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Events this Week

July 7, 2016 – [WMARS Vineyard Walk](#)

West Madison Agricultural Research Station, 8502 Mineral Point Road,
Verona, WI

General Information

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 May 21, 2016 through June 17, 2016.

PLANT/ SAMPLE TYPE	DISEASE/ DISORDER	PATHOGEN	COUNTY
FRUIT CROPS			
Apple	Black Rot	<u>Sphaeropsis</u> sp.	Dane
	Cytospora Canker	<u>Cytospora</u> sp.	Dane
Blueberry	Fusicoccum Canker	<u>Fusicoccum</u> sp.	Winnebago
Grape	Herbicide Damage	None	Pierce
	Anthracnose	<u>Sphaceloma</u> <u>ampelinum</u>	Dane
Cherry	Sooty Mold	None	Dodge
	Bacterial Canker	<u>Pseudomonas</u> <u>syringae</u>	Dane
	Brown Rot	<u>Monilinia</u> sp.	Dane
	Sphaeropsis Canker	<u>Sphaeropsis</u> sp.	Dane
Raspberry	Unidentified Viral Disease	Unidentified virus	Monroe

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

UW-Madison/Extension Insect Diagnostic Lab update

By: PJ Liesch

The following insects were reported to the Insect Diagnostic Lab as being active in the state, and have the potential to impact fruit production in the region. If you would like more information about the UW Insect Diagnostic Lab, you can visit [our website](#).

-Rose Chafer. Several reports of rose chafer came in to the insect diagnostic lab in early June. Most reports were associated with landscape plants, but damage to fruit trees and grapes can occur. Growers in portions of the state with sandy soils should keep an eye out for this insect. A few reports of severe damage have been reported from the NE corner of the state, including some damage to fruit trees and grapes. However, as of June 23rd, reports have slowed down, so this insect may be nearing the end of period of activity for the year.

-Tarnished Plant Bugs (Lygus Plant Bugs). Several sightings have been reported in the past week. These insects are often also spotted at deck and porch lights in the evening.

-Scale insects (such as the **European Fruit Lecanium**) are actively dripping honeydew in some spots of the state. These insects were frequently reported in 2015 and continue to be seen in many parts of the state this year. Reports have mostly been on yard and landscape hardwood trees, but fruit trees can also potentially be affected.

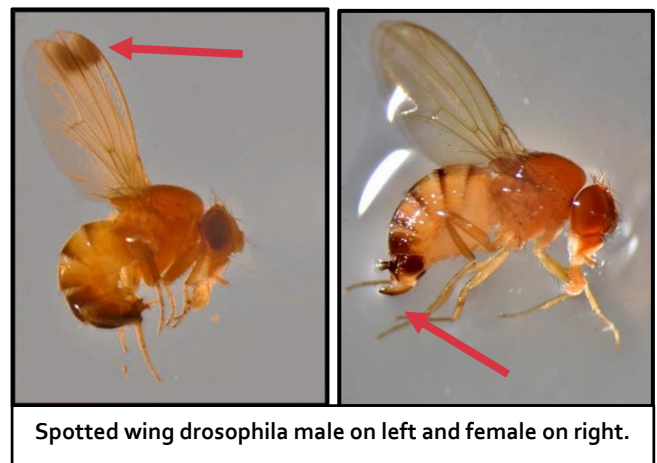
-Japanese beetles. The first Japanese beetle adults were noticed on the UW-Madison campus during the first week in June. The beetles were found near an area with south-facing slopes and subterranean steam tunnels which likely accelerated their development. Over the past couple weeks, more reports of adult emergence have been reported in the state, particularly in Central Wisconsin). The main emergence of Japanese beetle adults typically begins in late June and early July. Expect additional Japanese beetle adults to appear in the next 2-3 weeks.

Pest Alert – Spotted wing drosophila active in Dane County

By: Janet van Zoeren and Christelle Guédot

We caught our first Dane County spotted wing drosophila adult for 2016 this week, on June 23rd. They were caught this week on multiple Dane County locations. Interestingly, they have already been catching them for several weeks in Door County, Michigan and Minnesota.

Despite being later than those other locations, we are still finding spotted wing in Dane County nearly 2 weeks earlier than when they first showed up in 2015. For this reason, it could be an especially bad year for spotted wing. If you grow any fruits susceptible to spotted wing drosophila (raspberries, blueberries, cherries, and strawberries are all susceptible), please monitor on your farms, and, as soon as you find a single spotted wing adult, be prepared with several insecticide options that you can rotate, to minimize insecticide resistance. If you need a refresher on how to monitor for adults or larvae, or on which insecticides you can use in Wisconsin, please refer back to the article we published in the [previous issue of the Wisconsin Fruit News](#), pages 4-5, or to the [Spotted Wing Drosophila factsheet](#).



Also, you can keep reading below to learn about using exclusion barriers to manage spotted wing drosophila!

Berry Crops

Exclusion barriers as a sustainable strategy for management of Spotted Wing Drosophila

By: Alina Avanesyan and Christelle Guédot

Using *exclusion barriers* is a mechanical control strategy which prevents insect pests from getting into the enclosed area. Over the past decade, the use of exclusion barriers in berry crops has been gradually increased and, in some states, such as in California, exclusion barriers are used for almost all raspberries (Hanson et al., 2013).

There are many types of exclusion barriers, but the main idea is to cover crop plants either from all sides (called *complete exclusion*) or from the top (called *incomplete exclusion*); such barriers can be made from plastic or netting materials of different colors (Chouinard et al., 2016; Fig. 1-3).

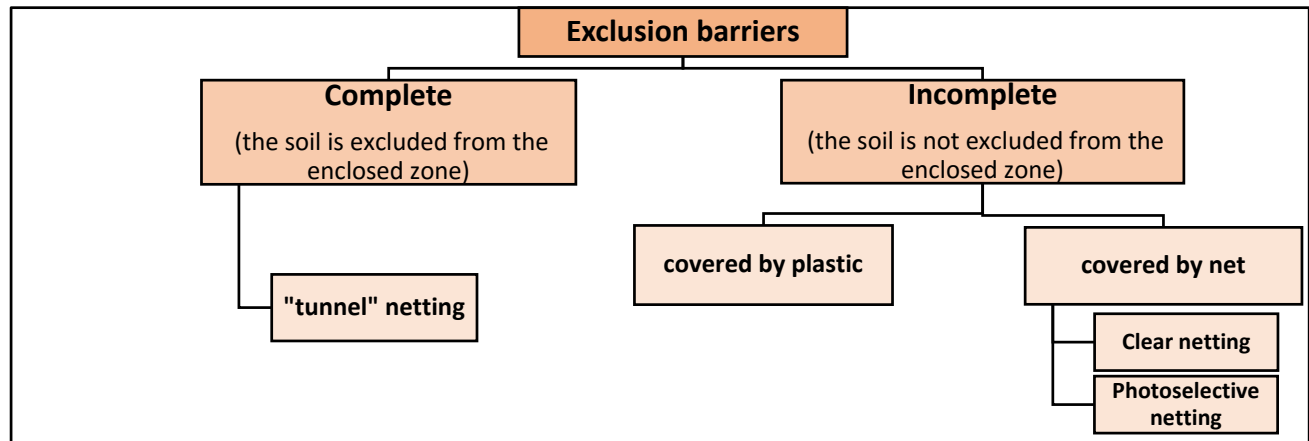


Fig.1. Types of exclusion barriers (based on Chouinard et al., 2016).



Fig.2. Incomplete (A, B) and complete (C, D) net exclusion systems (from Chouinard et al., 2016).



Fig.3. Plastic high tunnel (A, B) with raspberry plants (C) at Hoch Orchard & Gardens farm (La Crescent, MN)

Such exclusion barriers can protect crop plants not only by physical exclusion of insect pests but also by providing the microclimate which is unsuitable for developing pests (but favorable for plant growth and fruiting) (Table 1). Particularly, plastic cover in high tunnels can alter the solar radiation which may disrupt insect orientation and host location; this happens, for example, with Japanese beetle's movement (Hanson et al., 2013) and behavior of thrips and whiteflies (Burrack et al., 2013). On the other hand, enclosing the plot may cause potential problems with temperature management for plants or development of secondary pests (Chouinard et al., 2016).

Table 1. Advantages and disadvantages of using exclusion barriers

(based on Demchak et al., 2013; Hanson et al., 2013; Rogers et al., 2015; and Chouinard et al., 2016).

Advantages	Disadvantages
• Protection from animals, wind, frost, sunburn damage, etc. • Increased crop yields and fruit marketability • Physical exclusion of insect pests (e.g. <i>Drosophila suzukii</i>) • Unsuitable climate for pest development (e.g., increased temperature, altered solar radiation) • Decreased pressure from diseases • Advancement of the harvest season for early-season crops • Lengthening of the fall harvest season for late-season crops • Lengthening of shelf-life of crops • Significant reduction of the number of pesticide applications • Increased opportunities for organic control methods	• Additional costs for the tunnels and their management • Not easy to move • Potential problems with temperature management • Occurrence of disease and pests which are more problematic in the exclusions (e.g., powdery mildew, two-spotted spider mites, etc.) • Development of secondary pests (e.g., woolly apple aphid, the summer fruit tortrix moth, etc.) • Soil quality issues

It has been demonstrated recently that exclusion barriers could be effective strategies for the management of the invasive spotted wing drosophila, *Drosophila suzukii*, one of the main insect pests which attack berries. The studies which compared infestation of berries by *D. suzukii* inside and outside of the exclusion barriers showed that overall the exclusion barriers significantly decreased larval infestation rates.

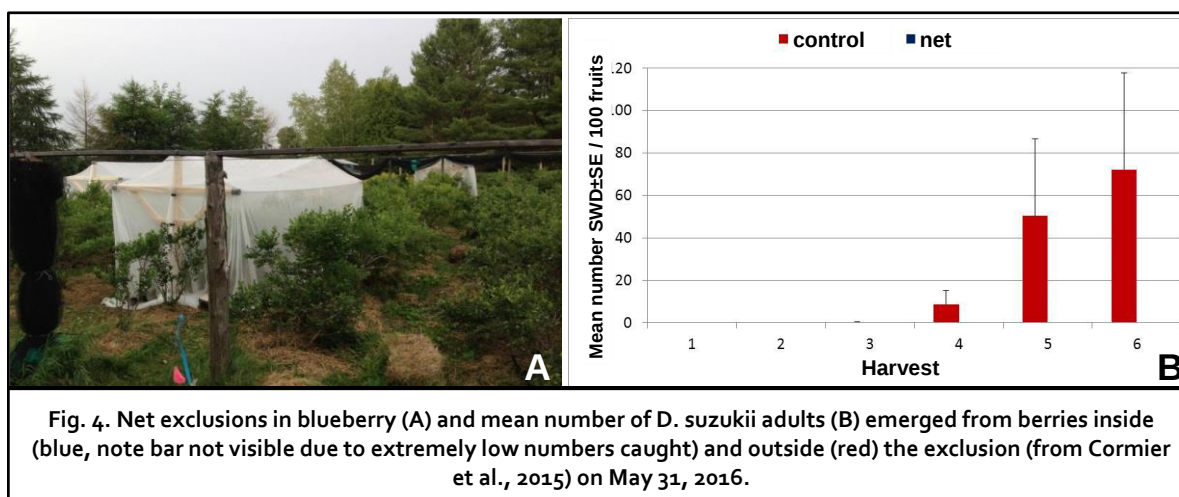
Particularly, Burrack et al. (2013) showed that blackberries and raspberries had lower infestation rate by *D. suzukii* under high tunnels than outside (Table 2). Similarly, Rogers et al. (2015) found that covered raspberry plots (both plastic and netting) had more marketable fruit than open plots. Interestingly, plastic high tunnels had the lowest percentage of infested berries compared to netting and uncovered plots (Table 3). In another study on blueberry, Cormier et al. (2015) trapped almost no adult *D. suzukii* inside net exclusions (Fig. 4).

Table 2. Mean *D. suzukii* larvae (+/- SEM) per blackberry and raspberry inside and outside high tunnels; pooled 2010–2012 data (from Burrack et al., 2013).

Plants	Inside tunnel	Outside tunnel
Blackberry	0.34 ± 0.11	1.17 ± 0.14
Raspberry	0.56 ± 0.09	2.90 ± 0.34

Table 3. Mean *D. suzukii* larval infestation (+/- SEM) of ‘Heritage’ raspberry grown in high tunnels and open plots (from Rogers et al., 2015).

Treatment	Percentage of infested berries
Netting high tunnel—untreated	34.58 ± 7.59
Plastic high tunnel—untreated	2.08 ± 1.34
Open plot—insecticide application	60.20 ± 6.53
Open plot—untreated	80.93 ± 5.17



Although the exclusion barriers can protect berries from *D. suzukii*, this strategy can be less effective if used, for example, during pollination, or if the mesh size of net cover is too large and flies still penetrate the enclosed area. For successful control of *D. suzukii*, **it is critical to use exclusion barriers at the right time and to follow several recommendations:**

- 1) Plants should not be covered during pollination, in order to allow pollinators (e.g., bees) access to the flowers. The exclusion covers (plastic or net) should be placed over plants right after pollination is complete (Liburd and Iglesias, 2013).
- 2) If netting is used, the recommended mesh size is 0.98 mm or less. It has been shown on blueberries that such mesh size can provide 100% protection from *D. suzukii* (Cormier et al., 2015).
- 3) If plastic exclusion (e.g. a high tunnel) is used, we recommend to use it as a complimentary strategy to netting and to leave entrances of the tunnel covered by a net. This will minimize the number of *D. suzukii* adults entering the tunnel.
- 4) Since some plant varieties (e.g., summer-bearing and fall-bearing raspberries) have different flowering and fruiting time, exclusions can be applied in sections: the varieties which have begun to ripen can be covered, whereas flowering varieties can be uncovered for pollination. This strategy can be helpful for small or organic growers. (Liburd and Iglesias, 2013).
- 5) Traps should be placed inside the netting to monitor for the presence of flies. It is important to not trap flies within the barrier. If flies are trapped inside the barrier, they should be controlled using an effective insecticide to eliminate the population before it builds up.

References:

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- Liburd, O. E., & Iglesias, L. E. (2013). Spotted Wing *Drosophila*: Pest Management Recommendations for Florida Blueberries. *Gainesville, FL: University of Florida*.
- Rogers, M. A., Burkness, E. C., & Hutchison, W. D. (2016). Evaluation of high tunnels for management of *Drosophila suzukii* in fall-bearing red raspberries: potential for reducing insecticide use. *Journal of Pest Science*, 1-7.

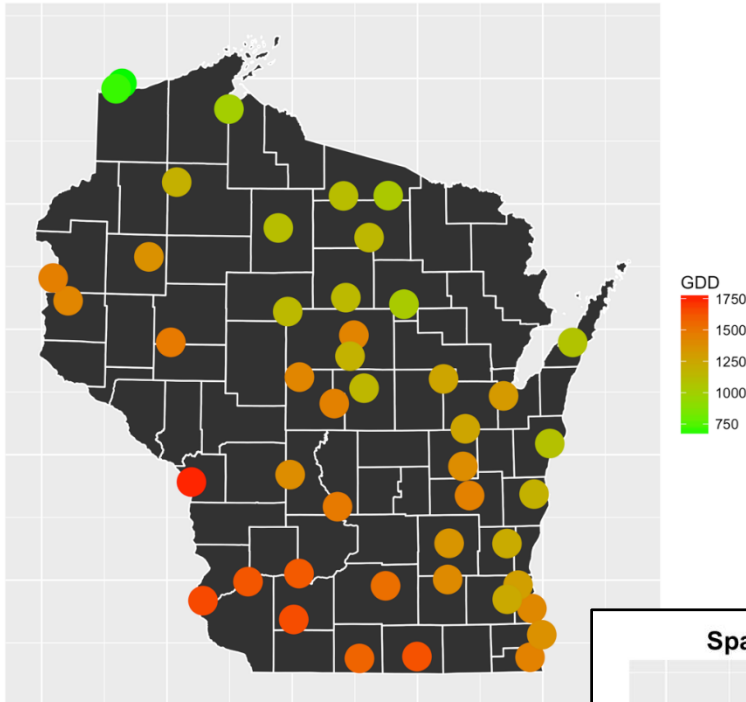
Cranberries

Cranberry Degree-Day Map and Update: as of June 22, 2016

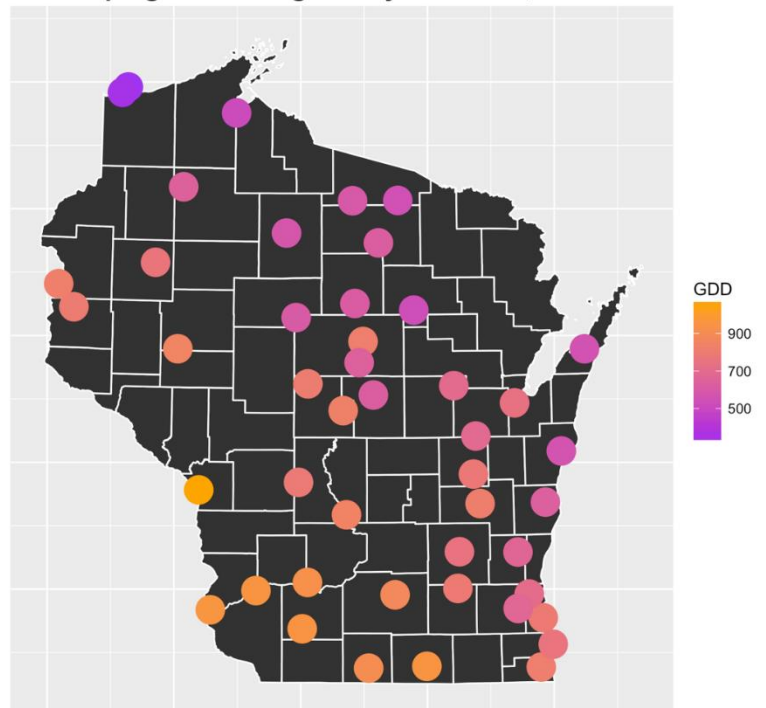
By: Elissa Chasen and Shawn Steffan, USDA-ARS and UW Entomology

Welcome to the official start of summer! The maps below show degree-day accumulations for cranberry plants and *Sparganothis* fruitworm across Wisconsin up through June 22, 2016. Temperature thresholds used for these calculations are 41 and 85 °F for the plant, and 50 and 86 °F for *Sparganothis*.

Cranberry Growing Degree Days: June 22, 2016



Sparganothis Degree Days: June 22, 2016



Plant DDs throughout WI range from 678-1,764. The central WI growing region has accumulated near 1,500 DDs and beds are typically well into bloom, while the northern WI growing region has accumulated around 1,100 DDs and are likely in the beginning stages of bloom.

Throughout WI, *Sparganothis* degree-days range from 308-1,061 DD. In central WI, *Sparganothis* DDs are mid-800s, meaning that peak flight is approaching, while in northern WI *Sparganothis* DDs are nearly 600, which means that growers in northern WI may just be beginning to see flight.

The image below details life history benchmarks of interest for *Sparganothis* fruitworm and the associated degree-day estimates for each benchmark. In central WI, depending on the specific climate of your marsh, larval emergence has begun, or will by next week.

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

The table below allows for comparison of degree-days over the last three years. We are right on track with last year's degree-day accumulations.

June 22	Cranberry Growing Degree Days			Sparganothis Degree Days		
	2014	2015	2016	2014	2015	2016
Central WI (Wisconsin Rapids)	1,283	1,461	1,447	749	837	836
Northern WI (Minocqua)	1,063	1,098	1,114	602	565	595

If you would like to read more articles and find more information specific to cranberry production in Wisconsin, be sure to read the most recent [Cranberry Crop Management Journal](#), also published by the University of Wisconsin-Extension. In the June 10th, 2016 issue of the Cranberry Crop Management Journal you will find information about: Bogside questions and answers, flower differentiation in cranberry, observations from the field, degree-day benchmarks, and grower updates.

Grape Disease Update

By: David S. Jones and Patty McManus

Regular rain events have continued to occur in grape producing regions of Wisconsin over the past two weeks. While the total accumulation of rainfall is not necessarily above average in many areas, the accumulation has occurred from numerous smaller rain events rather than one or two big ones. Unfortunately, this frequent wetting of foliage combined with temperatures in the 70s and 80s throughout much of Wisconsin has been ideal for disease development.

PARS. As of June 16th we had accumulated 430 GDD (base 50) and have recorded 9 rain events in the past two weeks. We are above the 5-year average for rainfall accumulation at this site, and it has been a wet couple of weeks. Shoots are currently between one and three feet in length, and we are at early bloom. ‘Valiant’ and the wild grape flowers in the area are just beginning to open up, so the flowers of other cultivars should be opening within the next several days. With early bloom upon us we are entering a critical period for disease management on fruit, as the black rot fungus infects fruit during bloom and weather has been highly conducive for infections by this pathogen. Growers in the Door County region should have an application against black rot out at this time and should plan on keeping plants protected with fungicides effective against black rot, downy mildew, and powdery mildew for at least the next 4-6 weeks.

Black rot was detected for the first time this year at PARS on June 16th on Valiant, Marquette, Frontenac and Frontenac Gris. Foliar damage is most noticeable on the oldest leaves in the canopy, particularly the first two to three fully expanded leaves at the base of each shoot. Several cultivars already have symptoms well up into the canopy on newer leaves. The rapid development of the disease has been helped along by the regular rainfall and warm temperatures. While leaves of infected vines will show symptoms, remember that young clusters will not show black rot symptoms at this time. Infected fruit will not begin to mummify until berries begin to size up in a few weeks, so concentrate your scouting efforts towards the foliage at this point in the season. Large numbers of lesions on foliage are a sign that risk of fruit infection is particularly high, and also contribute more inoculum (spores) that must be managed.



Above: black rot lesions on Marquette. The oldest leaves near the cordon have the most noticeable symptoms at this time of year. Photo by D.S. Jones. on May 31, 2016.



Above: black rot lesions on Valiant. In addition to leaf lesions, lesions on the stem are also visible in this image. Stem lesions also have the small black pimples in the middle, which pycnidia (the asexual fruiting body of the fungus). Photo by D.S. Jones.

Downy mildew, anthracnose, and phomopsis have not been detected at PARS, but weather over the past several weeks has been ideal for infections. Make sure to continue scouting for these pathogens in the coming weeks.

Recommendation for chemical management of black rot and downy mildew management are summarized in the previous grape disease update, found in volume one of the [Wisconsin Fruits Newsletter, Issue 5](#), page 8.

WMARS. As of June 16th we had accumulated 675 GDD (base 50) and have recorded 6 rain events in the past two weeks. In spite of the large number of rain events at this site, we are actually slightly below average rainfall accumulation right now. Shoots at WMARS are between two and five feet in length, and we are at late bloom or early fruit set, depending on variety. We are still in the midst of the critical window for protecting fruit against black rot, downy mildew, and powdery mildew, so growers should have a cover out at this time. Young clusters are also highly susceptible to phomopsis and anthracnose, so careful weekly scouting should be in place as fruit develop to ensure appropriate management is implemented if necessary.

As previously mentioned, recommendation for chemical management of black rot and downy mildew management are summarized in the previous grape disease update, found in the [Wisconsin Fruits Newsletter, Issue 5](#), page 8.

Black rot continues to develop on foliage at WMARS. After initially being observed on the first two to three expanded leaves of the vines, symptoms have spread upwards into the canopy on the more susceptible cultivars.



Above: fully expanded leaves that are in the upper canopy of 'Marquette' and 'Valiant' are now being damaged by black rot at WMARS. Infection tends to creep upwards from the oldest leaves in the canopy. Photo by D.S. Jones.

Downy mildew was detected at WMARS for the first time on June 13th. 'LaCrosse' and 'Valiant' were the first cultivars on which symptoms were detected this year. This was also the case in 2015. 'Valiant' has a particular problem with downy mildew on young clusters. Clusters of this cultivar are already being heavily damaged at this time. LaCrosse clusters are not damaged at this time.

"Oil spots" are a common symptom of downy mildew on wine grapes. An "oil spot" refers to a yellow to yellow-brown lesion anywhere from about 0.25 - 1.0+ inches wide that is visible on the top of the infected leaf. The white sporulation of downy mildew is typically observed on the underside of these lesions (see images below).



Above: downy mildew on a 'Valiant' cluster. Clusters that show symptoms at this early stage often develop a hooked shape as the rachis is damaged by the disease. Photo by D.S. Jones.



Above: downy mildew on a young 'Valiant' cluster. Berries infected at this stage may continue to develop with other berries in the cluster, but will not ripen or size normally. Photo by D.S. Jones.

However, it is important to note that not all cultivars have the same downy mildew symptoms. For example, 'LaCrosse' often does not have a prominent "oil spot" phase, instead developing a brown-black lesion with sporulation on the underside. This is sharply in contrast with 'Valiant,' which has typical "oil spot" symptoms with sporulation on the underside.



Above: downy mildew lesion on the top of a LaCrosse leaf. Notice that this lesion is brown/black as opposed to the more classic "oil spot" appearance. Photo by D.S. Jones.



Above: downy mildew sporulation on the underside of the leaf pictured at left. This sporulation from a brown/black lesion appears to be typical on LaCrosse. Photo by D.S. Jones.

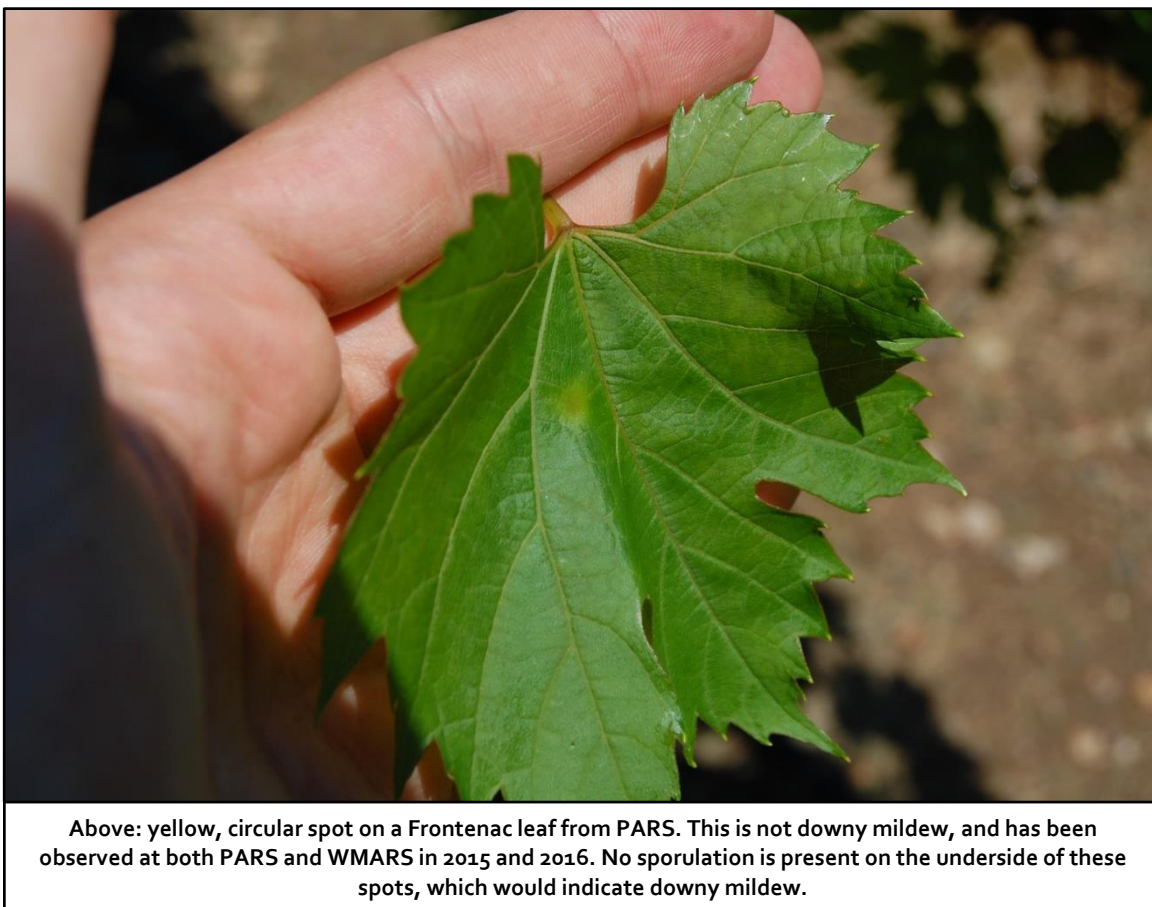


Above: downy mildew lesion on the top of a Valiant leaf. Notice that this lesion is yellow/brown-yellow. These symptoms are "oil spots." Photo by D.S. Jones.



Above: downy mildew sporulation on the underside of the leaf pictured at left. Unlike the LaCrosse lesion, the underside of the lesion is yellow to brown-yellow. Photo by D.S. Jones.

These differences highlight the importance of identifying sporulation before assuming downy mildew is to blame for any observed symptoms, as false diagnosis can lead to wasted sprays. Michigan State University Extension recently published an [article discussing mysterious yellow spots](#) on grape leaves that resemble traditional downy mildew symptoms which we have also seen over the past two years at our field sites.



Having scouting troubles? Don't forget about our diagnostic resources!

UW-Madison Plant Disease Diagnostic Clinic: <http://labs.russell.wisc.edu/pddc/>

UW-Madison Insect Diagnostic Lab: <http://labs.russell.wisc.edu/insectlab/>

UW-Madison Soil and Forage Lab: <https://uwlabs.soils.wisc.edu/fees/>

Wine and Table Grape Developmental Stages

By: Amaya Atucha, Janet van Zoeren, Annie Deutsch and Becky Wiepz – UW-Extension

The vines have taken off these past two weeks, and we already have full canopies. The majority of the cultivars at the West Madison Agricultural Research Station (WMARS) are at pea size berry (with exception of Aromella) – development varies from E-L* developmental number 27 (young berries enlarging, bunch at right angle to stem) to 31 (berries pea sized). At the Peninsular Agricultural Research Station (PARS) inflorescence are expanding, but individual flowers are only just beginning to open; development at PARS spans from E-L* developmental number 18 (14 leaves separated, flower caps still in place) to 23 (50% flower caps off).

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

Following photos taken on June 7th at West Madison Agricultural Research Station.



Brianna at WMARS; "beginning of bunch closure" E-L number = 32



La Crescent at WMARS; "berries pea-sized"
E-L number = 31
*poor fruit set in the tips of the clusters



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



St. Croix at WMARS; "berries pepper-corn size" E-L number = 29



Frontenac at WMARS; "berries pepper-corn size" E-L number = 29



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



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



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

Following photos taken on June 7th at the Peninsular Agricultural Research Station.



Brianna at PARS; "first flower caps loosening" E-L number = 19



La Crescent at PARS; "50% caps off (flowering)" E-L number = 23



La Crosse at PARS; "14 leaves separated, flower caps still in place" E-L number = 18



Marquette at PARS; "30% caps off (flowering)" E-L number = 21



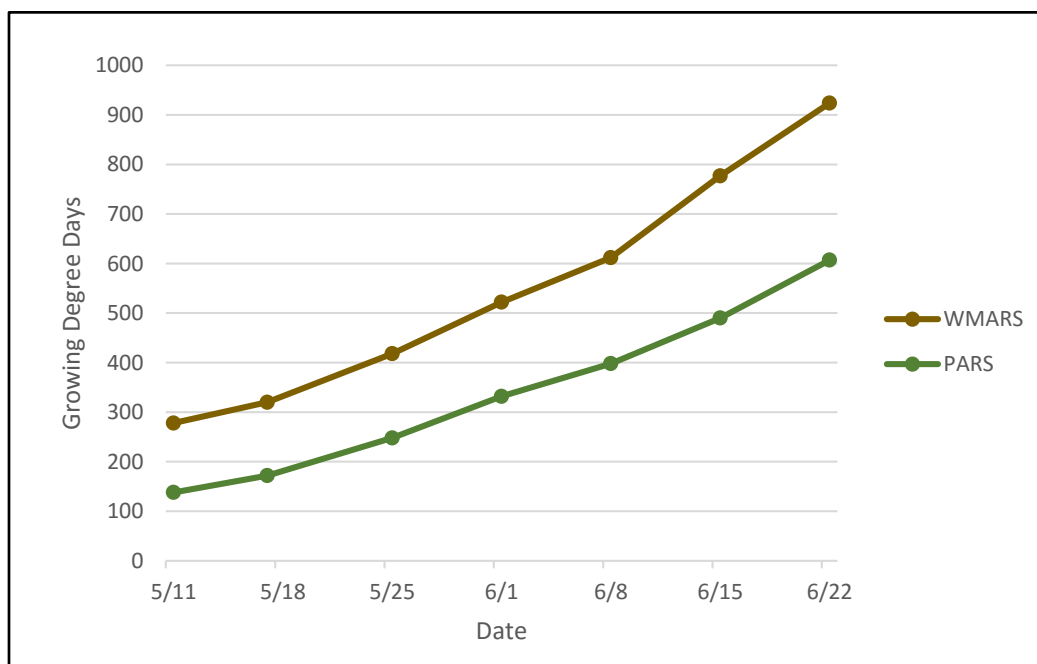
Frontenac at PARS; "50% caps off (flowering)" E-L number = 23



St. Croix at PARS; "first flower caps loosening" E-L number = 19

The growing degree day accumulations as of June 22nd for this year are: 924 GDD at WMARS and 607 GDD at PARS. At WMARS, we are just a little bit behind the degree day accumulations from last year, while at PARS we are bit ahead the accumulations from last year. All growing degree days are calculated using a base of 50°F.

Grape Growing Degree Days		
April 1 - June 22 2016		
	2106	2015
WMARS	924	943
PARS	607	566

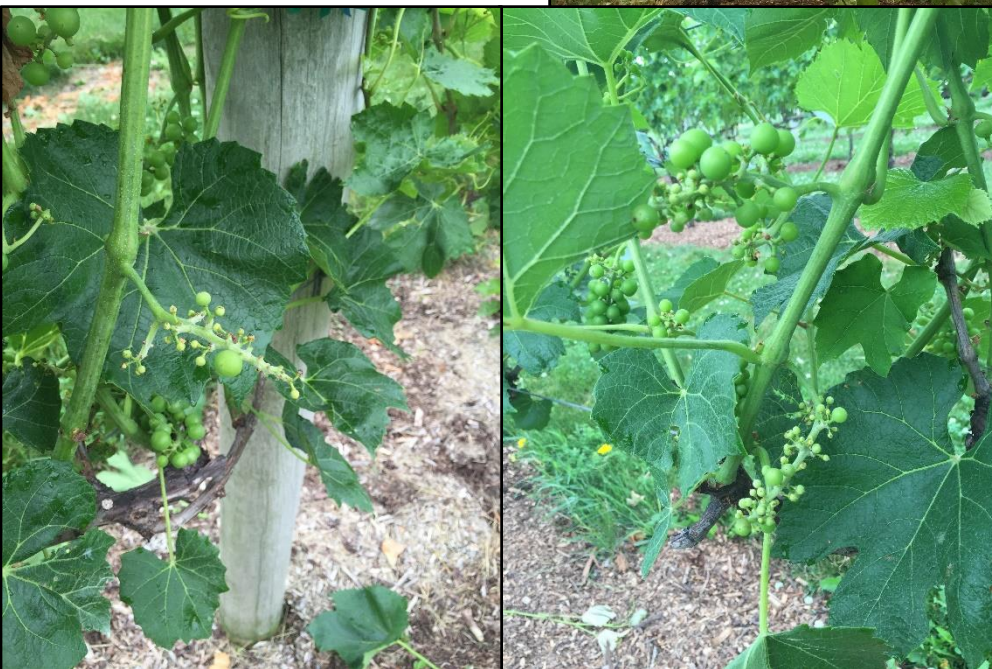


Here are some additional pictures of the management we have been doing to take care of the vineyard these last two weeks.



Mulch renewal. Mulch can be of great help to keep adequate moisture in the root zone, as well as controlling weeds. To learn more about vineyard floor management and weed control, you can view this [Northern Grape Project webinar](#).

Shoot combing in High Cordon training system. The left side of the picture shows a Petite Pearl vine after shoots have been combed down to expose the clusters to sunlight early in the season, while the right section of the pictures shown a vine that have not been combed, and where clusters are very shaded inside the canopy.



Poor fruit set in Brianna. We have observed that Brianna vines had a really poor fruit set in one of our research vineyards. We are not sure why, but we think it could be due to the earlier bloom of Brianna compared to other varieties in our experimental blocks. Cool and rainy weather early in the season might have affected fruit set.



Uneven fruit set in Leon Millot. Each flower in the inflorescence has four ovules, and if all of them are fertilized then each berry has the potential of having up to 4 seeds. Berry size is positively correlated with the number of seeds, and few seeds will result in smaller berries. Unfavorable weather conditions during bloom time can reduce the number of seeds in each berry and thus berry size. In addition, nutrient deficiencies, especially Zinc and Boron can also affect fruit set.

Last year (2015) we experienced poor fruit set on our LaCrescent vines, somewhat similar to what we have seen this year in Brianna. However, this year fruit set is much better in LaCrescent, with the exception of some vines showing clusters with very low fruit set in the distal tips. It could be possible that the flowers at the distal section of the inflorescence opened later than the ones at the base, reducing fruit set if the weather was unfavorable at that later time.



Aromella, a white wine grape variety from the breeding program at Cornell University, is one of the last varieties to bloom in our research plots in Southern Wisconsin. Due to our short growing season, in addition to its late bloom, this variety has not performed well and fruit does not reach high sugar content (Brix) for producing quality wine under our growing conditions.

Grape insect scouting report

By: Janet van Zoeren, Annie Deutsch and Christelle Guédot

Up at the Peninsular Research Station (PARS), there haven't been many pest insects – scale insects and phylloxera have been spotted, but are nowhere near damaging levels at this time. However, we have noticed a lot of insect activity over the past two weeks (scouting June 14th and June 22nd) at the West Madison Agricultural Research Station (WMARS).

Grape phylloxera populations are taking off this time of year, at least around Dane County, although outbreaks tend to be isolated. Although grape phylloxera forms galls on both leaves and roots, the root galls do not decrease yield in our native American grapes. Leaf galls begin to form when the shoots reach 5 inches long, generally in mid-May, and multiple generations continue to make galls near the shoot tips throughout the summer. The galls are distinctive (see images to the right and below), although the tiny larvae, or “crawlers”, can be harder to spot.



Grape phylloxera galls.



Severe grape phylloxera infestation.

Monitoring: It is especially important to monitor for galls in May when the first generation of adults form galls, since each gall contains a female who will produce many offspring. This week at WMARS the evidence of the first generation could be seen in the highly infested leaves, especially on Valiant and Brianna cultivars (see image to left).

Control: Assail and Movento are both registered to control grape phylloxera. However, these work best pre-bloom, when phylloxera larvae from the first generation are exposed while climbing to the new foliage at the shoot ends. For the southern areas of Wisconsin, this second generation has already protected themselves inside galls, **so it is too late to spray this year.**

However, if you notice an infestation on any of your vines this year, it would be a good idea to be especially careful about monitoring next summer, and you may want to consider using Admire Pro as a prophylactic soil-drench. Admire Pro should be applied from bud swell until the first leaf is fully expanded, in areas which have shown previously high phylloxera infestations.

Japanese Beetles were first seen on grapes at WMARS in early June this year. Although numbers are low at the moment, they will ramp up quickly as summer goes on. Japanese beetle has just one generation per year in Wisconsin, but adults will be present from now through the fall, and, when abundant, defoliate by skeletonizing leaves of grapes and many other crops. They rarely feed directly on the grape berries.

Monitoring and Control: Many products are registered for Japanese beetle in WI grapes, including Altacor, Sevin, Avaunt, and Assail. Japanese beetle can also be controlled by using Kaolin clay (as discussed by Reid Maier at the Wisconsin Fresh Fruits and Vegetables Conference). Most *Vitis labrusca* vines are resistant to some defoliation, and can withstand a higher population of Japanese beetles without showing decreased yield, so consider that when planning your spray schedule.

However, all young grapes should be protected, either with insecticide applications or through covering with a mesh. It is not recommended to monitor with pheromone-based lures in your grape plot, as that will attract the beetles to your crop. If you would like to use the pheromone-based traps, it is better to place them away from any susceptible crops.



Japanese beetles. Photo by Katie Hietala-Henschell.

Rose Chafer was reported to the UW Insect Diagnostic Lab in early June (see article by PJ Liesch on page 2 of [WFN issue 5](#)), and has been observed in blueberry fields in Western Wisconsin and cranberry in Central Wisconsin. Rose Chafer are common in sandy soils and, similar to Japanese beetle, are generalists, skeletonizing leaves of many plants, including grape and other fruit crops. They are an orange/brown color with long legs. Rose Chafer can be controlled by Assail, Sevin, or Danitol.



Tissue analysis to assess nutrient status of cold-hardy wine grapes

By: Amaya Atucha, Assistant Professor and Extension Specialist, UW-Madison Department of Horticulture

Tissue nutrient analysis has been shown to be a much better and more accurate indicator of vine nutritional status than soil analysis, and is essential for evaluating on an annual basis the need, as well as the response, of the vine to fertilizer. In addition, tissue analysis is a great tool to diagnose nutrient deficiencies before symptoms are expressed. However, the recommendation of taking tissue samples every year is precisely to avoid corrective fertilizer application and promote maintenance applications.

For grapes, the tissue collected to assess nutrient concentration is the petiole of mature leaves. There are two recommended timing for petiole sampling: at bloom or during veraison. Some people prefer to sample at bloom time because that allows for enough time to apply any nutrient that might be deficient (especially nitrogen and boron), while others advocate for the veraison period because nutrient concentration is more stable and results more reliable during this period. Regardless of the timing in which you decide to sample, the most critical thing is to be consistent and to sample at the same time every year, so that you can compare during different growing seasons how your vines are responding to your fertility program, as well as to diagnose problems or anomalies in nutrient within years.

Instructions to collect Petiole samples:

1. Divide the vineyard into sampling areas based on the type of soil, cropping history, and variety. In addition, separate sampling areas by variety and age (e.g. one sample should be taken for a 3-year-old Marquette block, and a separate sample for an 8-year-old Marquette block). If you have an area in your vineyard that shows symptoms, you should collect a separate sample for it.
2. Collect 50-100 leaves/petioles (use the higher end of the range for varieties with smaller leaves such as Foch and Marquette). Leaves/petioles should be collected randomly from 20-30 vines within a sampling unit, by collecting 2 leaves per vine from both sides of the rows and canopy. Select leaves/petioles from shoots that are well exposed to sunlight, healthy, free of insects, diseases or physical injury.
3. If sampling at full bloom, collect leaves located opposite the first or second flower cluster of a shoot (Figure 1). If sampling at veraison, collect the 5th to 7th fully mature leaf from the tip to the base of the shoot (make sure the shoot has not been pruned) (Figure 2).

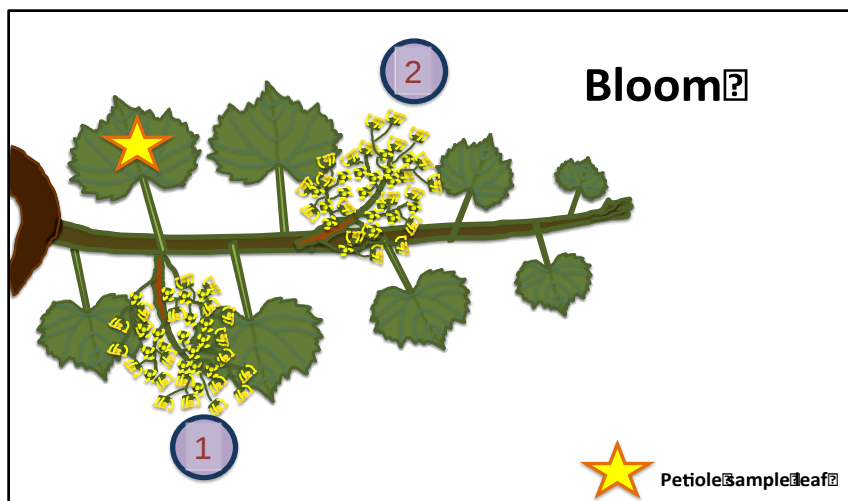
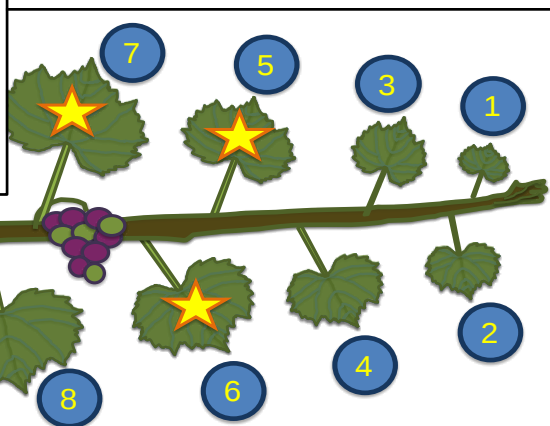


Figure 1. At bloom time collect the leaves opposite to the first cluster from the base of the shoot.
Illustration by Madeline Kay Wimmer.

 Petiole Sample Leaf

Illustration by Madeline Kay Wimmer (2016)



Veraison



Petiole Sample Leaf

Illustration by Madeline Kay Wimmer (2016)

Figure 2. At veraison collect 5th to 7th fully mature leaf from the tip to the base of the shoot. Illustration by Madeline Kay Wimmer.

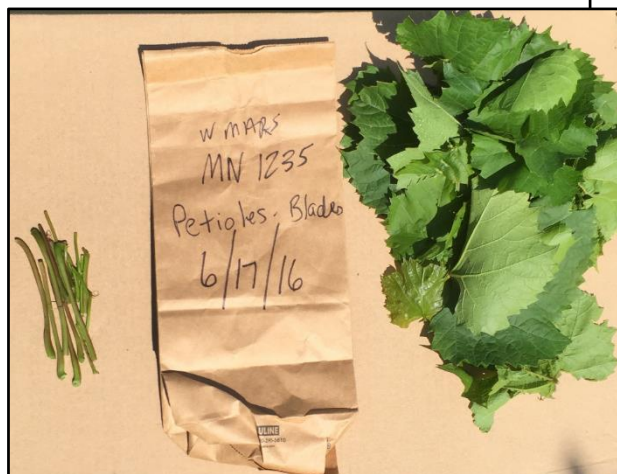


Figure 3. Separate petioles from leaf blades, and place the petioles in a clean labeled paper bag. Photo credit Jean Riester-Loper.

4. Separate the petioles from the leaf blades (if rinsing is required remove the leaf blade after the washing process, do not leave the leaves soaking in water as they will leach nutrients) and place the petioles in a **labeled** clean **paper bag** or bag provided by the tissue analysis lab (Figure 3 above). It is critical to label each sample to be able to keep records of each sampling area.
5. Let the petioles dry at room temperature or send them immediately to the laboratory. Do not use plastic bags.
6. Contact the tissue analysis laboratory before collecting and submitting your samples to determine any specific requirements.
7. You should request the following nutrients for testing: Total nitrogen (N), phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), manganese (Mn), zinc (Zn), boron (B), iron (Fe), and copper (Cu).

Sufficiency range for nutrients in Cold-Hardy Grape petioles (Based on Domoto and Rosen)

Nutrient	Full bloom (mid to late June)	Veraison (mid July to mid August)
Nitrogen (%)	1.20 - 2.20	0.90 - 1.30
Phosphorus (%)	0.15 - 0.60	0.12 - 0.40
Potassium (%)	1.50 - 4.00	1.50 - 2.50
Calcium (%)	0.70 - 2.00	1.00 - 2.00
Magnesium (%)	0.20 - 0.50	0.25 - 0.45
Sulfur (%)	> 0.12	> 0.12
Manganese (ppm)	20 - 150	30 - 150
Boron (ppm)	25 - 50	25 - 50
Copper (ppm)	5 - 10	5 - 15
Zinc (ppm)	20 - 100	30 - 50
Iron (ppm)	40 - 180	30 - 100

List of Plant and Soil Analysis Laboratories:

(The provided list of laboratories is not an endorsement to any particular laboratory and does not exclude other facilities that provide similar services)

University of Wisconsin Soil and Forage Analysis Lab

2611 Yellowstone Drive

Marshfield, WI 54449

Ph: 715-387-2523

[\(https://uwlab.soils.wisc.edu/plant-tissue/\)](https://uwlab.soils.wisc.edu/plant-tissue/)

AgSource Laboratories-Bonduel

106 N. Cecil Street

Bonduel, WI 54107

Ph: 715-758-2178

<https://agsource.crinet.com/page5714/PlantTissue>

Dairyland Laboratories, Arcadia WI

217 E. Main Street

Arcadia, WI 54612

Ph: 608-323-2123

<https://www.dairylandlabs.net/agronomy-services/plant-tissues>

U of MN Research Analytical Lab

135 Crops Research Building 1902 Dudley Avenue

St. Paul, MN 55108

Ph: 612-625-3101

<http://ral.cfans.umn.edu/>

AGVISE Laboratories

902 13th Street

P.O. Box 187

Benson, MN 56215

Ph: 302-843-4109

<http://www.agvise.com/>

Minnesota Valley Testing Laboratories

1126 N. Front Street

New Ulm, MN 56073

Ph: 507-8517 or (800) 782-3557

<http://www.mvtl.com/>

A & L Heartland Laboratories

P.O. Box 455

111 Linn Street

Atlantic, IA 50022

Ph: 712-243-6933

<http://www.allabs.com/>

AgSource Laboratories-Belmond

1245 Hwy 69

Belmond, IA 50421

Ph: 515-444-3384

<http://agsource.crinet.com/page2284/BelmondLabs>

Minnesota Valley Testing Laboratories

35 L Avenue

Nevada, IA 50201

Ph: 515-382-5486 or (800) 362-0855

<http://www.mvtl.com/>

Reduced risk insecticide: Exirel

By: Christelle Guédot, University of Wisconsin, Entomology

Insecticide: Exirel

- Available as 10SE (10% AI, Suspo Emulsion)
- Restricted re-entry interval (**REI**): 12hrs
- Pre-harvest interval (**PHI**) on pome and stone fruits: 3 days
- No more than 3 applications within single generation of target pest
- No more than 2 successive applications with 30-day period
- Do not exceed a total of 0.4 lb AI (61 fl. oz.) per acre per year
- Rate of use per acre: 8.5 – 20.5 oz. based on pest and crop
- Minimum interval between applications is 7 days for pome and stone fruits

Exirel is registered for use in Wisconsin on pome fruits, including apple, crabapple, pear, and quince as well as stone fruits, including apricot, sweet and tart cherry, nectarine, peach, and plum. It was first registered around 2014, so you may already have some experience with it. It is marketed by DuPont™ under the formulation 10SE (10% of active ingredient as a Suspo Emulsion, which is an oil in water emulsion). Exirel, similar to Altacor, is in the class of the anthranilic diamides, with a different mode of action acting on the insect ryanodine receptors in the muscles, causing an uncontrolled release of calcium in the cells. Exirel contains the active ingredient cyantraniliprole. Exirel has contact activity, but is most effective through ingestion of treated plants. Affected insects will rapidly stop feeding, become paralyzed, and will die within 1-3 days. Applications should be timed to the most susceptible insect stage, typically egg hatch and/or newly hatched larvae.

Exirel is registered for control of codling moth, European apple sawfly, green fruitworm, oblique banded leafroller, red banded leafroller, spotted tentiform leafminer, tufted apple bud moth, variegated leafroller, white apple leafhopper, oriental fruit moth, plum curculio, pear psylla, rosy apple aphid, cherry fruit fly, omnivorous leafroller, peach twig borer, spotted wing drosophila, black cherry aphid, Japanese beetle, and thrips. Apple maggot is listed for suppression only. See specific recommendations for some pests, such as codling moth, rosy apple aphid and others.

In our previous trials, conducted at the Peninsular Research Station in 2014, Exirel showed good activity against green fruitworm, codling moth 1st and 2nd generations, and leaf roller. No effect on apple maggot was found in these tests but Exirel is listed for “suppression only” for apple maggot and timing and environmental conditions may have impacted these results.

Exirel may be applied by ground equipment and by air (see label for specific application regulations). For ground foliar applications, use a minimum of 30 gallons per acre.

Exirel is highly toxic to bees exposed to direct treatment or residues on blooming plants. Do not apply Exirel when bees are foraging and until flowering is complete. Exirel is toxic to aquatic invertebrates and oysters and must not be applied directly to water.

As always, make sure to read the label before using any pesticide. You can find the label of Exirel at the following link: www.agrian.com/pdfs/DuPont_Exirel_Insect_Control_Label2ne.pdf.

Going Soft on Apple Diseases?

By: Patty McManus

Many popular apple varieties are highly susceptible to a range of fungal diseases, and repeated fungicide sprays are needed to produce a clean crop. Several “softer” chemistries are labeled on apple and marketed as an environmentally friendly approach to disease control. Some are even approved for organic production. But do they work?

Here I summarize research results from trials that tested three products—Oxidate, Serenade, and Regalia. These three products have been tested in trials in which treatments were randomized and replicated, which permits statistical analysis of the data. In most cases, they were tested over multiple years and in different states by different researchers. Results were published in peer-reviewed outlets, which means other researchers reviewed and approved of the methods used and conclusions drawn. Finally, in these trials, the products were used alone, rather than mixed or alternated with other fungicides. This is important, because it is really difficult to determine which product is “doing the work” when multiple products are mixed and/or alternated in a spray program.

In this summary, a product is rated “good” if it performed statistically significantly better than the untreated control, and was as good or better than the standard fungicide treatment (usually captan, sterol demethylation inhibitors, and/or strobilurins). A product is rated “fair” if it performed significantly better than the untreated control but was not as good as the standard fungicide. A product is rated “poor” if it performed no better than the untreated control. In the discussion below, “better” means statistically significantly better, and not just numerically better.

Oxidate. The active ingredient is hydrogen dioxide, a strong oxidizing agent that kills fungi and bacteria on contact, much as hydrogen peroxide from your medicine cabinet does. Apple diseases listed on the label include powdery mildew, rust diseases, and scab. You can enter sprayed orchards as soon as the product is dry, and there is no pre-harvest interval. Oxidate was tested for powdery mildew control on leaves and fruit in 3 trials. In none of the trials did it control mildew as well as the standard fungicides. In 3 of 3 trials it rated fair in controlling mildew on terminal shoots but poor on fruit. In 2 trials looking at leaf scab, Oxidate rated fair in 1 trial and poor in 1 trial. Similarly, in 4 trials looking at fruit scab, Oxidate rated fair in 2 trials and poor in 2 trials. Oxidate was more promising for sooty blotch and flyspeck control: in 1 trial it was as good as the standard fungicide treatment, and in 2 other trials it was better than the untreated control, but there was no standard fungicide treatment for comparison.

Summary for Oxidate: fair to poor on powdery mildew; fair to poor on scab; and good on sooty blotch and flyspeck. Why didn’t Oxidate do better? First, it is active on the plant surface when it comes into contact with fungi. It probably does not penetrate much and is not systemic. Secondly, it is non-persistent—it probably does not weather as well as standard fungicides.

Serenade. The active ingredient is the bacterium *Bacillus subtilis* strain QST713. There are different formulations, ASO, MAX, and Optimum, with lower to higher concentrations of bacteria. Target diseases include fire blight, powdery mildew, sooty blotch and flyspeck, rust, fruit rots, and scab (ASO and MAX forms). This strain of *Bacillus subtilis* produces lipoproteins that puncture the cell walls of fungal and bacterial pathogens. Serenade may also trigger plants’ defense responses (plant equivalent of an immune response).

The restricted entry interval is 4 hours; pre-harvest interval is 0 days. Although Serenade is labeled for many diseases, sooty blotch and flyspeck was the only fungal disease for which I was able to find data from multiple trials in which Serenade was tested alone rather than alternated in a spray program. Serenade was rated good in 2 of 6 trials, fair in 2 of 6 trials, and poor in 2 of 6 trials for percent of fruit showing any symptoms. When the *severity* of symptoms was monitored in 3 trials, Serenade rated fair in 2 trials and poor in 1 trial.



Summary for Serenade: good to poor control of sooty blotch and flyspeck. Why was its performance inconsistent? Biocontrol bacteria are living organisms. Their establishment, growth, and production of the lipoproteins depend on environmental conditions which vary among orchards and years.

Regalia. The active ingredient is extract of *Reynoutria sachalinensis*, giant knotweed. Target diseases include powdery mildew, sooty blotch and flyspeck, rust, fruit rots, scab, and fire blight. The mode of action is not fully understood, but Regalia is believed to trigger plants' defense responses. The restricted entry interval is 4 hours; pre-harvest interval is 0 days. Regalia rated fair in 5 of 5 trials evaluating powdery mildew severity on terminal shoots, and fair in 2 of 2 trials evaluating powdery mildew severity on fruit. Regalia rated poor in 3 of 3 trials evaluating leaf scab control, but did somewhat better on fruit, rating fair in 3 of 4 trials and poor in 1 of 4 trials. For severity of sooty blotch and flyspeck, Regalia rated fair in 2 of 3 trials and poor in 1 of 3 trials.

Summary for Regalia: fair for control of powdery mildew; fair to poor for control of scab; and fair to poor for control of sooty blotch and flyspeck. Plant defense response to pathogens is an extremely complex process that involves many genes and multiple metabolic pathways. Plenty of research has been conducted in this area, with the hope of developing products that “turn on” the right pathways to fight off fungi. Progress has been made, but there is no silver bullet.

These results from trials testing these three products—mostly fair to poor performance—might be disappointing for growers who want to replace some conventional fungicides with softer chemistries. But you need to consider the following points when interpreting the results. First, most researchers test products on highly susceptible varieties, because they want to separate the really good chemistries from the also-rans. But a product that rates merely “fair” for controlling scab on highly susceptible McIntosh might provide adequate control of scab on Honeycrisp, which is much less susceptible. Keep in mind that in the trials summarized here, the soft products were tested alone—not mixed or alternated with other fungicides. In the real world, you might alternate a soft product with captan, for example, and get good disease control with less captan residues. Most of the trials summarized here were not done in organic orchards. Some critics would argue that the entire orchard system must be organic for biocontrols and inducers of plant defenses to work most effectively. I don't know of any research to support or refute this argument. Finally, you need to consider your market and economics. As with conventional fungicides, prices vary for the softer products. If you are receiving a premium because you use only soft products, and/or your market is more tolerant of a few blemishes, then the soft products might be a good choice. But if your market demands blemish-free fruit, then these softer products might not provide the level of control you need, at least as stand-alone sprays on highly susceptible varieties.



Powdery mildew on a terminal shoot. Photo by Patty McManus.



Apple scab in mid-summer. Photo by Patty McManus.

References: Cooley et al. 2007 PDMR 1:PF050; Cox et al. 2010 PDMR 4:PF016; Rosenberger et al. 2004 F&N Tests 59; Rosenberger et al. 2010 PDMR 5:PF024; Rosenberger et al. 2010 PDMR 5:PF025; Turechek et al. 2004 F&N Tests 59:PF010;; Sutton and Anas 2007 PDMR 1:PF007; Sutton et al. 2009 PDMR 3; Sutton et al. 2010 PDMR 4:PF001; Yoder et al. 2012 PDMR 6:PF032; Yoder et al. 2014 PDMR 8:PF016
Yoder et al. 2014 PDMR 8:PF020 (PDMR=Plant Disease Management Reports F&N Tests=Fungicide & Nematicide Tests)

Apple fertility considerations for orchards with variable crop loads

By: Amaya Atucha, Assistant Professor and Extension Specialist, UW-Madison Department of Horticulture

There is a significant variability on crop load this year due to the late frost we experienced last May. Some growers have blocks with normal crop load and others with very light or no crop at all. Here are some guidelines to help you develop a balanced nutrient management program.

Nitrogen demand and mobilization in the tree can be divided in 4 periods: 1) budbreak to bloom, 2) petal fall to end of shoot growth, 3) end of shoot growth to harvest, and 4) harvest to budbreak. The period with the highest demand for nitrogen is from petal fall to end of shoot growth, and nitrogen supplies at this point come primarily from the soil. Foliar N applications are a good way to provide nitrogen to fruitlets and new spur leaves. Dr. Cheng, at Cornell University, recommends to supply extra nitrogen to blocks that had low N in last year's tissue test results by applying foliar urea at a rate of 5 lb of urea per 100 gallons at petal fall, first cover (7 days after petal fall), and second cover (2 weeks after 1st cover). However, in blocks with light fruit crop it is critical to control vigorous shoot growth by reducing or eliminating nitrogen application for this season.

Potassium application should also be reduced or eliminate if there is a light crop load. Potassium is the most used/removed nutrient element by fruit, that's why we need to supplement with fertilizer, however if there is a light crop there is less potassium needed to support the crop. Ideal soil range for potassium should be between 150-250 ppm, and base saturation of 5% of Ca level (too much potassium will interfere with Ca uptake!). Leaf level for potassium should be between 1.2 to 2.5%. The recommended N:K ratio is 1.25 to 1.5, too much nitrogen will reduce the uptake of K.

Calcium is a key nutrient for fruit quality as it increases fruit firmness and storage life. Calcium uptake happens during petal fall to harvest, and to ensure maximum calcium uptake during this period it is critical to maintain adequate soil moisture and pH, as well as a balanced potassium and nitrogen fertility program. In cultivars that are more susceptible to bitter pit the recommendation is to supply 3-4 foliar calcium applications starting 7 to 10 days after petal fall and continue in a 14-day interval until harvest. The first application should be at a rate of 1 to 2 lbs of calcium chloride (28% Ca) or equivalent per 100 gallons, and the following applications at a rate of 3-4 lbs calcium chloride per 100 gallons at 4 and 2 weeks before harvest. The effectiveness of these sprays is positively correlated with the coverage of the fruit, complete coverage is critical. In blocks with light crop loads fruit will be bigger and the concentration of calcium in the fruit will be diluted, which exacerbates bitter pit problems, especially in susceptible varieties as Honey Crisp. In blocks with low crop load it is recommended to reduce potassium supply to avoid competition with calcium.

Door County spotted wing drosophila update

By: Janet van Zoeren and Christelle Guédot

As mentioned in the previous issue of this newsletter, spotted wing drosophila has already been caught this summer in Door County, several weeks earlier than the first trap catch in previous years. The first trap-catch in Door County was on June 10th. The following week, on June 17th, a male and a female spotted wing were caught, at separate locations. And now, this week populations seem to be ramping up rather quickly, with 18 females and 2 males caught, at 6 separate locations. It is worth noting that this is still earlier than the first trap-catch of last summer.

These earlier trap catches may spell trouble for Door County tart cherry growers – in previous seasons the cherry harvest was finished before spotted wing drosophila populations reached damaging levels, but this year that is no longer the case. For this reason, it is especially important this summer to continue to monitor on your orchard, and to be aware of which insecticides are available to use if you do begin to trap any spotted wing. For more information about monitoring and controlling, please refer back to the article we published in the [previous issue of the Wisconsin Fruit News](#), pages 17-20.

Calendar of Events

July 7, 2016 – [WMARS Vineyard Walk](#)

West Madison Agricultural Research Station, 8502 Mineral Point Road, Verona, WI

July 12, 2016 – [WAGA Summer Field Day](#)

Apple Holler, Sturtevant, WI

July 14, 2016 – [PARS Vineyard Walk](#)

3:00 – 5:00 pm, Peninsular Agricultural Research Station, 4312 Hwy 42 North, Sturgeon Bay, WI

July 27, 2016 – WAGA Apple Field Day

Location TBD

August 10, 2016 – Cranberry Growers Summer Field Day

Brockway Cranberry, Black River Falls, WI

August 20, 2016 – Urban Horticulture Day

West Madison Agricultural Research Station, 8502 Mineral Point Road, Verona, WI

Useful Links:

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>

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

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

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

Soil and Forage Analysis Lab: <https://uwlabs.soils.wisc.edu/>

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

Edited by: Christelle Guédot, Entomology Specialist, UW-Madison and Amaya Atucha, Horticulture Specialist, UW-Madison. *Formatting by:* Janet van Zoeren, Fruit Crops Extension Intern, UW-Extension. Articles provided by other sources as attributed. Funding provided by the University of Wisconsin-Extension. *Email Questions to:* vanzoeren@wisc.edu.

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If you have any questions or comments about the Wisconsin Fruit News issues, please contact Janet van Zoeren: vanzoeren@wisc.edu.