moth, Oriental fruit moth, dogwood borer, peachtree borer and lesser peachtree borer as well as for some leafroller species (OBLR, Pandemis, omnivorous leafroller, light brown apple moth). In 2012, there were 20 insect species targeted with MD and this approach was used on nearly 2 million acres worldwide. In Wisconsin, we currently only have codling MD registered and we will discuss MD in the context of codling moth management herein.

Several mechanisms by which mating disruption may happen have been discussed. One is the competitive approach where dispensers in orchard might mimic calling female, attracting male to many false sources, or the non-competitive approach where dispensers might release so much pheromone that the background concentration of pheromone masks normal communication. More information can be found here http://jenny.tfrec.wsu.edu/opm/displaySpecies.php?pn=-80 on how these mechanisms act on the insect.

Monitoring effectiveness of MD: it is important to check that MD is actually happening in your orchard. Use codling moth monitoring traps to track pest activity and density to assess the effectiveness of MD. The target insects are not killed and are still flying around, so there is a need to make sure adequate control is achieved by looking at a reduction in moths trapped in the monitoring traps (as an indicator that males are not finding females). Ideally, use the CMDA lures for monitoring populations in MD orchards for better assessment of trap shutdown as these lures will attract both male and female codling moths.

Manufacturers: there are different manufacturers for MD products including Pacific Biocontrol, Suterra, Scentry, Trécé, Ridge Quest Inc, ISCA. This is not necessarily an exhaustive list. We do not endorse any company or products over others.

Dispensers: Dispensers vary in the number used per acre and the release rate associated with the type of dispensers. There are 1) the densely distributed dispensers (e.g., hand applied, microencapsulated, spray formulations) where the layout of the dispensers distribute the pheromone in the orchard; and 2) the sparsely distributed dispensers (e.g., misters) with fewer point sources and higher release rates which rely on natural aerial distribution of the pheromone in the orchard.

Benefits of MD:

- Improved biological control of this and other pests in orchard
- Slower development of insecticide resistance
- Less farm worker exposure to insecticides and lessened environmental impact
- No residue on crops, nontoxic to beneficials

- Adopted widely in Pacific Northwest with good results
- OMRI approved
- Season long activity
- Compatible with all other control methods
- Works all season long, rain or shine, and no need to reapply

Some considerations:

- Size and location of orchards: orchards less than five acres or near a source of the pest (abandoned orchard, unmanaged trees/hosts nearby) may not obtain optimal results. Smaller size orchards increase the amount of edge with surrounding landscape and may increase the likelihood that mating will occur outside of the MD area, and then attracting mated females back into the orchard to lay eggs on fruit.
- Border sprays may be needed if source of pest nearby
- Pest level: high populations (above 1% crop damage the previous season) will need to be controlled with insecticide first year of MD
- Other non-target pests that were controlled by insecticide for target pest may see resurgence

Mating disruption dispenser displays that were discussed at the field day

- Isomate Misters: Place in top third of tree for codling moth, 1-2/acre in grid pattern (209ft apart). Could use CM/OFM combo in mister. Temperature sensor. Place in upwind of prevailing wind with direction for plume to cover trees. Consider phytotoxicity of branches near mister
- Isomate CM Flex: 200-400 dispensers/acre
- Isomate C Plus: 400 dispensers/acre
- Isomate CM Ring
- Tangler with launcher for delivery of MD dispensers

This is not an exhaustive list, many other products are available. These were just displayed at our field day and we do not endorse any company or products over others.

<u>Take home message:</u> Mating disruption is an effective management strategy. All dispensers for codling moth work similarly in their efficacy at providing MD in apple orchards and the cost of dispensers vs. cost of labor to apply these dispensers should help determine which is most appropriate for your orchard. Check with the manufacturer if the product is registered in Wisconsin before purchasing it, not all products discussed are registered in Wisconsin.

Calendar of Events

August 13, 2018 – PARS Vineyard Walk
1 pm – 4 pm, Peninsular Agricultural Research Station, 4312 Hwy 42 N., Sturgeon Bay, WI

August 14, 2018 – Women Caring for the Land Workshop
8:30 am – 3 pm, Buser Cattle Company, 6440 Wiesner Rd, Omro, WI

August 23, 2018 – WBGA Fall Field Day
8 am – 5 pm, Nature's Finest Foods, 4902 County Rd S, Oshkosh, WI

There are more "Women Caring for the Land" Workshop dates and locations. Please see the events section of our website for more information about this series.

Useful Links:

Wisconsin Fruit Website: https://fruit.wisc.edu/

You can purchase ($10) the 2016 Midwest Fruit Pest Management Guide from the UW Learning Store: http://learningstore.uwex.edu/Midwest-Fruit-Pest-Management-Guide-2016-P1785.aspx

Insect Diagnostics Lab: http://labs.russell.wisc.edu/insectlab/

Plant Disease Clinic: http://labs.russell.wisc.edu/pddc/

Soil and Forage Analysis Lab: https://uwlab.soils.wisc.edu/

Weed Identification Tool: http://weedid.wisc.edu/weedid.php

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