Wisconsin Fruit News

Volume 3, Issue 1 – Apr 20, 2018

In This Issue:

Welcome back! We're excited to get started on the third year of the Wisconsin Fruit Newsletter.

This first issue, due to the late spring and slow start to the growing season, we have divided the newsletter up a little differently. Here we provide information that will be pertinent to many different crops, about NEWA weather stations and an insect pest forecast for 2018. In the disease section, there is a summary of grape disease pressure seen in 2017, and an article looking at apple disease-pressure predictions for 2018.

Next issue we will return to the regular format, with sections specific to berry crops, cranberries, grapes, and tree fruit.

Please notice that the items in the list of contents (at left) now are linked to the article, for easy referencing.

Thanks for reading. We hope you will continue to enjoy the articles and information here and on our Wisconsin Fruit website (fruit.wisc.edu).

General Information

NEWA weather stations update and applications

By: Janet van Zoeren, Amaya Atucha, and Christelle Guédot – UW-Madison Extension

For the summer of 2018, we now have fifteen new weather stations connected to NEWA (Network for Environment and Weather Applications), which you can use to help inform many of your decisions throughout this summer, including irrigation schedules, and determining optimal spray timings for fungicides, insecticides, and fruit thinners. To access these data, begin at the NEWA website at Cornell University. From there you can find the locations of all Wisconsin's weather stations (see Figure 1).

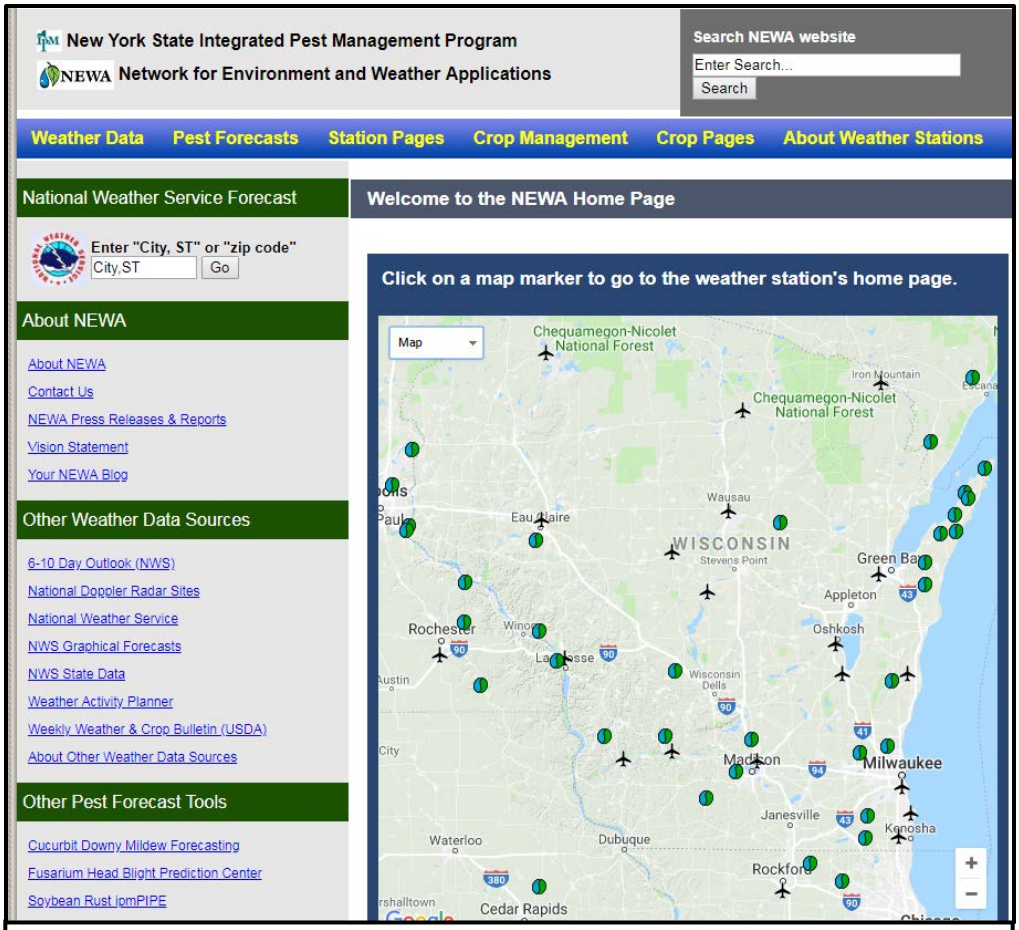


Figure 1: Main page of the [NEWA website](). Each green circle represents a weather station hooked up to the NEWA network.

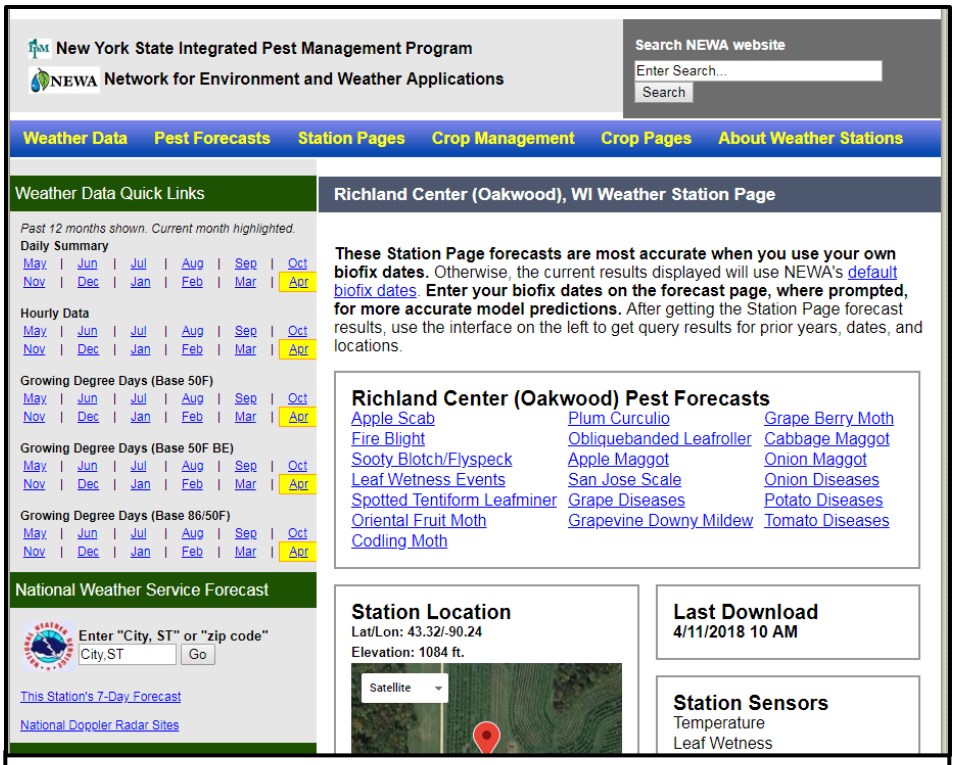
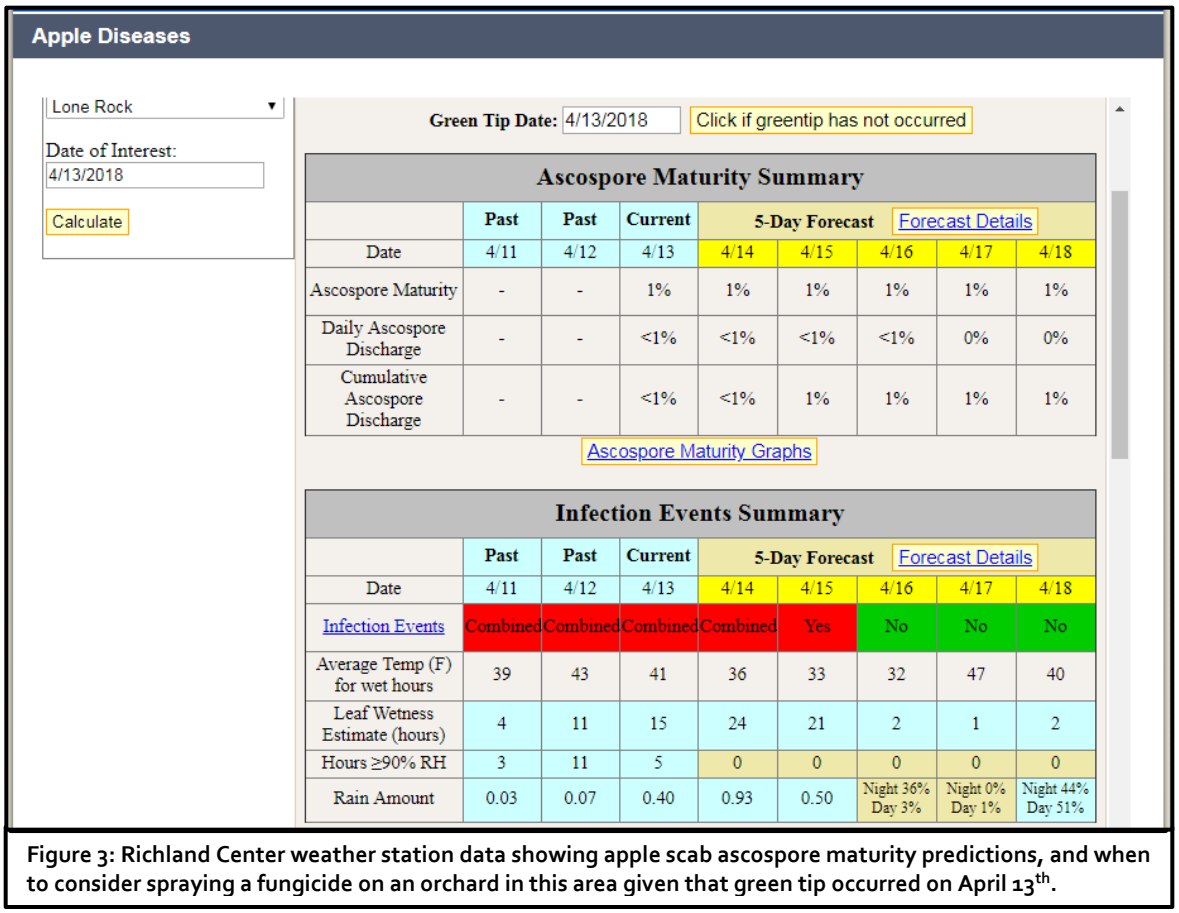


Figure 2: Richland Center weather station specific NEWA page, with links to weather data for the area and local pest forecasts.

There are a few different ways you can navigate the site. Along the top bar, you can choose if you are interested in learning about when to target sprays for a specific pest (Pest Forecasts), other crop management decisions such as irrigation or thinning (Crop Management), or if you would like to explore the resources available for either apple or grape grower (Crop Pages). You could also click on any green circle to take you to a page showing the information specific to that particular weather station (see Figure 2).

From this weather station page, if, for example, you want to know when to spray for apple scab, you would click on the Apple Scab link to go to a page showing the current and predicted weather along with the implications for the optimal timing of apple scab management in your area. So, if you were to enter April 13th as the green tip date, you would see a chart showing how previous and expected future degree day accumulations, rain events, leaf wetness hours play into when is best to spray for apple scab (see Figure 3).



Apple Diseases

Lone Rock

Date of Interest: 4/13/2018

Calculate

Green Tip Date: 4/13/2018 Click if greentip has not occurred

Ascospore Maturity Summary

	Past	Past	Current	5-Day Forecast				Forecast Details
Date	4/11	4/12	4/13	4/14	4/15	4/16	4/17	4/18
Ascospore Maturity	-	-	1%	1%	1%	1%	1%	1%
Daily Ascospore Discharge	-	-	<1%	<1%	<1%	<1%	0%	0%
Cumulative Ascospore Discharge	-	-	<1%	<1%	1%	1%	1%	1%

Ascospore Maturity Graphs

Infection Events Summary

	Past	Past	Current	5-Day Forecast				Forecast Details
Date	4/11	4/12	4/13	4/14	4/15	4/16	4/17	4/18
Infection Events	Combined	Combined	Combined	Combined	Yes	No	No	No
Average Temp (F) for wet hours	39	43	41	36	33	32	47	40
Leaf Wetness Estimate (hours)	4	11	15	24	21	2	1	2
Hours ≥90% RH	3	11	5	0	0	0	0	0
Rain Amount	0.03	0.07	0.40	0.93	0.50	Night 36% Day 3%	Night 0% Day 1%	Night 44% Day 51%

Figure 3: Richland Center weather station data showing apple scab ascospore maturity predictions, and when to consider spraying a fungicide on an orchard in this area given that green tip occurred on April 13th.

As mentioned previously, there are many applications of this website to orchard and vineyard management decisions, and we suggest that you may want to visit the website and explore some of those options. Additionally, as spring progresses, we will offer a series this spring looking at using NEWA weather data along with a fruit growth model to determine how much apple fruit thinner to apply on what days.

To learn more:

- Visit the NEWA webpage at http://newa.cornell.edu/.
- Read the recently published Cornell article, "Using the NEWA help desk" (available at http://blogs.cornell.edu/yourenewa/2018/04/15/newa-help-desk/).
- If you are interested in purchasing a weather station or connecting your weather station up to the NEWA network, please contact Amaya Atucha, the Wisconsin state NEWA coordinator, at atucha@wisc.edu.

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 January 1, 2018 through April 20, 2018.

PLANT/ SAMPLE TYPE	DISEASE/ DISORDER	PATHOGEN	COUNTY
FRUIT CROPS			
Apple	*Crown Gall*	*Agrobacterium tumefaciens*	*Columbia*
	Cytospora Canker	*Cytospora sp.*	*Columbia*

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

Insect Pest Updates

Insect pest forecast for 2018

By: Janet van Zoeren, PJ Liesch, and Christelle Guédot - University of Wisconsin Entomology

As we start looking ahead to spring (which feels awfully far away as I'm writing this), many of us working with fruit crops are wondering how "bad" 2018 will be for insect pests in Wisconsin. We've had a couple mild winters in 2015-2017, and also have seen surges in some of our key pests, such as Japanese beetle and spotted wing drosophila. It's tempting to suggest that the cold spell last January may have knocked pest populations back. Unfortunately, many factors affect which pests will be more or less problematic each year, making it impossible to predict with complete accuracy which pests we can expect to cause the most problems this summer. However, a look back at the weather patterns over the winter of 2017-18, along with some information about how our most problematic pests have responded to similar patterns in previous years, may help to inform our pest control strategies.

The winter of 2017-18, on average, saw less snowfall and more vacillating temperatures than Wisconsin averages (Figures 1 and 2).

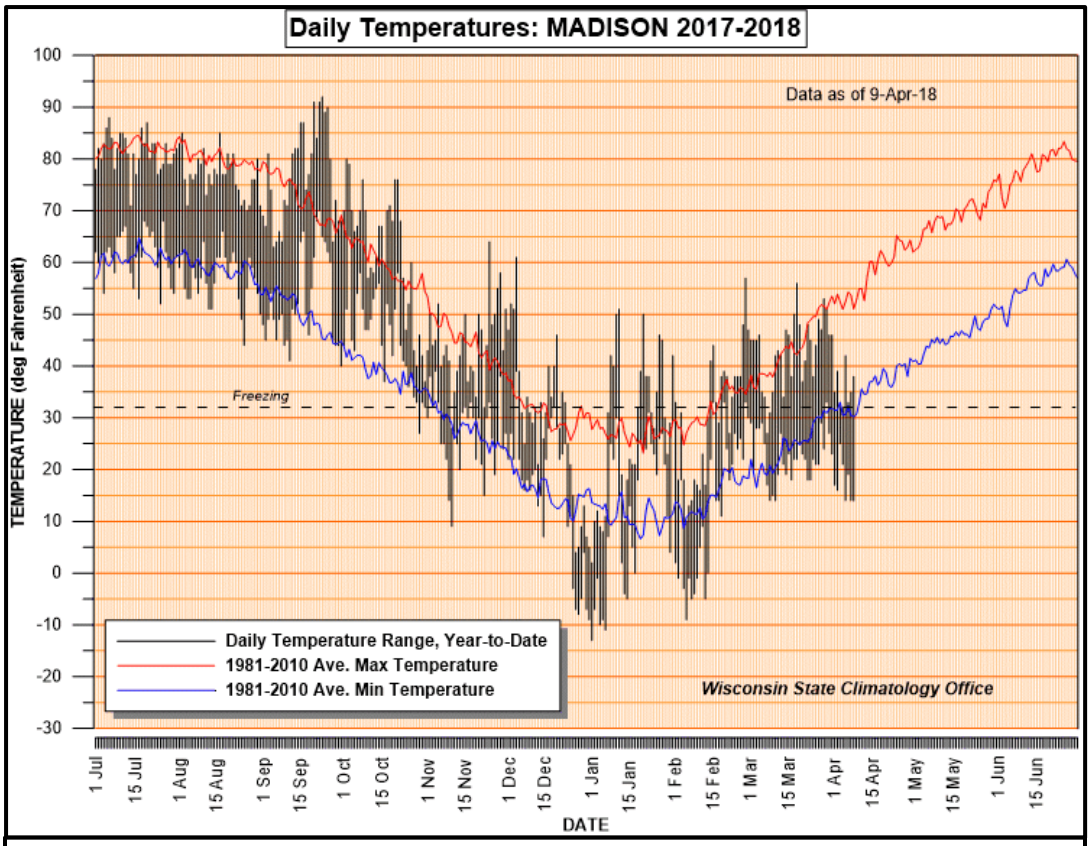


Figure 1. Daily temperature for 2017-2018 (in grey) compared to average high and low temperatures (in red and blue, respectively), for Madison, Wisconsin. Image courtesy of Wisconsin State Climatology Office.

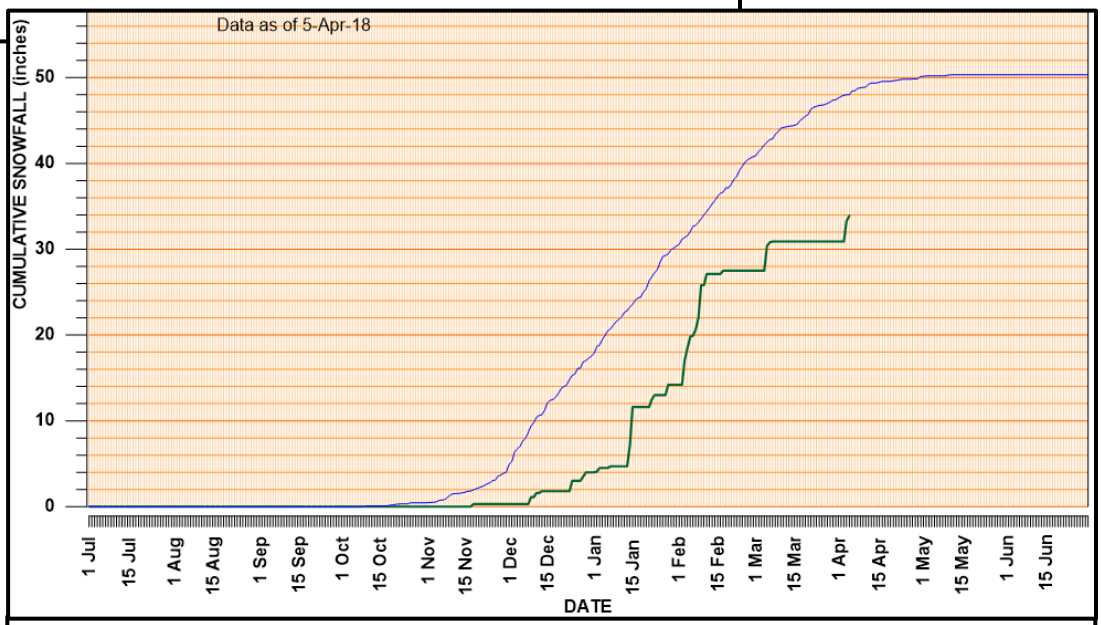


Figure 2. Cumulative snowfall, in Madison WI, during the winter of 2017-18 (in green) compared to average cumulative snowfall (in blue). Image courtesy of Wisconsin State Climatology Office.

On their own, the extreme cold we saw in early January and the unseasonably cold temperatures we're experiencing currently are unlikely to seriously set back most of our insect pests. Most of the pests that thrive in Wisconsin are adapted to the cold, and will be able to survive similarly well at 15°F versus -15°F. Insects withstand the cold using a variety of methods, mainly using some form of "supercooling" in which they use an antifreeze substance in their blood to avoid freezing even at temperatures below 32°F. Others, like the **brown marmorated stink bug**, avoid below-freezing temperatures altogether by spending the winter in our houses or heated outbuildings.

However, there are a few trends from this winter that are worth discussing further. First, temperatures this past winter were not just cold, but were also highly variable, with a cold New Year's followed by a warm spell in mid-January, temperatures dropping off again by early February, an unusually warm spell in March, and now back to unseasonable cold. Although cold temperatures on their own are unlikely to have a strong effect on our pest insects, temperature fluctuations may. Some species might have begun to deacclimate to the cold during the warm temperatures in February, which may have led to mortality during this recent cold snap. Additionally, for other species, including the **Japanese beetle**, fluctuating cold temperatures have been shown to increase cold stress over consistently cold temperatures (i.e. Payne 1928).

Another factor in insect mortality is snowfall. For insects that overwinter below ground or in the leaf litter, a thick covering of snow provides insulation to keep temperatures more mild throughout the winter. A thick snow cover can keep the soil 20 to 30°F warmer than air temperatures. Snowfall accumulation this winter was well below average (see Figure 2), removing some of this insulating effect, and likely reducing some species' abilities to withstand the cold temperatures. One such insect is the **Japanese beetle**, which reached especially damaging levels last summer. Japanese beetles overwinter as a grub underground, and use "supercooling", which is similar to antifreeze in their blood, to survive soil temperatures down to at least 15°F. Because of the limited snowfall, it is likely that soil temperatures, at least in places, reached mortality levels for Japanese beetle. Historical records from New England suggest that Japanese beetle mortality is greatly reduced when snow cover is present but can sometimes reach ~40% in the absence of snow cover (Fleming, 1972). As mentioned above, Japanese beetles are less able to survive when temperatures vary between warm and cold, like they did this past winter, than if they had stayed cold (Payne 1928). Taken together, the low snow cover and vacillating temperatures may lead to a much-needed summer with decreased Japanese beetle pressure.

Spotted wing drosophila may also be relying on the insulation of snow to survive the winter. Although we don't know much about the overwintering habits of spotted wing drosophila, what we do know is that a, there is a winter morph that is more adapted to cold tolerance than the summer morph, b, early summer infestation patterns suggest that spotted wing is overwintering in Wisconsin instead of arriving each spring, and c, if they do overwinter in Wisconsin, they do so as mated females. Research has shown that the winter morph of spotted wing can survive temperatures down to around -4°F, and presumably they are finding insulated pockets in tree bark or in the leaf litter to withstand colder winter temperatures. A lack of insulating snow may keep numbers at least a little bit lower this spring. Additionally, over the past few years our first spotted wing trap catch of the season has been earlier each year, likely due to warming spring weather. It will be of interest if current chilly spring temperatures can keep spotted wing arrival later this year than it has in previous years. With a little luck, spotted wing drosophila numbers will be at least a little lower, and will increase a little later, than they have in previous years.

Finally, even if not having a deadly effect on most of the insects that are well adapted to Wisconsin's winters, the cold winter temperatures may have an impact on keeping out the newer potential invaders. Some of the newly arrived insect pests have been making use of several years' worth of mild winters to expand their range north, including the **African fig fly** and other southern imports. A colder-than-normal winter is likely to knock some of those southern imports back, although they will certainly continue to come north over the summer and are unlikely to be held back for long.

In summary, although we cannot definitively know which insect pests will be more or less likely to cause damage this coming summer, winter weather is unlikely to reduce populations of most of our insect pests to a significant degree. However, **some pests are unlikely to be reduced by this past winter, such as brown marmorated stink bug and our native pests such as the apple maggot and plum curculio**. Others are more likely to have been affected by the combination of cold spells, low snowfall, and vacillating temperatures, and **we hope we may see lower numbers, or at least a later season, of Japanese beetle, spotted wing drosophila, and African fig fly**.

Whatever the case, we'll be sure to keep you up to date with the latest insect pest trends in this newsletter.

References

Fleming, W.E. 1972. *Biology of the Japanese beetle*. USDA-ARE Technical Bulletin No. 1449, 129pp.

Payne, N. 1928. *Cold Hardiness in the Japanese Beetle, Popillia japonica Newman*. Biological Bulletin, 55(3), 163-179. doi:10.2307/1536834

Disease Updates

Summary of grape disease at two research farms for the 2017 growing season

By: Denise Smith and Patty McManus

Grape diseases were rated every other week until harvest by estimating percent leaf/fruit area diseased at the West Madison Agricultural Research Station (WMARS) and the Peninsular Agricultural Research Station (PARS) near Sturgeon Bay. The vineyard at each station consisted of eight cultivars in five replicates of five vines and was established in 2012. The cultivars were Brianna, Frontenac, Frontenac gris, La Crescent, La Crosse, Marquette, St. Croix, and Valiant. Both vineyards were managed according to conventional practices with the exception of withholding fungicides starting in 2015. In 2017 Revus, a fungicide that controls downy mildew but has no effect on other diseases, was applied at a low rate to reduce downy mildew damage so that we could better assess other diseases.

Black rot

Black rot symptoms on leaves and canes appeared early in the season but did not reach high levels by the end of the season. Valiant was most affected at both locations. Symptoms did not appear on more than 50% of the area of leaves and canes of any cultivar. On the other hand, the berries had very high levels of disease. Fifty percent or more of the berries were symptomatic for all cultivars; Marquette was the most diseased at both locations, with more than 75% of the clusters symptomatic. Overall, the disease level on fruit at WMARS was lower than at PARS. At WMARS, Brianna was the only other cultivar to have more than 50% of the fruit affected. At PARS, Valiant, Frontenac, and Frontenac gris (in addition to Marquette) had more than 75% fruit affected. This is the fourth year that we have rated disease in these vineyards. We have noticed that left unchecked, black rot on fruit gets progressively worse from one year to the next.

Figure 1: Damage to Marquette fruit caused primarily by the black rot fungus.

Downy mildew

Downy mildew was partially controlled at both locations by repeated applications of Revus at the lowest rate specified by the label. Frontenac, Frontenac gris, and Marquette had very few leaves with symptoms at both locations. The other five cultivars had symptoms on 25-50% of the leaf area at WMARS and about 25% of the leaf area at PARS. As in 2015, 2016, and 2017, Valiant was the only cultivar with downy mildew on berries, with just over 25% of clusters affected. Valiant is highly susceptible to downy mildew, so Revus may need to be applied at a higher rate to control the fungus.

Phomopsis

Phomopsis cane and leaf blight symptoms were not evident until later in the growing season. Leaf spot did not exceed 25% leaf area until mid-August, and then only St. Croix had up to 50% leaf area affected. Frontenac had almost no leaf spot at either location. Only St. Croix had serious fruit damage caused by Phomopsis; 25-50% of clusters at WMARS and 50-75% of clusters at PARS had lesions on rachises and peduncles, resulting in fruit rot near harvest-time.

Figure 2: Phomopsis lesions on peduncle and rachises of a St. Croix fruit cluster.

Powdery mildew

As in recent years, powdery mildew was substantially worse at PARS than at WMARS. At WMARS, all cultivars had at least low levels of powdery mildew on leaves but only Frontenac and Frontenac gris had more than 50% leaf area colonized by the powdery mildew fungus. At PARS, all cultivars had more than 50% leaf area diseased, with Brianna, Frontenac, Frontenac gris, and Marquette approaching 100% leaf area affected. The amount of diseased fruit was somewhat lower, but still unacceptably high for wine production. Fruit clusters affected at WMARS exceeded 25% for only Brianna and Frontenac gris. Valiant had almost no powdery mildew on fruit clusters at PARS while St. Croix, Marquette, and La Crescent had 25-50% of clusters affected. In addition, 50-75% of clusters were diseased for Frontenac, Frontenac gris, and Brianna and over 75% of La Crosse fruit clusters were diseased. Even though powdery mildew is famous for developing under hot, dry conditions, our observations since 2015 suggest that this disease can also be very serious in cool, rainy conditions.

Figure 3: Powdery mildew on berries and Phomopsis lesions on leaves.

Other diseases

Rupestris speckle was found on less than 25% leaf area of Frontenac and Frontenac gris at WMARS. An extremely limited outbreak of ripe rot, caused by the fungus *Colletotrichum*, occurred in one block of La Crescent at WMARS.

Apple Diseases—What to Expect After a Cold Winter and Delayed Spring

By: Patty McManus

Plant disease development requires a pathogen, a susceptible plant, and an environment that favors disease development. If a disease has occurred in your orchard in the past, then almost certainly the pathogen is still there—pathogens generally don't go away, even if you don't notice the disease every year. Cold temperatures, such as those we had in Wisconsin this past late December and early January, can reduce pathogen populations, but there will probably be enough pathogen lurking to cause problems in 2018, if the weather is rainy during spring and early summer when most diseases take hold. Here are some things to keep in mind regarding early season diseases.

Apple scab. The apple scab fungus overwinters in apple leaves on the orchard floor. During late winter and early spring the fungus undergoes mating and develops spores. Just about the time that apple tree buds show green, spores start being discharged from old leaves on the ground. Spore discharge peaks just before bloom and then tapers off until about early June when all spores are spent. When spring is delayed, as it seems to be in 2018, trees tend to move quickly from green tip to bloom—as if the tree has "pent up" growth that leaps once we get a few warm days. The scab fungus will be on a similar delayed schedule and similarly is "pent up." When temperatures warm up, and there is rain, there will be large doses of spores discharged over a relatively short period. A challenge for scab control this spring might be keeping flushes of new growth protected with fungicides. Even though the first sprays will be delayed, you might have to spray at shorter intervals to keep new growth protected. Those who use copper as an early spray for double duty against scab and fire blight might want to use a lower dose this year. If trees move quickly from green tip to bloom, a lower rate will result in less copper residue present during bloom and early fruit set stages, and thereby minimize copper toxicity to fruit.

Powdery mildew. The apple powdery mildew fungus overwinters in dormant buds. In spring, as infected buds break, new leaves emerge "pre-infected" with powdery mildew. However, infected buds are less cold hardy than healthy buds, and when temperatures dip to -15 F or colder, infected buds die. Therefore, powdery mildew is often "killed off" in a particularly cold winter, because the buds themselves are killed. Conversely, powdery mildew can be particularly severe on new growth following a mild winter. I am not aware of any information on the effect of having several consecutive days with temperatures between -10 and 0 F, as we had in southern WI in late December and early January. I suspect that those temperatures over several days might have reduced the threat of powdery mildew for 2018. Nevertheless, you should protect susceptible cultivars (e.g., Honeycrisp), especially young orchards that need good terminal growth and trees that had powdery mildew last year.

Fire blight. This disease is caused by the bacterium, *Erwinia amylovora*. *E. amylovora* survives very well in bark at canker margins, and perhaps in rootstocks, no matter how cold winter is. If an apple tree survived winter, then *E. amylovora* in that tree also survived. The most important determinants of how much fire blight will develop is the degree of susceptibility of the tree and the weather during bloom through about mid June. Under favorable conditions (moisture and temps greater than 65 F) *E. amylovora* can double its populations every few hours. This means that even if you start with a very low amount of the pathogen, there will be enough to incite an epidemic, if the weather is conducive. The most effective treatment is streptomycin, which should be applied during bloom. Streptomycin has little or no effect if applied after bloom, because it is only locally systemic, while *E. amylovora* moves throughout the tree in vascular tissues.

Calendar of Events

April 21, 2018 – Hard Cider Apple Grafting Workshop
1 pm – 4 pm; DC Smith Greenhouse, 465 Babcock Dr., Madison, WI

May 3, 2018 – Apple Pruning Workshop
3 pm – 5 pm, N2296 Little Long Lake Road, Shell Lake, WI

May 31, 2018 – Berry Summer Field Day
8 am – 5 pm, N9895 Kluth Rd, Clintonville, WI

July 18, 2018 – Summer Apple Growers Field Day
8 am – 5 pm, Oakwood Fruit Farm, 31128 Apple Ridge Rd, Richland Center, WI

Useful Links:

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

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

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

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

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

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

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