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

Wisconsin Fruit News

Volume 2, Issue 11 – September 1, 2017

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General Information

UW Insect Diagnostic Lab—Fruit Insect Report: August 31st, 2017

By: PJ Liesch

Below is the fruit insect report from the past two weeks:

Reports suggest that **Japanese beetle** pressure is finally starting to taper off for the year. This insect has been particularly destructive in the southern two thirds of the state this year and growers should continue to monitor for additional beetles if high numbers have been observed the past few weeks.

Fall webworms have been popping up throughout the state the past few weeks. The silken tents are quite obvious in southern portions of the state. Farther north, caterpillars are small, so thorough scouting can help prevent issues before significant damage occurs.

Several samples of apples with **codling moth** caterpillar damage have recently come in to the UW Insect Diagnostic Lab. These have typically been from backyard growers that had not been using monitoring traps for this pest.

Brown marmorated stink bug eggs and first instar nymphs on a raspberry leaf.

Many **stink bug** samples have come into the UW Insect Diagnostic Lab recently. Nymphs (juveniles) of the **green stink bug** have been spotted in southern Wisconsin for several weeks. Recent cases have found small nymphs in the northern part of the state, including Bayfield county. **Brown Marmorated Stink Bug** eggs and nymphs were recently confirmed from a raspberry patch in Waukesha county after a physical specimen was sent in. Few reports of nymphs have occurred this year, but the find suggests potential issues for berry growers in coming years. Sightings of adults Brown Marmorated Stink Bugs are expected to increase dramatically in the coming weeks as the adult stink bugs attempt to move into homes when seeking overwintering spots.

We're approaching the peak period for **yellowjackets** and **paper wasps** throughout the state. While these insects typically won't damage sound fruit, they can be common opportunistic scavengers of compromised fruits. Activity is likely going to be conspicuous into October before colonies die out for the year.

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 12, 2017 through Aug 25, 2017.

PLANT/ SAMPLE TYPE	DISEASE/ DISORDER	PATHOGEN	COUNTY
Apple	Apple Scab	Venturia inaequalis	Eau Claire
	Blister Spot	Pseudomonas syringae pv. papulans	Lafayette
	Cedar-Apple Rust	Gymnosporangium juniperi-virginianae	Racine
	Cytospora Canker	Cytospora sp.	Eau Claire
	Nectria/Tubercularia Canker	Tubercularia sp.	Eau Claire
	Root/Crown Rot	Phytophthora sp.	Dane
Grape	Black Rot	Phyllosticta ampelicida	Columbia
Pear	Pear Scab	Venturia pirina	Eau Claire

For additional information on plant diseases and their control, visit the PDDC website at pddc.wisc.edu. Follow the clinic on Facebook and Twitter @UWPDDC.

Berry Crops

Picnic/sap beetles

By: Christelle Guédot, UW – Madison Fruit Crop Entomology and Extension

Common name: Picnic beetles, also called sap beetles
Order: Coleoptera
Family: Nitidulidae
Scientific Name: *Glischrochilus* spp. and *Stelidota* spp.

Picnic beetle adult. BugGuide Photo by Joe Schuller.

Picnic beetles, also called sap beetles, are a complex of over 180 species of beetles that feed on damaged, overripe, or decomposing fruits and vegetables. Most of them are small (1/8" to ¼" long) and oval. An important identifying characteristic for sap beetles is the clubbed antennae (knob at the end of the antennae) on the adult beetles. The eggs are small, ~1/25" long, milky white, and are laid within plant matter. Larvae are less than ¼" long, white (turning pale yellow when mature) with a light brown head.

Life Cycle

Sap beetles overwinter as adults in plant cover near the soil. They emerge in the spring, feed on fungi, pollen, sap or decaying matter, and lay eggs. Larvae feed for about three weeks and emerge as adults in mid-summer. Adults fly into fruit and vegetable plantings from wooded areas at about the time berries begin to ripen. Strawberry sap beetle (*Stelidota geminata*) overwintering adults fly into strawberries planting from wooded areas, feed on berries, sometimes in groups, and females lay eggs on the injured fruit. In general, there is only one generation per year for sap beetles.

Damage

Sap beetles chew deep cavities in ripe berries and this injury may lead to colonization by pathogens. Sap beetles can directly damage fruits and vegetables. Overripe fruit is very attractive to sap beetles, and often they can be found on previously damaged or diseased fruits. The feeding by sap beetles makes fruit unmarketable and the beetles themselves can contaminate harvested fruits. Pick your own operations may suffer greater damage where pickers leave large numbers of ripe and over-ripe fruit in the field. Late maturing varieties of raspberry are more vulnerable as populations of sap beetles continue to increase throughout the summer.

Cultural control

Practicing sanitation by removing overripe, damaged, and diseased berries from a planting and frequent and complete picking will decrease the attractiveness of the planting. Culled fruit can be buried deep in the soil or destroyed to eliminate attractant chemicals and reduce food sources for picnic beetles.

Mechanical control

Trapping with buckets baited with over-ripe fruit can be effective at reducing beetle populations. Place traps outside field borders, especially near woodland edges, as the crop begins to ripen to intercept adults moving into the planting from outside areas. Other baits include stale beer, vinegar, and molasses-yeast-water mixture. Trapped beetles should be discarded often (every 3-4 days) and traps rebaited.

Chemical control

If the use of an insecticide is warranted, ensure penetration of the canopy and be aware of preharvest intervals as these insects are present when fruit is ripening and ripe. Insecticides recommended for controlling strawberry sap beetles include Assail, Brigade, Danitol, and Rimon. All product recommendations can be found in the 2017 Midwest Fruit Pest Management Guide. Additionally, you should always fully read and follow the label before spraying any pesticide.

Spotted wing drosophila update

By: Benjamin Jaffe, Janet van Zoeren, Matt Kamiyama and Christelle Guédot

As we move into fall, with fall-bearing raspberry season beginning and harvest-season taking attention away from other farm maintenance, now is a good time to discuss preliminary findings from some research we have been conducting on spotted wing drosophila (SWD) biology, as well as to remind you of recent research findings and management recommendations for SWD control.

2017 Phenology

Continuing the trend that we have been seeing in recent years, our first SWD trap catch in 2017 was earlier than we have seen in previous years. In Dane County this year, we first found SWD in the traps on June 5, 2017. This is more than two weeks earlier than our first trap catch last year (June 23, 2016), and over a month earlier than the year before (July 8, 2015)! We can suspect that this trend may continue in coming years. Population densities have continued to rise through the season, with adult trap catch numbers reaching into the thousands in a single trap (on Aug 3rd, see graph below).

We will continue to monitor into the fall, and will be interested to see if SWD continue to be present into December, similarly to the previous years.

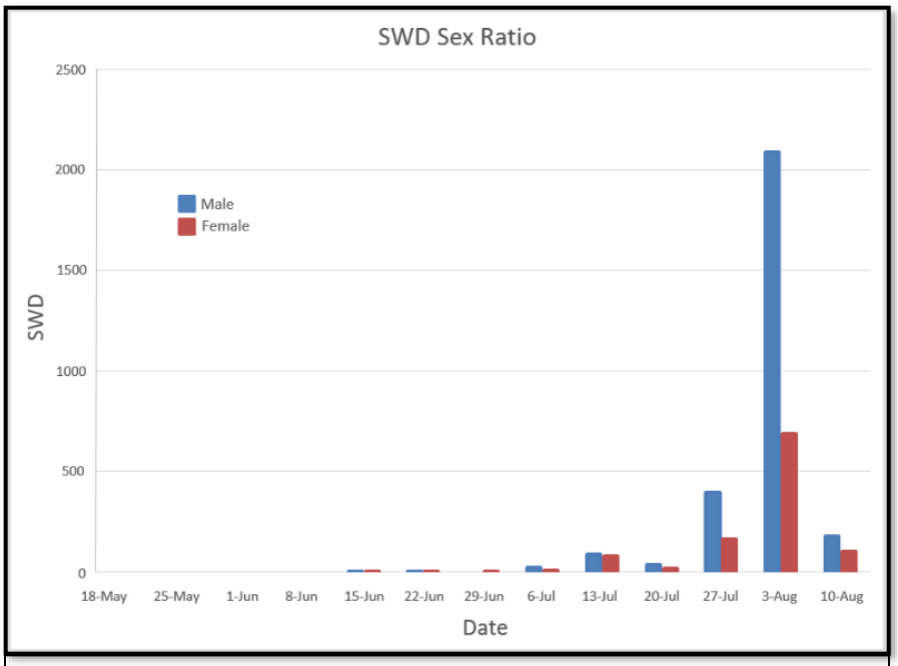


Figure 1: SWD trap catch during the summer of 2017 in Dane County, with blue indicating males SWD and red indicating female SWD.

Preliminary data spatial/temporal project

Given the amount of research focused on SWD, it is surprising how little we still know about their basic biology and behavior. For example, we do not know where and when they are most active in fruit crops. Over the past two years, we have studied where and when SWD are active in raspberries. In 2016, we ran two separate experiments that found 1) flies were most active around sunset and 2) we trapped most flies at the top of the canopy and close to the ground. In 2017, we set up traps to combine the two previous experiments, and to look at SWD activity over time at three different heights in raspberries (Figure 2).

While the average number of SWD trapped is low, given that traps were left out for only 3 hours at a time, some trends are beginning to emerge (Figure 3). 1) Most of the SWD we trap are in the middle of the canopy, 2) the population is crepuscular, meaning that it is most active at sunrise and sunset, 3) SWD appear to move to the top half of the canopy at sunset and then overnight in the bottom half of the canopy.

Figure 2: Clear sticky trap set up at the top of a raspberry.

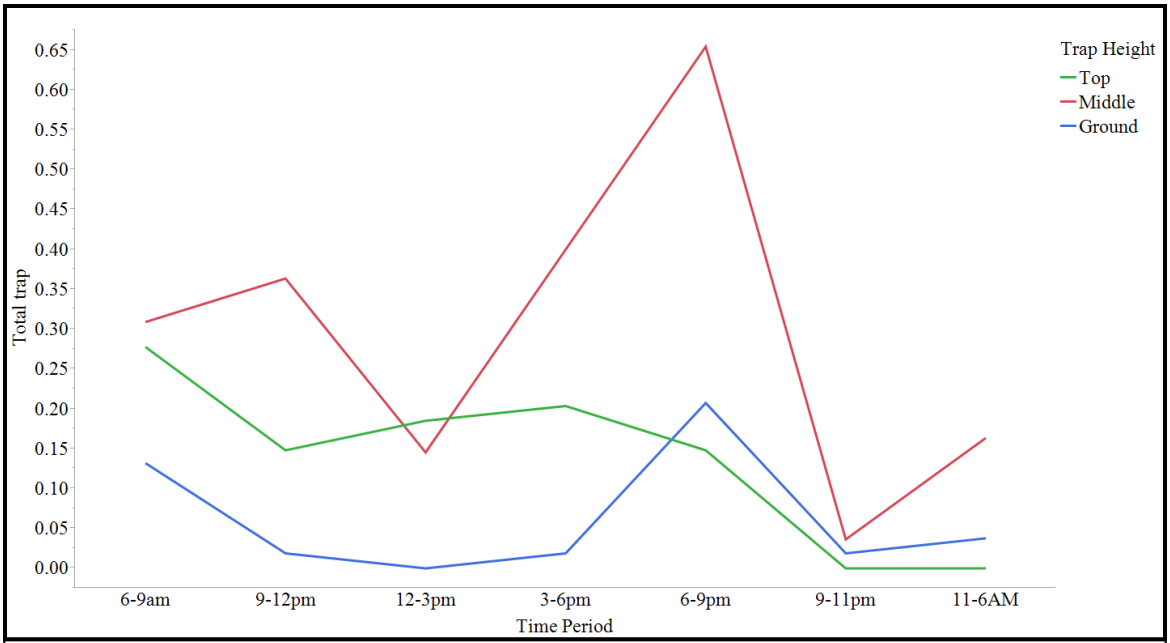


Figure 3: Combining information on where and when SWD is present. Traps were placed high in the canopy, in the middle of the canopy, and near the ground, and were checked at three hour intervals throughout the day. All trapping took place in an Iowa County raspberry field, from July 24 through Aug 4.

We collected this data in between the harvest of summer-bearing raspberries and the development of the fall-bearing raspberries; we expect to trap more SWD as we continue this experiment through the fall and look forward to making informed improvements to SWD management.

Recent research findings and management recommendations

Key management recommendations for spotted wing drosophila remain the same. In short, it is crucial to spray highly effective insecticides every seven days, from now through the end of harvest, in order to maintain continuous coverage of all susceptible fruit. Some insecticides that have been shown to be highly effective are listed in the table below, along with the pre-harvest interval (PHI). In order to be able to continue to control SWD in future years, we need to take the time now to rotate mode-of-action classes of these insecticides. In the following table, The Insecticide Resistance Action Committee (IRAC) code indicates which insecticides have similar modes of action, and using chemistries from alternating classes will have a huge impact on how long into the future each of these products will continue to be effective.

Class (IRAC)	Trade name	Active ingredient	REI	PHI (days)	Rate (per acre)	Efficacy for SWD	Comments
Carbamates (1A)	Sevin XLR PLus	Carbaryl	12hrs	7	1-2 quarts	Good	**Caution:** may injure Early Dawn and Sunrise varieties
Pyrethroids (3A)	Brigade WSB	Bifenthrin	12hrs	3	6.4 – 32 oz.	Good	
	Danitol 2.4EC	Fen-propathrin	24hrs	3	10 ⅔ – 21 ⅓ fl. oz.	Excellent	Max of 2 applications/year
	Pyganic **OMRI**	Pyrethrum	12hrs	refer to label	16 – 64 oz.	Good	Recommended that spray mix be buffered to pH of 5.5 - 7.0
Spinosyns (5)	Entrust **OMRI**	Spinosad	4hrs	1	1.25 – 2 oz.	Good	Max of 3 applications/crop

Some newer research focuses on cultural and biological control options, which will hopefully begin to take the pressure off of chemical controls. A few of these recent research findings are discussed below, but it should be emphasized that, at least at this time, these are meant as a supplement to reduce insecticide need, but are not intended to replace insecticides.

High adult trap counts do not necessarily translate to highest risk of fruit infestation. Observations from the Michigan State University Extension tart cherry blocks have shown that the presence of larvae in the fruit does not necessarily correspond to areas where the most adult SWD flies are caught in the traps. What this means is that, because SWD is so prevalent in our landscape at this point, catching few or many adults in a trap should be considered the same situation. Either way, you will need to spray. Additionally, it may be helpful to use a salt test (described in our Spotted wing drosophila extension publication) to check if there are larvae in your fruit prior to harvesting. This MSU Extension article, by UW graduate Dave Jones, provides a concise and highly informative summary of SWD management recommendations, including why the discrepancy between trap catch and larval infestation changes how you should think about SWD control.

Lowering humidity helps control SWD: Tochen et al (2016) found that, both in the lab and in field observations, SWD prefer increased humidity. In the lab portion of the experiment, they found that increasing humidity has a positive effect on SWD fecundity (females live longer and lay more eggs, and larvae develop more quickly). In the field, periods of higher humidity correlated to increased numbers of SWD. These results suggest that taking measures to reduce humidity in your fields and orchards may lower SWD preference for your crops. Some possible ways to lower humidity may include: drip irrigation, aggressive pruning to maintain airflow, and reducing irrigation needs through mulching.

Work cited: Tochen, S., Woltz, J. M., Dalton, D. T., Lee, J. C., Wiman, N. G., and V. M. Walton. 2016. *Humidity affects populations of Drosophila suzukii (Diptera: Drosophilidae) in blueberry*. Journal of applied entomology, 140, 47-57.

Exclusion netting is a difficult but effective option: Exclusion netting ranges from draping the fruit in mesh fabric to growing in hoop houses or high tunnels, and, when used properly and carefully, can replace insecticide use in the control of SWD. Recommendations for effective use of exclusion barriers were discussed more fully in Volume 1, Issue 6 of this newsletter, and are summarized here:

1) Nets should be placed over fruit crops shortly after pollination, in order to allow bees and other pollinators access to the flowers.
2) The recommended mesh size is 0.98 mm or less.
3) If plastic exclusion, such as 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 times, exclusions can be applied in sections: the varieties which have begun to ripen can be covered, whereas flowering varieties can be uncovered for pollination.
5) It is still best to place traps inside the netting to monitor for the presence of flies. If flies are trapped inside the barrier, it is important to control them using an effective insecticide to eliminate the population before it builds up.

Pick fruit early and often: Harvesting fruit every 2 days and bagging culled fruits for 32 hours will significantly reduce SWD populations and should be integrated as much as possible into an IPM plan to combat SWD. These techniques were discussed more fully in Volume 2, Issue 6 of this newsletter.

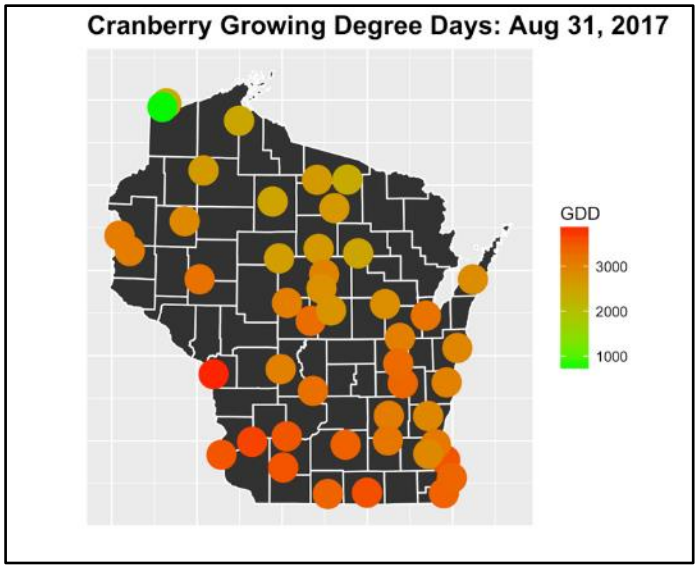
Happy fall!

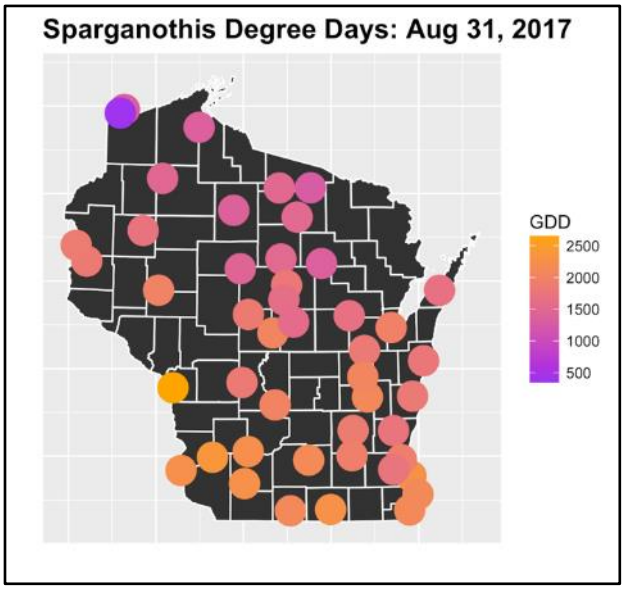
Cranberries

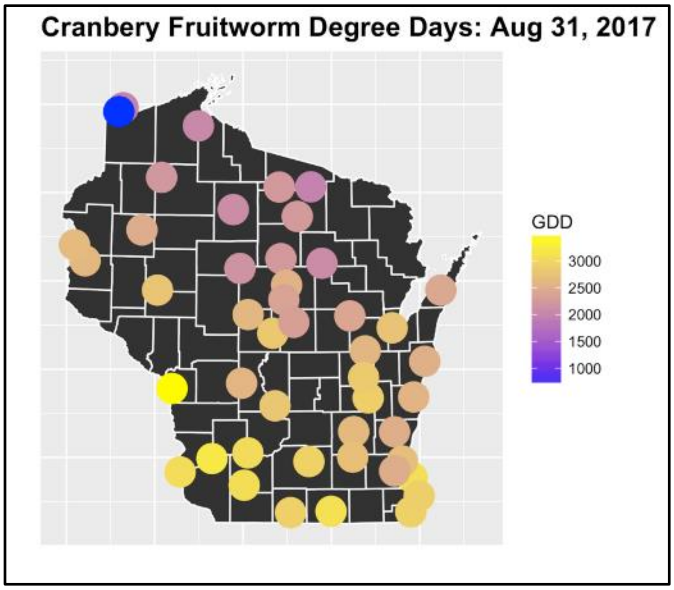
Cranberry plant and pest degree-days: Aug 31, 2017

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

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







Aug. 31	Cranberry DDs			Sparg DDs			CFW DDs		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
Northern WI (Minocqua)	2819.3	2972.7	2646	1671.9	1828.5	1526.4	2414.2	2570.9	2248.1
Central WI (Wisconsin Rapids)	3412.3	3562.8	3274.6	2161	2321.7	2045.9	2977.1	3125.6	2844.2

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

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

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

* Egg hatch window: 895 – 1,890 DDs

Grapes

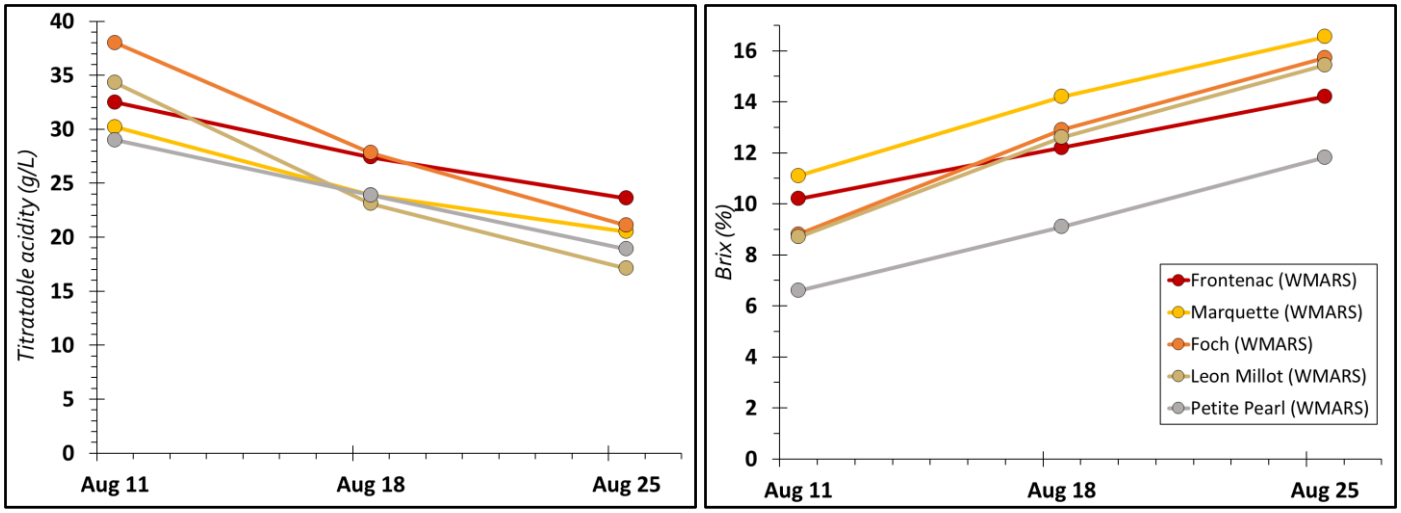
Wine and Table Grape Developmental Stages for Sept 1 2017

By: Janet van Zoeren, Jean Riesterer-loper, Jacob Scharfetter, Denise Smith and Amaya Atucha

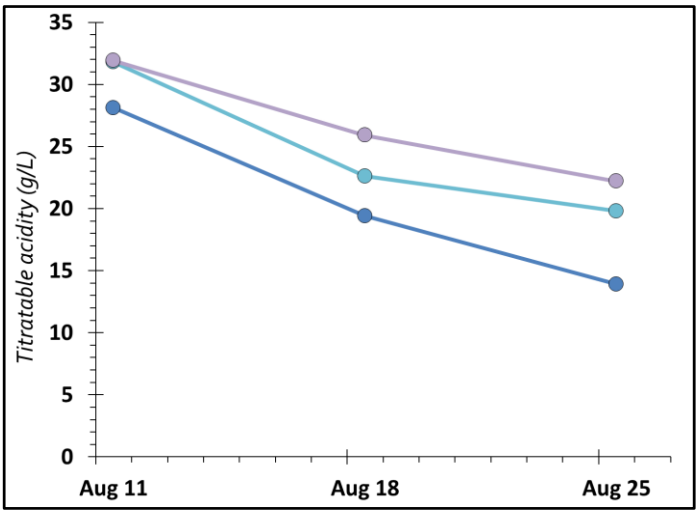
Dane County

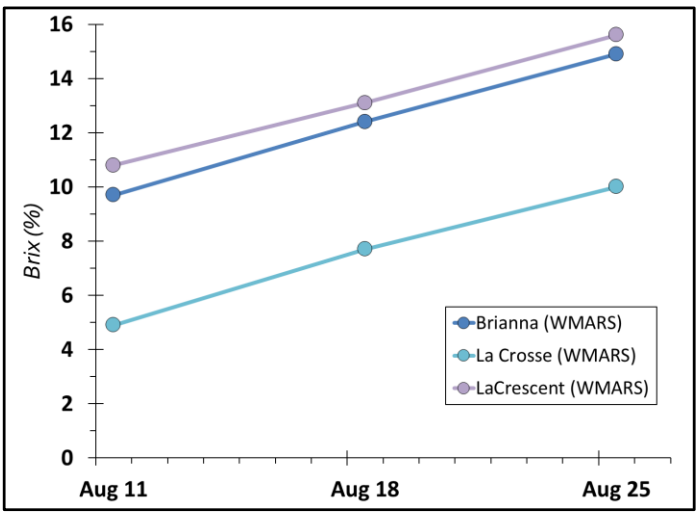
At the West Madison Agricultural Research Station (WMARS) all cultivars are steadily ripening. White wine grape cultivars are about one to two weeks away from harvest (at 10 to 15 Brix), while red wine grape cultivars are about two to three weeks from harvest (at 12 to 16 Brix). Somerset table grapes are in the process of being harvested (at 19 Brix), and table grape cultivar Einset will be harvested in the next week or two.

Sugar (Brix) and TA (titratable acidity) concentrations as of August 25th are shown in the chart and graphs below. All cultivars are at slightly lower Brix (0.5 to 2% less) and higher TA (5 to 6 g/L more) concentrations this year compared to the same period in 2016.



Titratable acidity (above left) and Brix (above right) of red wine grape varieties as WMARS.





Titratable acidity (above left) and Brix (above right) of white wine grape varieties as WMARS.

Aug 25, 2017 **Grape Brix and Titratable Acidity (TA)**

	WMARS	
Grape Variety (Reds)	**Brix (%)**	**TA (g/L)**
Frontenac	14.2	23.6
Marquette	16.6	20.5
Foch	15.7	21.1
Leon Millot	15.4	17.1
Petite Pearl	11.8	18.9
Grape Variety (Whites)	**Brix (%)**	**TA (g/L)**
Brianna	14.9	13.9
La Crosse	10.0	19.8
La Crescent	15.6	22.2

Following photos taken on Aug 28th at West Madison Agricultural Research Station.

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

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

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

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

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

St. Croix at WMARS; "berries with intermediate sugar level" E-L number = 36

Somerset at WMARS; "berries harvest-ripe" E-L number = 38

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

Door County

At the Peninsular Agricultural Research Station (PARS) berries continue to slowly ripen. Berries vary from stage E-L* developmental number 34 ("berries begin to soften") to 36 ("berries with intermediate sugar level"). We will begin sampling to measure maturity at PARS in the next weeks.

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

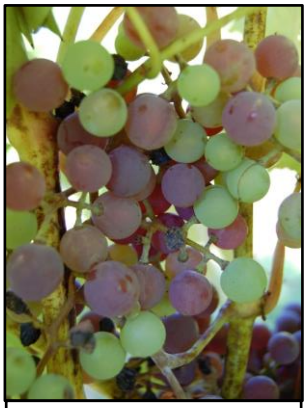
Following photos taken on Aug 30th at Peninsular Agricultural Research Station.

Brianna at WMARS; "berries with intermediate sugar level" E-L number = 36

La Crescent at WMARS; "berries begin to color" E-L number = 35

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

Marquette at WMARS; "berries with intermediate sugar level" E-L number = 36



Frontenac at WMARS; "berries begin to color" E-L number = 35

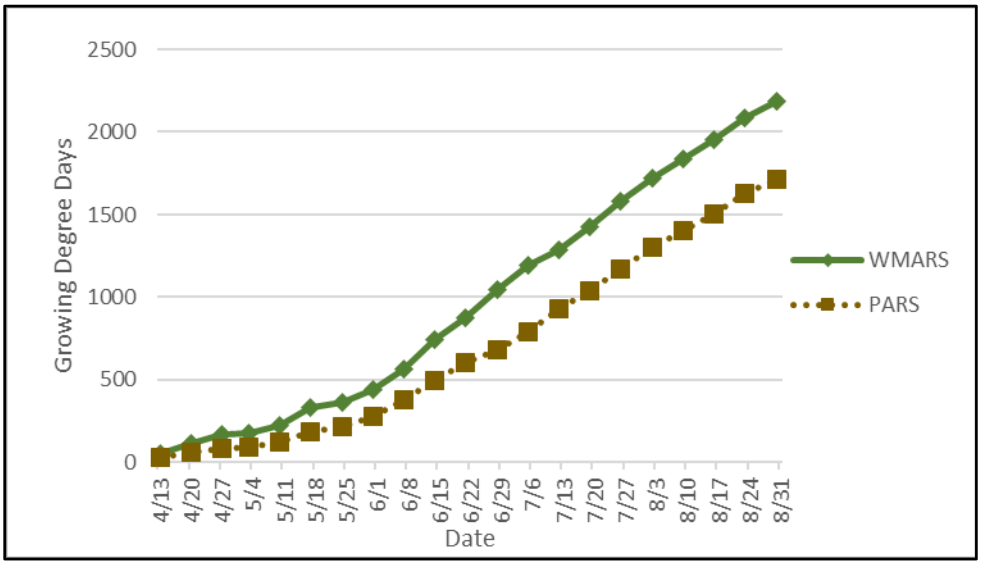
St. Croix at WMARS; "berries begin to color" E-L number = 35

Grape Growing Degree Days

April 1 - Aug 30, 2017

	2107	2016
WMARS	2187	2468
PARS	1713	1936

The growing degree-day accumulations as of August 30th for this year are: 2,187 GDD at WMARS and 1,713 GDD at PARS. Door County continues to be over three weeks behind Dane County in terms of growing degree-days. At both locations, we are significantly behind the degree-day accumulation from 2016. Degree-days are calculated using a base of 50°F, starting on April 1st as a biofix.



Tree Fruits

Silver leaf of apple

By: Janet van Zoeren and Patty McManus

Silver leaf, a fungal disease of apple, pear and cherry trees, has been found affecting young, healthy apple trees in Wisconsin orchards this summer. Previously, silver leaf has been considered a disease primarily of older and stressed trees, and has been of limited economic importance. It is unclear why the fungus has begun affecting younger and more vigorous trees. Marking affected trees and carefully observing patterns of symptoms over the next few summers will be important to understanding if this is an isolated incident or a longer-term problem. However, aggressive pruning of areas with foliar symptoms is not recommended at this time.

Silver leaf is caused by the fungus *Chondrostereum purpureum*. The first observed symptom is a silver sheen on a few or many leaves per infected plant (see image at right). Silver leaves can be caused by other stressors, so the best way to confirm true silver leaf in an orchard is to cut into the infected branch to look for dark staining in the wood.

Block of young, healthy trees in a Wisconsin orchard, showing symptoms of silver leaf on the right and asymptomatic trees at left.

Silver leaf fruiting body. Photo provided by the UW Plant Disease Diagnostics Clinic.

Silver leaf biology and life history

Spores from the fungus are released during wet periods of autumn and spring, and infect new trees at pruning scars or other open wounds, such as those created when heavy snow breaks branches. The fungus lives in the xylem (water-carrying tissue) of infected branches, causing the wood to stain a dark color as the branch dies. A toxin released by the fungus moves up to the leaves and creates air pockets in their tissues, which in turn causes the epidermis to lift away from underlying cells, imparting the characteristic silver-sheen to the leaves. Because the toxin is moved in xylem, the infected wood tissue can be significantly lower in the branch than where foliar symptoms are observed. Once the wood begins to decay, the fungus puts out fruiting bodies, which are visible growing on the affected branches (see image at left). These will send out more spores that infect other trees in the coming years. It is important to note that the silver leaf symptoms cannot spread on their own, as they are not a fruit body, so seeing only those without the fruiting fungal bodies does not necessitate immediate action.

The silver leaf pathogen is a generalist, being able to survive on many species of trees (e.g., willow, poplar, maple, oak), and historically has been an incidental problem rather than an economically important pest of fruit trees in Wisconsin.

2017 observations

Peter Werts and Thomas Bernard of the IPM Institute of North America have been observing the progression of silver leaf infection this summer and have contributed the following information: This summer, silver leaf symptoms began to appear on two- to five-year-old, healthy high-density blocks throughout the state in mid-June. By now (in mid-August), the worst-hit blocks have entire trees showing foliar symptoms of silver leaf. Some branches were cut open, and show dark staining from the fungus in the heartwood, with disintegration of the pith. To date, I have not heard reports of fruiting bodies on young or healthy trees. Infection rates seem to be similar regardless of cultivar, rootstock, or location within the state. Growers in Michigan and Minnesota have noticed similar symptoms and trends to those observed in Wisconsin.

Management recommendations

Because silver leaf hasn't generally been an economically important disease of fruit trees, there has not been much research focusing on it. At this time, no fungicides are known to control silver leaf. For small areas of damage, it is recommended to prune out infected branches, being sure to cut at least four inches below where staining can be seen in the heartwood. When pruning, be sure to sanitize pruning equipment frequently, and dispose of infected prunings by burning or burying them. In general, avoiding pruning during wet periods may decrease the risk of infection by the silver leaf fungus.

Silver leaf has at times exhibited foliar symptoms for a season and then subsided the following growing season. For that reason, and because symptoms seem to be so widespread in certain blocks this season, we recommend marking diseased trees instead of pruning symptomatic branches or removing trees. Then, carefully watch these trees next spring and summer, to see if symptoms reoccur or if the tree loses vigor next summer. However, if fruiting bodies appear on any tree in your orchard, the wood is already dying and those parts of the tree should be removed immediately to prevent further infections in the orchard. The efficacy of wound paints and sealants on preventing infection by pathogenic fungi is inconsistent, and they are not recommended for preventing silver leaf. As with any disease that affects vascular tissue, silver leaf can impair a tree's ability to transport water from roots to leaves and fruit. Therefore, trees that showed symptoms in 2017 should be irrigated to avoid drought and heat stress in 2018, even if symptoms do not develop in 2018.

Reduced risk insecticide: Venerate

By: Christelle Guédot, University of Wisconsin, Entomology

Insecticide: Venerate

- Available as XC (extra concentrated 95% active ingredient)
- Restricted re-entry interval (**REI**): 4hrs
- Pre-harvest interval (**PHI**) on all crops: 0 day
- No limit on the number of applications per season
- Rate of use per acre: 1-8 quarts
- Intervals between applications vary depending on pressure, usually is every 3-10 days.

Venerate™ XC is a newer insecticide registered for use in Wisconsin on pome fruits, including apple, crabapple, pear, loquat, and quince as well as stone fruits, including apricot, cherry, nectarine, peach, plum, and prune. It is marketed by Marrone© Bio Innovations under the formulation XC (extra concentrated 95% active ingredient). Venerate is OMRI approved and can be applied in organic as well as conventional production systems. Venerate™ XC is a biological insecticide/miticide containing multiple active ingredients from heat-killed cells and fermentation solids of *Burkholderia* species strain A396. Venerate™ XC causes enzymatic degradation of the exoskeleton and interferes with the molting process of target insects. Mortality of the insect targets occurs through contact and/or ingestion of venerate™ XC.

Venerate is registered for control of plum curculio, pear psyllid, green fruitworm, leafrollers, oriental fruit moth, peach twig borer, redhumped caterpillar, tent caterpillar, and suppression only for stink bugs, aphids, mealybugs, mites, thrips, and whiteflies. See specific recommendations for some pests, such as peach twig borer and leafrollers.

Key considerations for the effectiveness of Venerate is close scouting and early attention to infestations. Proper timing of application targeting newly hatched immatures is essential for optimal effectiveness. Thorough coverage of infested plant parts is necessary for effective control of insects and mites.

Venerate can be applied by ground or air. Important mixing directions are outlined in the label, here is an exert: "Fill tank 1⁄2 to 3⁄4 of desired amount of water. Start the mechanical or hydraulic agitation to provide moderate circulation before adding VENERATE™ XC. Add the desired volume of VENERATE™ XC to the mix tank and the remaining volume of water and continue circulation. Maintain circulation while loading and spraying. "

Venerate is not toxic to bees, fish, birds or most beneficial insects. However, to minimize potential exposure to bees and other pollinators, do not apply while bees are foraging.

Venerate is OMRI approved and NOP compliant so it is a good option for organic growers. Its new modes of action can complement IPM programs and reduce risks of insecticide resistance.

As always, make sure to read and follow the label before using any pesticide. You can find the label of Venerate XC by clicking here or by copying this address in your browser: https://marronebioinnovations.com/wp-content/uploads/delightful-downloads/2017/01/VenerateXC_SpecimenLabel_2014_01_web-1.pdf

For more information on Venerate go to https://marronebioinnovations.com/ag-products/brand/venerate/

Apple maturity index report – Aug 31st 2017

By: Janet van Zoeren and Amaya Atucha

Honeycrisp has matured a lot over the past two weeks, and the most mature fruit is nearing harvest-ready. In Richland County this week, flesh firmness ranged from 6.0 – 9.0 and soluble solids ranged from 10.1 – 12.0. In Dane County, flesh firmness ranged from 6.2 to 9.3 and soluble solids ranged from 7.7 to 11.8. Starch is highly variable, with some apples not yet beginning to convert any starch to sugar (entirely dark colored, giving them a rating of 1), while a couple have converted nearly all starch to sugar (entirely light coloration, giving them a rating of 6). Seeds vary from "brown tip" (rating of 1) to "100% dark brown" (rating of 4, mature). The apples with the highest starch index also have the highest seed coloration index. However, those do not necessarily have the highest soluble solids or lowest firmness indices.

Aug 30, 2017

The average and range values of these maturity indices for each location are shown in the chard at right and graphs below.

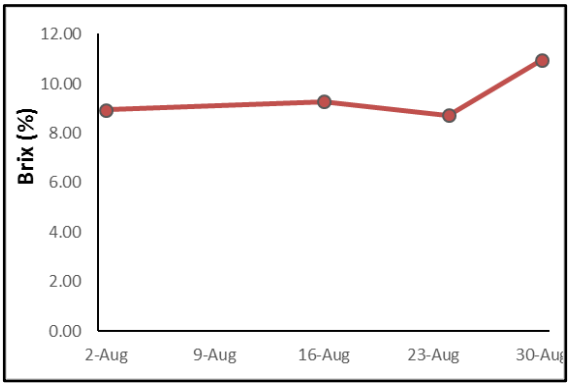
Richland Center:

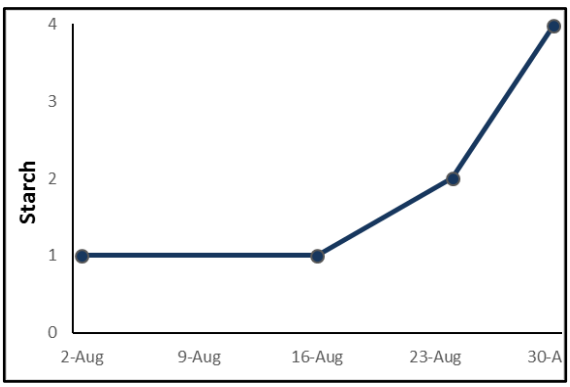
	Weight (g)	Firmness (lbs)	Soluble solids (%)	Seed color	Starch Index
Average	150	7.0	11.0	2.5	4.0
Range	93 – 266	6.0 – 9.0	10.1 – 12.0	2 - 4	1.5 - 6

Fitchburg:

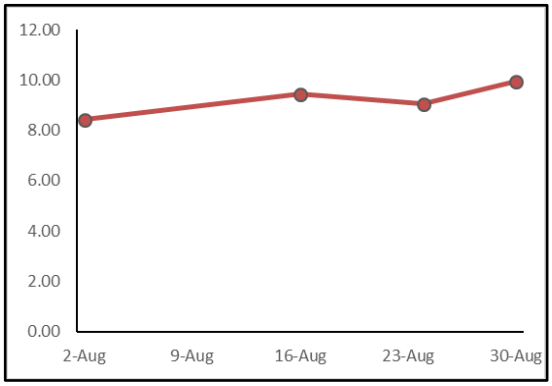
	Weight (g)	Firmness (lbs)	Soluble solids (%)	Seed color	Starch Index
Average	159	7.4	10.0	1.9	2.1
Range	88 – 205	6.2 – 9.3	7.7 – 11.8	1 - 3	1 –5

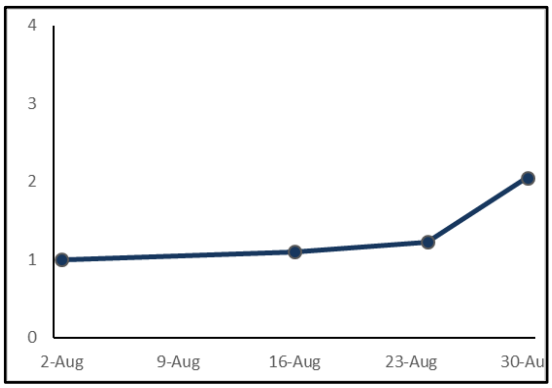
<u>Richland County</u>





<u>Dane County</u>

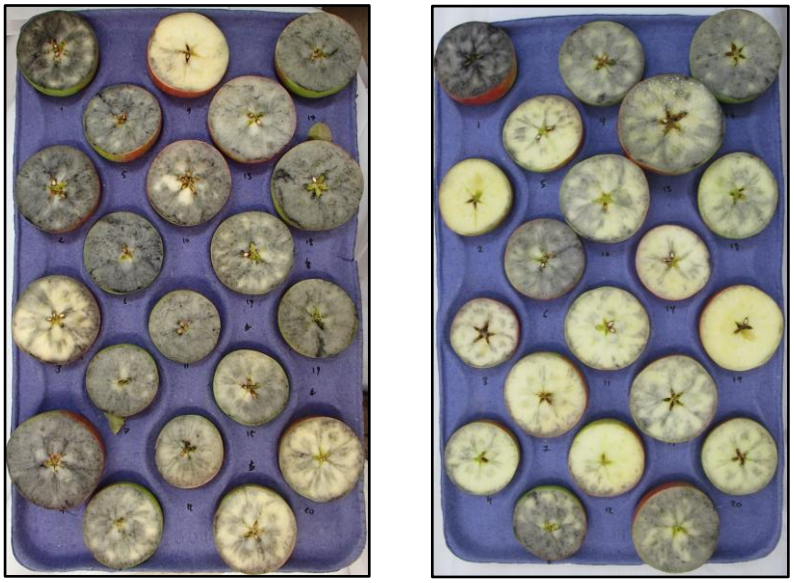




Iodine starch staining patterns:

Aug 24 Aug 30

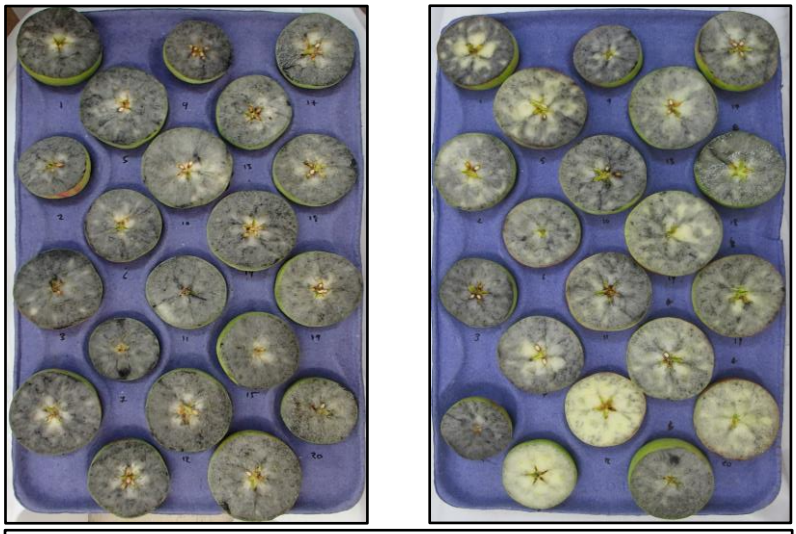
Richland County



Iodine starch-staining pattern for Honeycrisp from Richland County: samples taken Aug 24 (left) and Aug 30 (right).

Aug 24 Aug 30

Dane County



Iodine starch-staining pattern for Honeycrisp from Dane County: samples taken Aug 24 (left) and Aug 30 (right).

Armillaria root rot on tree fruits

By: Sara Thomas-Sharma and Patricia McManus

About the pathogen:

A soil inhabitant, the fungus *Armillaria* spp. is commonly found in coniferous and broad-leaved forests. The disease is called Armillaria root rot, oak root fungus disease, mushroom root rot, and shoestring root rot. In fruit trees, the disease is observed when orchards are planted on cleared forest land or in sites with a history of the disease. The fungus is visible as a white fungal mat between bark and wood, clusters of honey colored mushrooms at the base of the tree in autumn, and dark brown to black threadlike 'rhizomorphs' on the surface of bark and dead roots (Fig. 1).

Fig. 1. Infestation of *Armillaria sp.* is observed as a white fungal mat between bark and wood (A), honey colored mushrooms at base of tree in autumn (B), and dark threadlike structures called 'rhizomorphs' on the surface of bark and dead roots (C). Photo by Robert L. Anderson, USDA Forest Service, Bugwood.org.

Symptoms:

The disease is a greater problem in stone fruits (*Prunus* spp.) than in apple and pear. There are no *Prunus* rootstocks that are resistant to the disease, but the degree of susceptibility might vary. Mahleb (*Prunus mahaleb*) and mazzard (*Prunus avium*) are very susceptible to the disease but sweet cherry on mazzard rootstocks are more resistant than sour cherry on mazzard rootstocks. Like many root rots, the aboveground symptoms include a general decline in growth and weakening of plants. In mid-summer *Armillaria*-infected trees collapse suddenly, often with leaves attached. The sudden collapse of trees rather than a gradual yellowing and defoliation of leaves is indicative of Armillaria root rot rather than Phytophthora root rot. Also, Phytophthora is common in heavy, poorly drained soils while Armillaria infestation occurs in light, well-drained, sandy soils. The spread of the fungus occurs via root-to-root contact, and tree death occurs in circular patterns from an infection center within the orchard.

Management:

- Avoiding sites with a history of *Armillaria* is the primary step for management. This is especially true for stone fruits that are particularly susceptible to the pathogen.
- While establishing new orchards, it is critical to work the soil to remove stumps of trees and old roots that may harbor the pathogen.
- Fumigation is only moderately effective since the fungus can survive deep in the soil and remain protected in roots.
- Research on peach indicates some other control methods that might be effective (https://www.clemson.edu/extension/peach/commercial/diseases/armillariarootrotmanagement%20.html), but these have not been tested on cherry.

Calendar of Events

There are no upcoming events at this time. If you have anything to add to the calendar, please contact the editors (see below).

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.