Wisconsin Fruit News

Volume 1 Issue 10 – August 19, 2016

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Events this Week

August 31, 2016 -- WBGA Fall Field Day
Carandale Farm, 5683 Lincoln Rd, Oregon, 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 Aug 6, 2016 through Aug 18, 2016.

PLANT	DISEASE/ DISORDER	PATHOGEN	COUNTY
Blueberry	*Gloeosporium Leaf Spot and Stem Canker*	*Gloeosporium sp.*	*Dunn*
	Phomopsis Twig Blight/Canker	*Phomopsis sp.*	*Clark, Dunn*
	Ripe Rot	*Colletotrichum gloeosporioides*	*Clark*
Cherry	*Cherry Leaf Spot*	*Blumeriella jaapii*	*Dane*
Cranberry	*Early Rot*	*Phyllosticta vaccinia*	*Wood*
	Upright Dieback	*Phomopsis vaccinii*	*Monroe*
Pear	*Fire Blight*	*Erwinia amylovora*	*Dane*

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 (IDL) as being active in the state between Aug 5th and Aug 17th, 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.

-Japanese Beetles are still active and feeding on a variety of plants, including fruit trees and raspberries. Beetle pressure should begin to decline for the season in the next few weeks. For more information on Japanese Beetles, please see the Wisconsin Fruit News, Volume 1, Issue 8 (pages 6-7 and 17-18).

-Spotted Wing Drosophila is active and reports of damage on raspberries and blackberries have been coming in to the UW Insect Diagnostic Lab from across the state. Late season berry growers should be vigilant to check their fields for this insect.

-Gypsy Moth is typically thought of primarily as a pest of forest and urban trees, although this species can feed on fruit trees, such as apple, as well. Many reports of gypsy moth egg masses (beige and fuzzy in appearance; 1-2" long, see image at right) have recently come in to the UW Insect Diagnostic Lab. These eggs won't hatch until next spring, allowing growers time to keep an eye out for any egg masses on their trees. Pay particular attention if damage from gypsy moth caterpillars was noted on nearby landscape trees this spring and summer.

Gypsy moth egg masses. Photo by Ferenc Lakatos, University of West-Hungary, Bugwood.org.

Oblique-banded leaf roller adult (at left) and larva (at right). Photo credits: Cheryl Moorehead, Bugwood.org (adult) and Todd M. Gilligan and Marc E. Epstein, USDA APHIS ITP, Bugwood.org (larva).

-Oblique-Banded Leaf Roller A few images and specimens of adult oblique-banded leafroller adults have come in to the UW Insect Diagnostic Lab in recent days. The resulting second generation caterpillars have to potential to directly damage fruit.

-Yellowjackets and Paper Wasps are considered secondary pests that will show up to scavenge at damaged fruit. These insects start their colonies from scratch each year and build up over the course of the season. As a result, they are often most noticeable in late summer and early fall around the time of harvest. Reports of these insects have been increasing and are expected to increase through parts of October.

Unusual fruit crops for Wisconsin: Currants

By: Janet van Zoeren and Jason Fischbach

Many growers are looking to add new or unique fruits to their farm, as insurance against a bad year in the primary crop or as a way to increase offerings to pick-your-own customers. We will be running a series this fall on unusual and underutilized crops for the Wisconsin market. Black, red, and white currants are an easy to grow option, and could help diversify offerings to agritourists, as well as provide a unique ingredient for local jams, juices, or winemakers. They are very high in Vitamin C, and offer other potential nutritional benefits to the health-conscious consumer. In general, currants are cold-hardy, easy to grow, and well-suited to the growing conditions of Wisconsin. This is, in fact, to be expected, since many species of wild currants are native to Wisconsin woodlands.

Growing Conditions and Management

With excellent winter-hardiness and frost tolerance, a robust crop of currants can be expected every year, as long as the plants are properly cared for. Currants grow best in cool, moist conditions, and can thrive in full sun or partial shade, as long as it is not too hot or dry. The multi-stemmed bush sets fruit on "strigs", with each strig having 3-15 berries, depending on the cultivar. Long-strigged varieties like Rovada and Blanka are easier to harvest by hand and look better when sold fresh and on the strig. Most currant cultivars will have a sprawling growth habit, with perimeter stems nearly touching the ground in heavy fruiting years. For this reason, commercial currant production will require aggressive annual pruning or trellising to improve fruit presentation and aid in harvest. More information on fertilizing and pruning currants can be found on pages 3-4 of the Extension Publication "Growing Currants, Gooseberries, and Elderberries in Wisconsin".

Black currant fruit is positioned the length of the cane and in large bushes can be buried in the interior of the bush, making machine and hand harvesting difficult. Photo by Jason Fischbach.

As a native crop, currant has predominantly native insect pests, which are generally managed to below-economic threshold levels by native predators. Diseases can generally be avoided through proper pruning to maintain good airflow, and by being sure to buy virus-free rootstock from a reputable nursery. Many of the pests and diseases affecting cultivated currants are also present on the wild bushes, so it may be beneficial to remove nearby wild currants from woodlands or hedgerows, so those do not become a refuge to build up pest problems. Powdery mildew, the most frequently problematic disease in currants, can be controlled by buying cultivars which are resistant or tolerant to mildew.

One disease that has been a problem for currants is the white pine blister rust. This fungus alternates hosts between currants and white pine, and although it doesn't generally cause very much damage to the currant itself, it can be very destructive to white pine trees. For this reason, growing currants in Wisconsin was banned from the 1920s through the 1960s, and efforts were put in place to remove wild currants from pine woodlands. Many of the newest currant cultivars are resistant to white pine blister rust, and this disease is no longer at epidemic levels, so planting currants is now not only legal, but a great way to incorporate native plants into commercial fruit production!

Cultivars for Wisconsin Production

Jason Fischbach, the county extension agent in Bayfield and Ashland counties, has been assessing the yield, fruit quality, and consumer preference of some commercially available cultivars. Some of the cultivars he has had good luck with are listed below:

Comparing some red, white, and pink currant varieties. Photos by Jason Fischbach.

Red Jade (red) is an all-around good option, scoring as one of the best tasting of the red currants, and being fast to pick with medium yields. Ripens early-July.

JVT (red) is also considered one of the better red currants for fresh eating. However, the yield is lower than Red Jade, and it takes longer to harvest, due to having shorter strigs.

Comparing strig lengths of currant varieties. Photos by Jason Fischbach.

Pink Champagne (white) is high-yielding, attractive to look at, and has a sweet flavor making it appropriate for fresh markets. The main disadvantage of the Pink Champagne is that the smaller strigs take longer to harvest and overgrown bushes tend to have smaller individual berries. Commercial production of Pink Champagne will almost certainly require pruning and trellising to increase strig and berry size. Some disease resistance. Ripens mid-July.

Ben Sarek (black) is a vigorous, high-producing bush with resistance to both white pine blister rust and powdery mildew. Relatively upright plant. Berries are large and easy to pick. Good for jams, jellies and wine, but flavor may be too strong for the fresh market.

Titania (black) has a sweeter, and less acidic flavor than most black currants. Vigorous plants can withstand some frost. Resistant to white pine blister rust. Ripens mid-July. Stems tend to flop, making pruning and trellising beneficial.

Rovada (red) and **Blanka** (white) are high-yielding with long strigs, flavor is good for both with flavor improving well after veraison. Ripen late-July.

Uses and Benefits of Currants

Market demand for black currants is strong outside the USA, particularly in Europe, but is still limited in Wisconsin. However, currants offer excellent health benefits, containing high levels of Vitamin C and anthocyanins, which help with overall immune health. They are often used in value-added products, particularly wine, jam, and juice, which could represent a growing market demand in Wisconsin.

One potential pitfall to the viability of currants as a commercial crop in Wisconsin is the time necessary for harvesting by hand. Even at minimum wage, this cost can add up quickly. For this reason, Jason Fischbach has also been looking at the potential for mechanical harvesting of currants with a blueberry harvester. His research results and a discussion of currant harvest will be the subject of another article, to be published in this newsletter later this fall.

Strawberry Rootworm

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

Now that strawberries have been harvested, and there are lots of other crops demanding so much attention, it may be tempting to ignore those strawberry plots. But, a little bit of monitoring and management this time of year could really pay off next spring. Strawberry rootworm is a sporadic pest, and initially can be easily overlooked. However, like most insects, populations can quickly build up to reach concerning levels. Being aware of sporadic pests and scouting once or twice over the summer can ensure a problem does not arise in the near future. August is the best time to monitor for strawberry rootworm, since this is when the second generation of adults feeds on strawberry leaves.

Strawberry rootworm adult and damage (small round holes in leaf). Photo by David Handley, University of Maine.

Identification and life cycle: In the spring, adult strawberry rootworm females lay eggs in the soil or on leaves near the base of the strawberry plant. The larvae hatch into white grubs with brown spots, which feed underground on the roots of the strawberry plant. After about 2 months of feeding, they pupate and emerge as adults in mid-summer, around August. The 1/8-inch-long, shiny metallic dark-brown or black adults cause the most damage, feeding on strawberry leaves. They will continue to feed until temperatures begin to drop in late-fall, and then will overwinter in mulch or soil crevices, until they emerge again next May or June to lay the next generation of eggs.

Damage symptoms and monitoring: The most significant damage to strawberry plants from the strawberry rootworm is caused by the leaf-feeding adult beetles, both in spring and again in the late summer. Adults feed on the leaves, creating round holes or eventually skeletonizing leaves. At high densities this can greatly reduce the photosynthetic capabilities of the plant. Additionally, the larvae feed on roots of strawberry, and although they generally do not cause significant damage on their own, they can stunt growth and further weaken the plant, causing it to succumb more quickly to adult feeding.

If you suspect strawberry rootworm damage, now is the time to be scouting! Because adults feed at night, it is best to scout at night with a flashlight, looking for the metallic adult beetles. The most effective way to scout is to place a white sheet or tarp under each plant, then at night tap the plant and count the beetles that fall off onto the sheet. If you find 10-20 beetles per square foot, control measures should be taken. It is also possible to monitor with white sticky cards.

Cultural and chemical controls: **Cultural control** The most effective way to keep strawberry rootworm populations below economic thresholds is by periodically plowing up strawberry fields, and rotating these with other crops. If you find above-threshold numbers of beetles this fall, it may be a good idea to renovate this fall. It is also important to ensure the new rootstock is pest free, and from a reputable nursery. General tidiness, such as removing plant litter and overwintering habitats from surrounding areas, can often also help keep pest populations low.

Biological control There are currently no biocontrol agents known to be effective against strawberry rootworm.

Chemical control Chemical controls are rarely necessary for strawberry rootworm, and if used unnecessarily may remove beneficial predators, leading to outbreaks of other strawberry pests. Therefore, it is recommended to only spray for this pest if you have reached the 10-20 beetles per square foot threshold. If you do need to spray, the Midwest Small Fruit and Grape Spray Guide does not specifically address strawberry rootworm, but the following insecticides labeled for other insect pests in strawberry are likely to also control this pest as well:

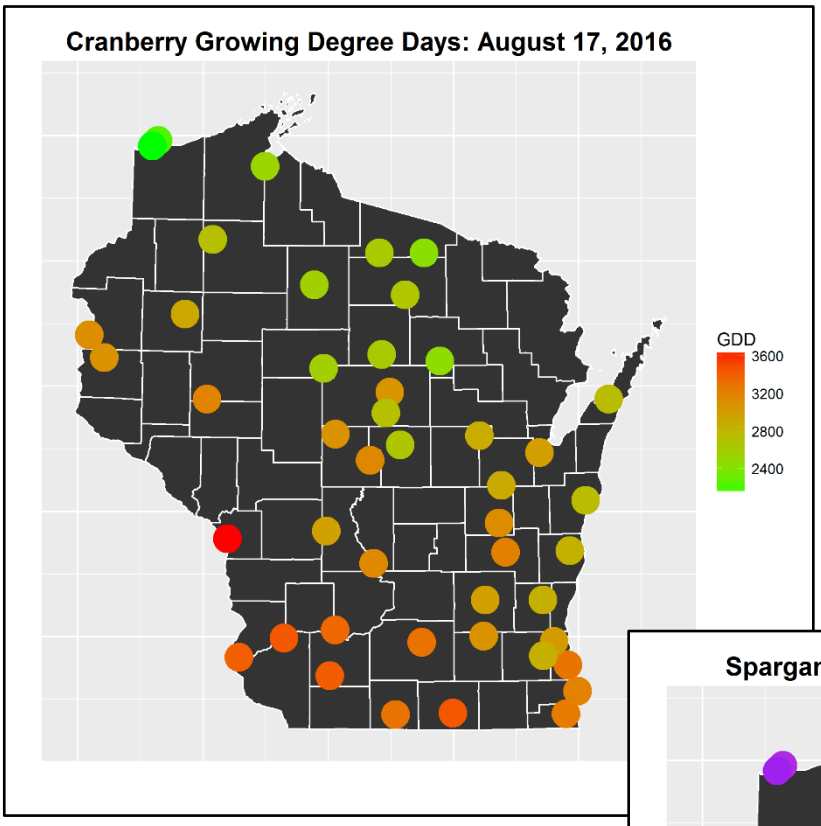
Product Name	Mode of Action	REI	PHI
Danitol 2.4 EC	Fenpropathrin (3A)	24 hours	2 days
Sevin XLR Plus	Carbaryl (1A)	12 hours	7 day
Rimon 0.83 EC	Novaluron (15)	12 hours	1 day
Brigade WSB	Bifenthrin (3A)	12 hours	0 days
Assail 30 SG	Acetamiprid (4A)	12 hours	1 days
Endosulfan 3 EC	Endosulfan (2A)	7 days	7 days

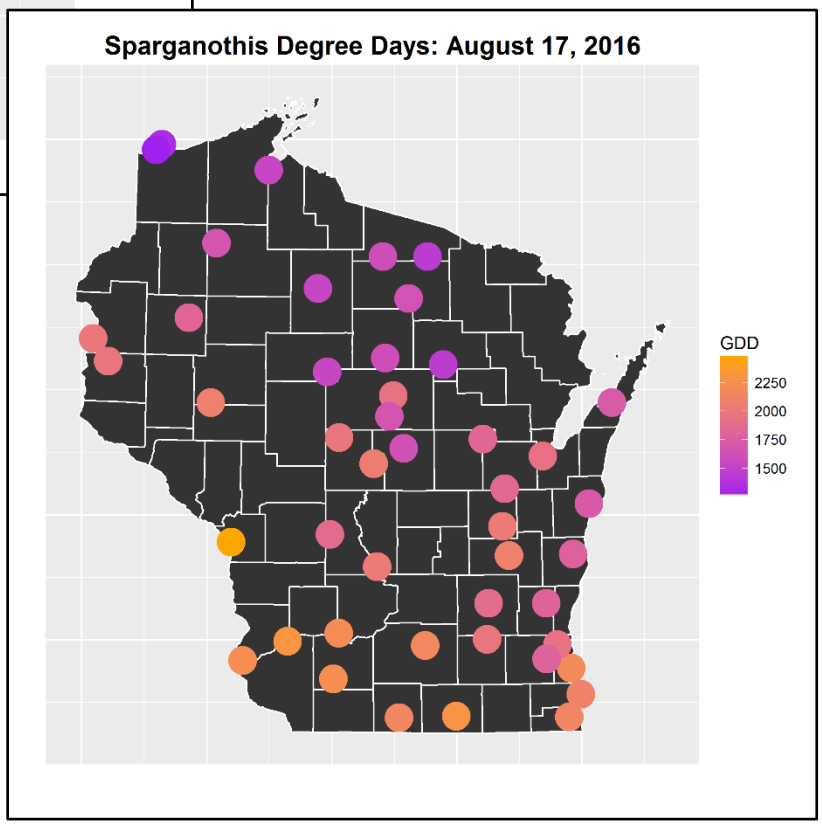
IRAC Code = Insecticide Resistance Action Committee Mode of Action group **RR** = reduced risk

Cranberry Degree-Day Map and Update: as of August 17, 2016

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

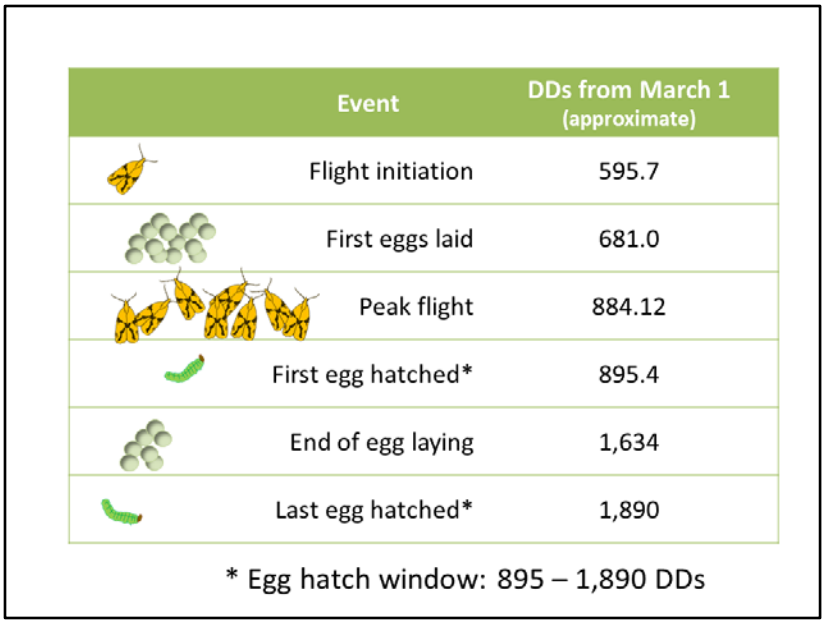
The maps below show degree-day accumulations for cranberry plants and *Sparganothis* fruitworm across Wisconsin up through August 17, 2016. Temperature thresholds used for these calculations are 41 and 85 °F for the plant, and 50 and 86 °F for *Sparganothis*.





Plant DDs throughout WI range from 2,123-3,668. The central WI growing region has accumulated around 3,200 DD, while the northern WI growing region has accumulated around 2,600 DD.

Throughout WI, *Sparganothis* degree-days range from 1,255-2,461 DD. In central WI, *Sparganothis* DDs are around 2,100, while in northern WI, *Sparganothis* DDs are about 1,600. See the image below for life history benchmarks of interest for *Sparganothis* fruitworm and the associated degree-day estimates for each benchmark (Deutsch et al. 2014). In central WI, larval emergence is complete.



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

Aug 17	Cranberry Growing Degree Days			Sparganothis Degree Days		
	2014	2015	2016	2014	2015	2016
Central WI (Wisconsin Rapids)	2,815	3,103	3,171	1,783	1,977	2,056
Northern WI (Minocqua)	2,431	2,527	2,631	1,484	1,501	1,612

Deutsch, A. E., C. R. Rodriguez-Saona, V. Kyryczenko-Roth, J. Sojka, J. E. Zalapa, and S. A. Steffan. 2014. Degree-Day Benchmarks for *Sparganothis sulfureana* Development in Cranberries. Journal of Economic Entomology 107 (6): 2130-2136.

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 August 10th, 2016 issue of the Cranberry Crop Management Journal you will find information about: timing of insecticide applications, potassium management, observations from the field, atmospheric nitrogen fixation, and grower updates.

Grape disease update

By: David S. Jones and Patty McManus

PARS (Sturgeon Bay): As of August 15th we had accumulated 1582 GDD (base 50) and have recorded 2 rain events in the past two weeks. This region has dried out significantly over the past weeks, with high temperatures in the 70s and 80s. Powdery mildew has developed rapidly at PARS in the past two weeks. Unlike many other diseases that we have discussed during the growing season, such as black rot and downy mildew, powdery mildew favors periods of warm, humid weather with minimal rain. Brianna, Leon Millot, Marechal Foch, and LaCrosse are most severely damaged at this time. Early infections have also been found on Valiant, Frontenac, and Frontenac gris.

Downy mildew has continued to cause damage on LaCrosse, LaCrescent, and Valiant. Minor damage can also be seen Brianna and St. Croix at this time. Frontenac, Frontenac gris, and Marquette can occasionally be found with isolated downy mildew lesions, but damage is extremely minimal at this time. No fruit of any cultivar except for Valiant has been destroyed by downy mildew at this time.

WMARS (Madison): As of August 16th we had accumulated 2027 GDD (base 50) and have recorded 4 rain events in the past two weeks. We are quickly approaching harvest at this site, beginning with Brianna harvest scheduled to occur in the next 7-14 days. As berries ripen and soften we have seen an uptick in phomopsis fruit rot, which will be discussed below.

Downy mildew damage is extremely severe on LaCrosse, LaCrescent, Valiant, St. Croix, and Brianna at this time. Frontenac, Frontenac gris, and Marquette remain overwhelmingly undamaged by this disease.

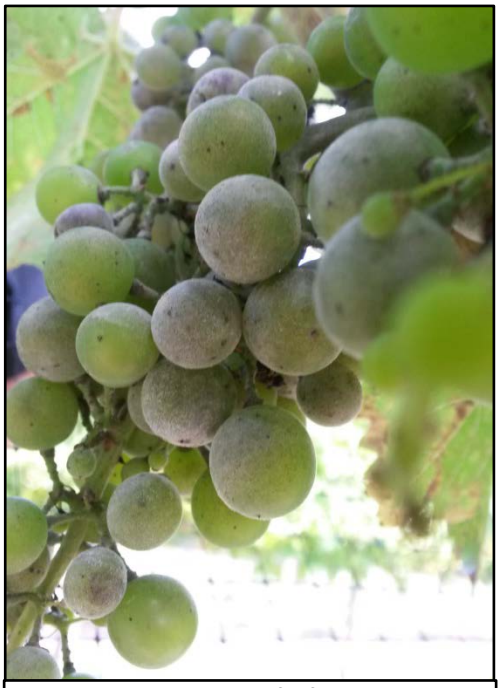
Unlike PARS, we have not seen powdery mildew take off in the past two weeks. While isolated infections can be found, damage is minimal at this time. This difference is likely due to differences in environmental conditions between the two regions. Weather has been wetter in Madison over the past two weeks, and powdery mildew is favored by periods of warm, humid, dry weather. Unlike many other fungal pathogens, powdery mildew spores do not need a film of water in order to germinate, so they are able to cause severe damage in conditions that do not normally favor fungal development.

Grape berries with early powdery mildew infections. Note the grey, web-like patterns on many of the berries. This web-like pattern is a result of cell death due to poor epidermal expansion of infected cells during berry growth and development (Photo by D.S. Jones).

Disease Discussion:

Powdery Mildew: Powdery mildew causes different symptoms on leaves, stems and fruit. For this reason, it is important to familiarize yourself with the symptoms of this disease on all parts of the vine as you scout in upcoming weeks.

Even if berries seem undamaged by the disease, rachis tissue can often be heavily damaged by the pathogen. Note the black-brown webbing on the stem. This webbing is also the result of cell death due to poor epidermal expansion of infected cells (Photo by D.S. Jones).



Berries in later stages of infection become entirely covered in powdery white conidia (spores). The grey, web-like pattern can still be seen underneath (Photo by D.S. Jones).

Left: black-brown web-like pattern characteristic of powdery mildew infection on green canes. Right: black-brown web pattern on seasoned wood late in the fall (Photos by D.S. Jones).

Powdery mildew infection on the upper surface of a Frontenac leaf. Remember that downy mildew will never sporulate on the upper surface of a leaf, so this is one reliable way to tell the difference between powdery and downy mildew (Photo by D.S. Jones).

Early powdery mildew infection on the upper surface of a Frontenac leaf (Photo by D.S. Jones).

Phomopsis fruit rot (Phomopsis cane and leaf spot):

What is phomopsis fruit rot?

Phomopsis fruit rot is a disease caused by the fungal pathogen *Phomopsis viticola*. This disease is typically called Phomopsis cane and leaf spot, and this is the name most commonly given in Extension literature. Fruit are most susceptible between bloom and approximately pea sized fruit development, while foliage is most susceptible shortly after bud break until shoots are roughly greater than 1.5 feet in length. While infections can occur throughout the remainder of the year, early season is the peak time for controlling this pathogen.

What does Phomopsis fruit rot look like?

Phomopsis fruit rot damage is most frequently mistaken for black rot at this time of year. Like black rot, phomopsis causes a shriveling of berries that is accompanied by the development of small black "pimples" called pycnidia. These are asexual fruiting bodies of the fungus. Unlike black rot however, phomopsis only damages and destroys fruits during the ripening process following veraison. In contrast, black rot damages and destroys berries during sizing and development, typically prior to veraison.

Phomopsis fruit rot is also often accompanied by the cane and leaf spots, which are pictured below. If cane and leaf spots are present with fruits displaying phomopsis fruit rot symptoms, this can be a useful clue for identification as you scout.

Above: Phomopsis cane spot on St. Croix canes in mid-July. Note the elongated, cracked lesions with black-purple edges and brown centers (Photos by D.S. Jones).

At left: phomopsis leaf spot lesions on the petiole and leaf surface of a St. Croix leaf in early spring.

Phomopsis commonly causes a death of the "side arm" of the rachis. Note the brown, curled portion of the rachis in this image (Photo by D.S. Jones).

Later in the season, dead rachises commonly fall off, leaving a small scar behind (Photo by D.S. Jones).

Withered berry covered in phomopsis pycnidia (Photo by D.S. Jones).

Above: rachis death caused by phomopsis cane and leaf spot (Photo by D.S. Jones).

What do I do if I notice that my vines are damaged by phomopsis fruit rot?

If you are noticing phomopsis fruit rot right now, the appropriate window for management has already passed. Like black rot, it is likely that the infections that you are now seeing occurred during or shortly following bloom. Phomopsis goes through a period of inactivity following fruit infection and becomes active as fruit ripens. However, it is a good idea to flag areas that have had problems with phomopsis fruit rot with bright flagging tape so that you can come back after the growing season and remove any mummified fruits or infected rachises that may be left on vines.

How do I prevent future problems with phomopsis cane and leaf spot/fruit rot?

Dormant season applications of lime sulfur are effective in reducing the number of viable overwintering phomopsis pycnidia. Infections present in cordon or spur tissue will have asexual structures filled with spores that are the overwintering form of the pathogen. Reducing the number of pycnidia present during the winter months will mean fewer spores in the spring, leading to reduced risk of infections. Note that lime sulfur products can cause phytotoxicity on green foliage, and should only be applied during the dormant season.

In the spring, applications against phomopsis should begin when shoots are between one and three inches in length. These early applications protect young shoots against the cane and leaf spot damage caused by the pathogen. Applications should continue through 4-5 weeks following bloom. The bloom window is critical in protecting the fruit from phomopsis fruit rot. While phomopsis infections can occur later in the season, berries are most susceptible inside of this window, and the overwintering spores become largely depleted after several weeks in the early growing season, reducing the risk of later season infections significantly.

Captan and mancozeb are both highly effective in managing phomopsis cane and leaf spot. Note that mancozeb has a 66-day pre-harvest interval. Ziram and Topsin M are both moderately effective in managing phomopsis.

Pristine, Flint, and other strobulurin or pre-mixed strobulurin products are listed in the Midwest Fruit Pest Management Guide for management of phomopsis cane and leaf spot, but remember that many these products might cause phytotoxicity problems on our cold-climate grape hybrids. Sovran, one of the products that does NOT cause phytotoxicity problems, is only slightly effective in controlling phomopsis cane and leaf spot.

While Ridomil Gold MZ and Ridomil Gold Copper provide excellent downy mildew control and moderate black rot control, they are only slightly effective against phomopsis and make poor choices for sprays specifically targeted at this pathogen. These products also have a 66-day pre-harvest interval.

For the full list of fungicide efficacy against phomopsis cane and leaf spot, please see pages 93-94 of the 2016 Midwest Fruit Pest Management Guide.

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://uwlab.soils.wisc.edu/fees/

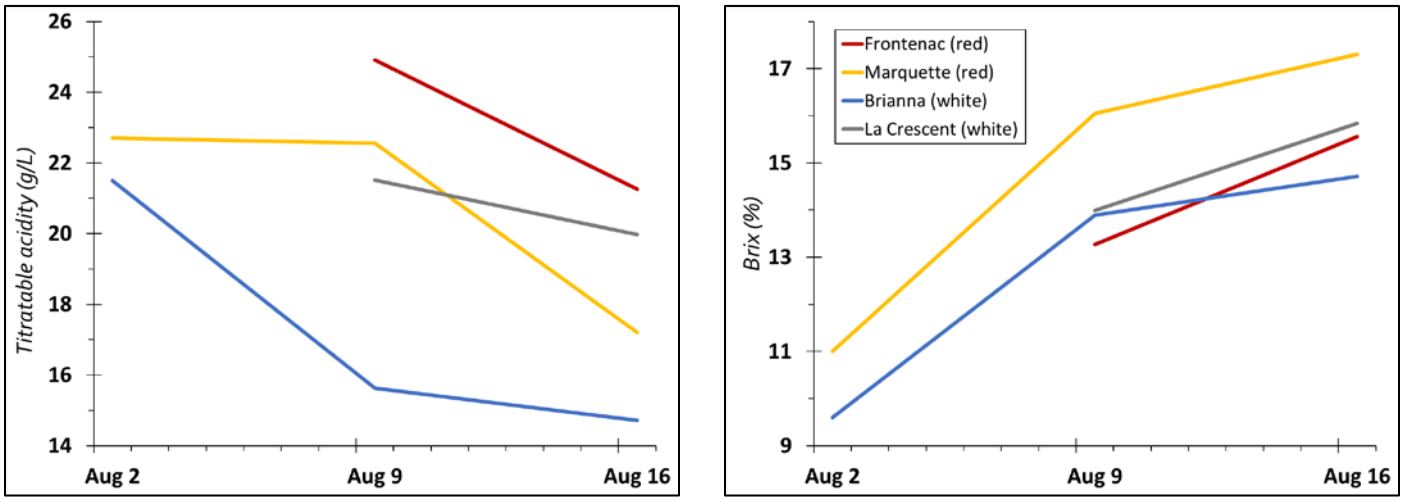
Wine and Table Grape Developmental Stages

By: Janet van Zoeren, Annie Deutsch, Madeline Wimmer, and Amaya Atucha – UW-Extension

We are nearing harvest at the West Madison Agricultural Research Station (WMARS), especially at some of the earlier ripening varieties such as Brianna and Marquette. Sugar (Brix) and TA (titratable acidity) concentration in berries as of August 16th are shown in the chart and graphs below.

Aug 16, 2016 **Grape Brix and Titratable Acidity (TA)**

Grape Variety (Reds)	Brix (%)	TA (g/L)
Frontenac	15.6	21.3
Marquette	17.3	17.2
Grape Variety (Whites)		
Brianna	14.7	10.6
La Crescent	15.8	20.0



Titratable acidity (above) and Brix (to right) of grapes at WMARS.

At the Peninsular Agricultural Research Station (PARS), development is a little over two weeks behind central Wisconsin. We will begin sampling TA and Brix from berries at PARS this coming week, and will include that information in the next newsletter.

Following photos taken on August 16th at West Madison Agricultural Research Station.

Brianna at WMARS; "berries not quite ripe" E-L number = 37

La Crescent at WMARS; "berries with intermediate sugar content" E-L number = 36

La Crosse at WMARS; "berries with intermediate sugar content" E-L number = 36

St. Croix at WMARS; "berries not quite ripe" E-L number = 37

Frontenac at WMARS; "berries with intermediate sugar content" E-L number = 36

Marquette at WMARS; "berries not quite ripe" E-L number = 37

Somerset at WMARS; "berries not quite ripe" E-L number = 37

Einset at WMARS; "berries not quite ripe" E-L number = 37

Following photos taken on August 17th at the Peninsular Agricultural Research Station.

Brianna at PARS; "berries begin to enlarge" E-L number = 35

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

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

Marquette at PARS; "berries begin to enlarge" E-L number = 35

Frontenac at PARS; "bunch closed, berries hard and green" E-L number = 33

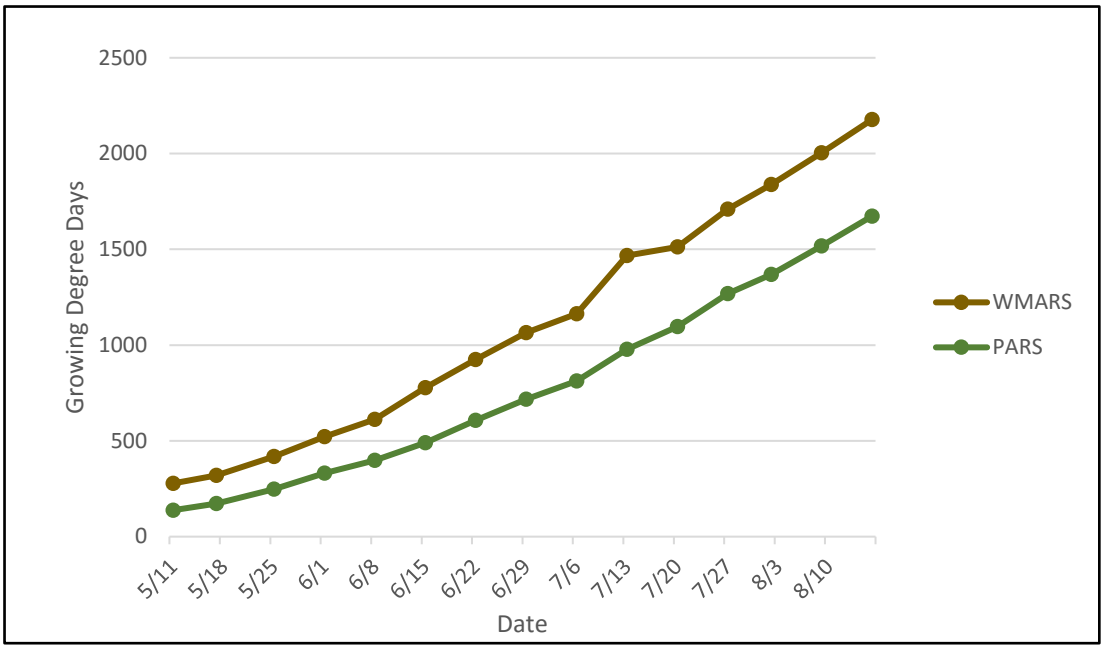
St. Croix at PARS; "berries begin to soften" E-L number = 34

The growing degree day accumulations as of August 16th for this year are: 2,177 GDD at WMARS and 1,673 GDD at PARS. As can be seen in the graph below, the difference in degree day accumulations between PARS and WMARS continues to widen as summer goes on, indicating that WMARS berries will ripen most likely at least two weeks before PARS berries. All growing degree days are calculated using a base of 50°F.

Grape Growing Degree Days

April 1 - Aug 16, 2016

	2106	2015
WMARS	2177	2090
PARS	1673	1577

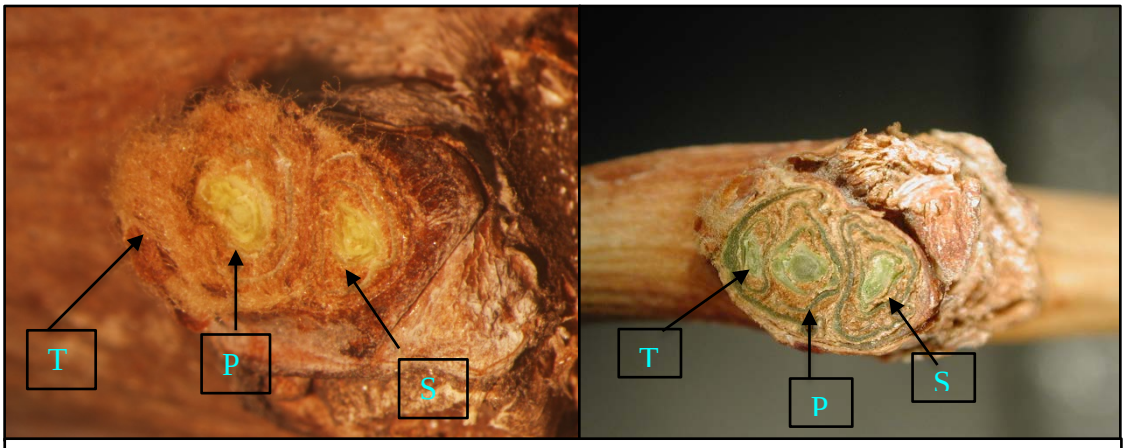


Ripening process of grapes in primary and secondary shoots as a result of the spring frost

By: Madeline Wimmer and Amaya Atucha, UW-Madison Department of Horticulture

Spring 2016 has certainly reminded us of how climate change has and will continue to challenge grape production in Wisconsin. The late spring frost we experienced in mid-May affected several areas throughout the state and resulted in various degrees of damage to new shoots and inflorescences in grapevines. The degree of damage ranged from just a few leaves to entire shoots. Several factors may affect the severity of a spring frost events: vine age, cultivar, phenological stage of vines, lowest temperature reached during the frost event, extent of time that temperatures stayed below freezing, the slope of the vineyard site (how easily cold air could drain away from the growing area), the height of the cordon, etc.

The damage observed after a late spring frost to actively growing shoots is a pretty depressing view, after so much work and resources are devoted to maintaining the vineyards. However, grapevines have compound buds (see image on next page), which consists of three growing points each capable of growing a shoot. These three growing points within one bud are usually referred to as the primary, secondary, and tertiary buds. The primary bud is the largest and most fruitful of the three buds, and is the first one to break during bud burst. The secondary bud may also bear fruit and breaks after the primary shoot. In some cultivars, the secondary shoot can be seen growing out of the same node as the actively growing primary shoot, whereas in other cultivars secondary buds will only break if the primary bud/shoot has been damaged. If both primary and secondary buds are damaged, either due to extreme low temperatures during fall and winter or due to spring frosts, a tertiary shoot will develop. While tertiary shoots do not carry inflorescences and will not bear fruit, the vegetative shoots will allow growers to keep vines alive and retrain them for the following growing season. So, while the complications of a late spring frost, like the one we experienced last May, make the management of vines much complicated due to the different types of shoots as well as timing of fruit ripening, at least there is hope to recover fruit from late growing secondary shoots and maintain the life of the grapevines.



Above: Compound bud of grape vines contains a primary (P), secondary (S), and tertiary bud (T). Photo credit: Jean Reisterer-Loper and Harold Larsen.

This year, Dr. Atucha's fruit lab at University of Wisconsin-Madison is tracking a small sample of Marquette grapevines from a commercial vineyard in Vernon County, Wisconsin, which experienced 40-80% primary shoot frost kill in May. As a result of the damage, these grapevines have a combination of primary and secondary shoots both bearing fruit, and the differences in fruit development between fruit from primary and secondary shoots are substantial. When fruit on primary shoots achieved veraison, the fruit on the secondary shoots was still green and far behind. Yet beyond looking at color, how can we tell the extent to which secondary fruit is behind in development? To answer this question, we are tracking the ripening process of fruit from primary and secondary fruits by measuring the concentration of soluble solids or sugar content (brix) and total acid content (titrateable acidity g/L).

The results from two weeks of analysis are listed in the table below:

Table 1.1 Marquette primary & secondary fruit analysis 2016

	Primary Fruit		**Secondary Fruit**	
	Soluble Solids (Brix)	TA (g/L)	Soluble Solids (Brix)	TA (g/L)
8/6/16	13.1	25.04	5.3	38.44
8/12/16	16.6	22.50	7.6	30.34

To no surprise, soluble solids concentration of grapes collected from secondary shoots was about half of the soluble solids concentration in fruit from primary shoots. The opposite trend was observed for total acidity. At this point most growers are wondering if the fruit from secondary shoots will be able to catch up with those of primary shoots, and if they will be able to harvest those grapes at the desired fruit quality. If the weather holds, and we have a dry and warm fall as we did in 2015, it is possible that grapes on secondary shoot will ripen before the first fall frost. However, if growers have fruit on primary and secondary shoots they will have to harvest them at different times, given that fruit from primary shoots will ripen earlier than those on secondary shoots.

We will continue to report on fruit quality for fruit in both primary and secondary shoots as the harvest season progresses.

Reduced-risk insecticide profile: Rimon

By: Christelle Guédot, University of Wisconsin, Entomology

Insecticide: Rimon

- Available as 0.83EC (0.83 lb. AI, Emulsifiable Concentrate)
- Restricted re-entry interval (**REI**): 12hours
- Pre-harvest interval (**PHI**): 14 days for pome and 8 days for stone fruits
- Do not exceed a total of 150 oz. per acre per year
- Rate of use per acre: 15 – 50 fl. oz. depending on crop and pest
- Minimum interval between applications is 10 days for pome and 7 days for stone fruits

Rimon is registered for use in Wisconsin on pome fruits, except pear, as well as on stone fruits, including apricot, cherry (sweet and tart), nectarine, peach, plum, and prune plum. It is marketed by Adama, formerly known as MANA Inc., under the formulation 0.83EC (0.83 lb. of active ingredient per gallon as an Emulsifiable Concentrate). Rimon is an insect growth regulator in the class of the benzoylureas (IRAC group 15), which are inhibitors of the chitin synthesis. Rimon contains the active ingredient novaluron. Novaluron disrupts the formation and deposition of the insect cuticle that occur during molting. This disruption will result in the insect death. This mode of action effects the insect immatures, and Rimon has no direct effect on adult insects. Rimon is active through ingestion of treated plants and/or direct contact with the immature pest life stages.

Rimon is registered for control of budmoths, codling moth, leafminers, leafrollers, oriental fruitmoth, and peach twig borer, and suppression of plant bug and white leaf hopper.

Rimon is best used by timing applications with degree days for specific insect pests to target the optimal immature life stages. See the label for specific recommendations on timing of applications. Optimal protection will occur when applications are initiated at the beginning of egg laying.

Rimon may provide up to 14 days of protection depending on application rate and the growth rate of foliage and fruit.

Rimon may be applied by ground equipment, chemigation, and by air (see label for specific application regulations). Use restrictions for ground applications on all crops: do not apply within 75 feet of bodies of water and all applications must include a 25-foot vegetative buffer strip within the buffer zone to decrease runoff.

Be aware that the use of adjuvants/surfactants is prohibited on stone fruits.

Because of its mode of action Rimon is not likely to affect adult bees. As a precaution, avoid applying any pesticide during bloom when bees are flying.

Rimon is toxic to freshwater and estuarine marine invertebrates and must not be applied directly to water or to areas where surface water is present. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas. See label for more on environmental hazards and ways to mitigate water contamination.

As always, make sure to read the label before using any pesticide. You can find the label of Rimon at the following link: fs1.agrian.com/pdfs/**Rimon**_0.83EC_012062510_**Label**4r.pdf

Preharvest fruit drop control in apple orchards

By: Amaya Atucha, UW-Extension State Specialist

Preharvest fruit drop can account for 5 to 30% of the crop in certain apples varieties. As apples mature they produce a high amount of the ripening hormone ethylene, which stimulates the production of enzymes that breakdown the walls of cell in the abscission zone, causing fruit to drop. Unfortunately, this process is irreversible and once the enzymes begin breaking down the cell walls in the abscission zone there is no way back as the fruit stems loosen and the fruit rapidly drops. Plant stress can increase the severity of fruit drop, in particular stress factors such as pest infestation, nutrient deficiencies or imbalances, heavy summer pruning, and water/heat stress.

There are several options to manage fruit drop, and although they are not 100% effective all the time, if implemented properly they can help reduce the amount of fruit drop. It is important to identify the varieties and the blocks where fruit drop is most severe, and monitor them frequently so that drop control can be implemented on time.

Drop control using plant growth regulators

Several plant growth regulators are registered for apples to control preharvest drop. NAA (naphthalene acetic acid), ReTain (aminoethoxyvinylglycine), and Harvista (1-mcp) are all effective at controlling drop, although they differ substantially in their mode of action and timing of application, as well as their effect on fruit.

A) NAA: is a synthetic auxin growth regulator that prevents the action of enzymes responsible for the formation of the abscission zone. Fruit treated with NAA will continue their ripening process normally, however in some cases it may be accelerated. The optimal time to apply NAA is 7 days before harvest or right before the first fruit drops, thus it is considered a "rescue" treatment. NAA is effective for 7-10 days after spraying, and the ideal condition for spraying are temperature in the mid 70's. A second application can be made 7 days after the first one to extend the drop control period. Concentration of 10 ppm NAA are effective in controlling drop, and two application of 10 ppm 5 days apart can extend the drop control window for 2 weeks after the first application (however, multiple application of NAA will accelerate fruit ripening, resulting in soft fruit). NAA should be applied in a dilute spray with plenty of water and ensuring good coverage, addition of a non-ionic or organosilicone surfactant is recommended.

B) ReTain: the active ingredient is aminoethoxyvinylglycine (AVG), and it stops fruit drop by binding to an enzyme that blocks ethylene production. As a consequence, fruit ripening is delayed and starch degradation and color development, in red cultivars, is slowed down. ReTain is more effective than NAA for stop drop control. However, it is more expensive and timing the application is more challenging than with NAA. Based on the label recommendation, ReTain should be applied 4 weeks before anticipated harvest, which is just before the rise in ethylene production. In hot years the recommendation is to spray ReTain 4 weeks before the anticipated harvest, and in normal or cool years 3 weeks before harvest has shown best results. Similar to NAA, good coverage is needed to ensure maximum effectiveness of the product, and addition of an organosilicone surfactant (Silwet L-77 or Sylgard 309 at 12 oz per 100 gallons) is also recommended. The recommended ReTain application rate is 17 oz/100 gallons for high ethylene producing varieties such as McIntosh and Macoun, and 6.0 to 7.5 oz/100 gallons for less sensitive varieties such as Gala.

C) Retain+NAA: The combination of both products has shown to be more effective than the individual products. In addition, the combination of ReTain and NAA does not reduce fruit quality as NAA alone does. We recommend one application of half rate of ReTain+10ppm of NAA+ organosilicon surfactant, and a second application 2 weeks after the first application of full rate of ReTain+10ppm of NAA+ organosilicone surfactant.

D) Harvista: active ingredient is 1-methylcyclopropene (1-mcp). It binds to the ethylene receptors in the cell membrane so that even when the fruit is producing ethylene there is no response to it because the receptors are blocked. Fruit ripening is delayed and starch degradation, fruit color and watercore onset are delayed. In addition, 1-mcp preserves fruit firmness during storage. Harvista can be applied 7 to 3 days before harvest, which allows fruit to ripen normally and achieve the desired fruit quality characteristics.

Calendar of Events

UPCOMING EVENTS:

August 31, 2016 -- WBGA Fall Field Day
Carandale Farm, 5683 Lincoln Rd, Oregon, WI

September 7, 2016 – WMARS Vineyard Walk
West Madison Agricultural Research Station, 8502 Mineral Point Road, Verona, WI

September 23-25, 2016 – Warrens Cranberry Festival
Warrens, 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://uwlab.soils.wisc.edu/

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

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