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The Wisconsin Fruit News has a new outreach specialist!

This week, we welcomed our new associate outreach specialist, Elizabeth DiNovella. She's in charge of this newsletter and the Fruit News website <https://fruit.wisc.edu/>. Her email is edinovella@wisc.edu.

General Information

Apple silver leaf bulletin available

By: Patty McManus

Several apple growers in Wisconsin have been troubled in recent years by the disease silver leaf. Janet van Zoeren (former editor of Wisconsin Fruit News) and Patty McManus (UW-Madison plant pathologist) have produced a fact sheet on this topic that can be accessed from the UW-Madison Plant Disease Diagnostics Clinic web site. Go to <https://pddc.wisc.edu/2019/03/05/silver-leaf/>.



Young, vigorous high-density apple trees, with trees showing symptoms of silver leaf (on the right) adjacent to those that do not (on the left).

African fig fly pest alert

By: Elizabeth DiNovella

African fig fly has been detected in Wisconsin on and off since 2012 and can be found in traps intended to monitor spotted-wing drosophila. Janet van Zoeren (former editor of Wisconsin Fruit News) and Christelle Guedot (UW-Madison Department of Entomology) wrote a pest alert factsheet about it.

Link: <https://pddc.wisc.edu/2019/04/18/african-fig-fly/>

UW-Madison/Extension Insect Diagnostic Lab update

By: PJ Liesch, UW Insect Diagnostic Lab

With many landscape plants starting to break dormancy, overall insect activity has increased over the last two weeks. Fruit crop insect activity is still relatively low, but is expected to pick up in the near future. Insect reports and samples at the UW Insect Diagnostic Lab (IDL) are beginning to increase for the year.

Brown Marmorated Stink Bug: BMSB continues to be one of the top reported insects at the UW Insect Diagnostic Lab. Approximately 10% of all insect cases at the IDL this year have been of BMSB. The vast majority of reports are of BMSB adults in, on, or around structures where they had overwintered. However, the stink bugs may soon move onto plants as green foliage emerges.

Grape Flea Beetle: Activity of this insect has not yet been reported at the UW Insect Diagnostic Lab this year, but with the swelling of grape buds, growers should be on alert for this pest. The IDL typically sees reports of grape flea beetle beginning in late April and early May.

Spring Caterpillars: Eggs of many of our spring caterpillars hatch around the time bud break of their host plants. Based on accumulated growing degree days thus far, the eggs of two common fruit crop pests (Eastern Tent Caterpillar and Gypsy Moth) may be hatching in southern parts of Wisconsin. Activity of these and other caterpillars will be increasing in the next few weeks.

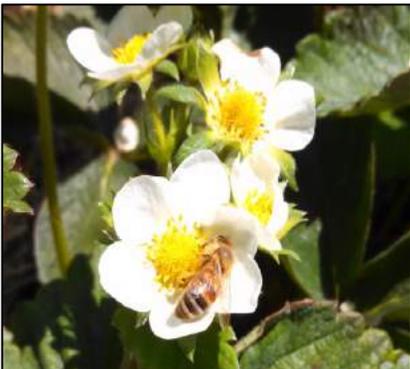
Spring Pollinators: Pollinator activity is rapidly increasing in the state. Observations and reports coming in to the IDL indicate lots of activity of honey bees, bumble bees, and some of the wild bees, including certain mason bees (*Osmia* spp.) and others. Growers should be particularly aware of pollinators and their activity when spraying around the time of bloom.

Berry Crops

Stocking densities of managed pollinators for berry production

By: Christelle Guédot, UW-Madison Department of Entomology

Berry crops are dependent on pollinators for optimal fruit yield. Some growers rely on managed pollinators for their pollination services by either renting hives for the western European honey bee (*Apis mellifera*) or purchasing colonies of the common eastern bumble bee (*Bombus impatiens*). Other growers rely on wild bees nesting in and around their farms to pollinate their crops.



Honey bee visiting strawberry flower

For growers using honey bees, the recommended number of colonies per acre varies depending on the crop you grow. For raspberry and strawberry the stocking density recommended is one colony per acre while for blueberry, it is recommended to use on average three hives per acre (depending on the blueberry cultivar). For berry crops, it is best to bring in hives after the crop starts to bloom to entice bees to forage on the crop. This is due to the fact that small fruit crops tend to be less attractive to honey bees compared to other flowers because of their shape and somewhat low nectar production. Blueberry bloom is short and flowers need to be pollinated within three days after they open. Thus it is recommended to move bees into blueberry fields

after 5% bloom but before 25% of full bloom.

Bumble bees are native bees that are active during cooler and more overcast days than honey bees, making them great pollinators in the spring. They also visit flowers faster and deposit more pollen per flower visit than honey bees. In blueberry production, the recommended stocking density is three bumble bee colonies per acre and overall for fruit it is between 0.5 to 3 colonies per acre.

Whether you decide to rent honey bee hives, purchase bumble bee colonies, or simply rely on naturally occurring wild bees in and around your farm, research from Michigan suggests that, at least in vine crops and blueberry, at the recommended stocking densities, bumble bee pollination resulted in similar yield and fruit quality as honey bee pollination, and similar to pollination from high native pollinator populations.

Happy growing season!



Wild bee visiting a blueberry flower

Cranberries

Degree-day based models not available

By: Elizabeth DiNovella

Unfortunately, we are unable to provide DD models this week. We hope to provide this information again in the future.

Grapes

Grape Variety Developmental Stages: April 26, 2019

By: Jacob Scharfetter, Elizabeth DiNovella, and Amaya Atucha

At the West Madison Agricultural Research Station (WMARS) in Madison, WI, shoot development across most cultivars ranged between E-L stage 2 (“Bud scales opening”) and stage 3 (“Woolly bud with or without green showing”). Given current weather forecasts budburst (E-L stage 4) should be expected early next week. Currently, grapevine buds are phenologically one week ahead of 2018 season and are on par with the 2017 phenological development. At the Peninsular Agricultural Research Station (PARS), all varieties are still at E-L stage 1 (“winter bud”).

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

Following photos were taken on April 22, at West Madison Agricultural Research Station



Brianna
 “Bud Scales Opening”
 E-L stage 2



Crimson Pearl
 “Bud Scales Opening”
 E-L stage 2



Frontenac
 “Bud Scales Opening”
 E-L stage 2



Itasca
 “Woolly Bud”
 E-L stage 3



La Crescent
 “Woolly Bud”
 E-L stage 3



Marquette
 “Bud Scales Opening”
 E-L stage 2



Petite Pearl
 “Bud Scales Opening”
 E-L stage 2

Date: April 1 – April 22

Growing Degree Days
 (Base 50°F)

	2019	2018	2017
Location: WMARS	59	8.1	69.8
Location: PARS	5	0	13.5

Depicted are the growing degree-day accumulations from April 1 to April 23 for the past three seasons. Currently, the 2019 season is running ahead of both the 2017 and 2018 seasons. Degree-days were calculated using a base 50°F, starting on April

1 as a biofix. The abbreviation “BE” (Baskerville-Emin”) refers to the specific way in which to calculate degrees, using a sine wave instead of a simple average temperature calculation – this should provide a somewhat more accurate estimation of degree days. We calculated degree days using the NEWA website, and you can visit their “About degree days” page to learn more about the degree days and the formulas used for their respective calculations (<http://newa.cornell.edu/index.php?page=about-degree-days>).

Grape flea beetles are here

By: Christelle Guédot, UW-Madison Department of Entomology



Grape flea beetle adult.

Grape flea beetles have been spotted at the West Madison Agricultural Research Station and at some vineyards last week. You should make sure to actively scout for flea beetle (photo 1) on your vines and pay attention to bud damage indicative of the presence of either flea beetle or cutworm feeding (photo 2).



Grape bud with a hole from flea beetle feeding. This was diagnosed as flea beetle damage, rather than cutworm, due to adult flea beetles found nearby.

If the spring temperatures remain warm as they currently are, at least in Southern Wisconsin, we should have a shorter window of flea beetle activity and less damage to the buds than last year. Early season damage to 2-5% of buds warrants an insecticide application. Several insecticides can be used to control flea beetle, including Baythroid XL, Danitol, Sevin XLR Plus, and Scorpion.

Happy growing season!

Tree Fruits

Impact of Last Winter on Apples Diseases

By: Patty McManus, UW-Madison Department of Plant Pathology

Weather conditions during the growing season have a great impact on plant disease occurrence and severity. This is the basis for disease prediction models that are available on the NEWA web site (newa.cornell.edu) or from companies that sell weather-monitoring equipment (e.g., Spectrum Technologies). But what about events such as last winter’s polar vortex? Did pathogens die from extreme cold? Unfortunately, in most cases, the answer is probably no, or even if they were knocked back, there will still be enough to cause disease in 2019. Here I review how apple diseases might be affected (or

not) by the prolonged low temperatures throughout much of Wisconsin in January and February and the somewhat delayed spring.

Apple scab. The apple scab pathogen overwinters in scabby leaves on the orchard floor. Wisconsin was blanketed in snow by the time the really cold temperatures set in last winter. The snow insulated leaves on the ground from extreme temperatures, so unfortunately, you can expect the usual scab spore load this spring. Scabby leaves that remained on the tree in December and January are not a threat. The scab fungus in those leaves was likely killed by cold, dry air. Having a somewhat delayed spring (at least by modern standards) has given growers more time to prepare for scab sprays. However, a delayed spring means that apple bud development will be compressed, moving very quickly from green tip to bloom. Likewise, the scab fungus, rather than releasing spores over an extended period of time will do so over a compressed period, meaning very high risk for infection just at the time that fruit are most susceptible (bloom to petal fall). Mixing a broad-spectrum protectant fungicide (e.g., captan, mancozeb) with a locally systemic fungicide (e.g., sterol inhibitor) at bloom to petal fall is critical. Also, keep in mind that if you applied a high rate of copper at green tip for fire blight and scab control, and trees move quickly from green tip to bloom, there is a greater risk of copper residues being present at bloom, which in turn can scar fruit. You can't undo the high rate if already applied, but do not apply additional copper.



Apple scab

Fire blight. The fire blight pathogen, *Erwinia amylovora*, has no problem surviving cold winters. In the lab, researchers store *Erwinia* in glycerol as an antifreeze at minus 112 degrees Fahrenheit. In nature, trees provide a natural antifreeze for *Erwinia*, and the trees themselves would die from cold before the pathogen would. Even if the low temps of last winter killed some *Erwinia*, as a bacterium it grows very quickly meaning you can start with almost nothing and end up with a lot under ideal conditions (65-80 degrees F and moisture). What matters most for fire blight development is conditions during bloom and when shoots are rapidly growing in early June.

Canker diseases. Extremely low temperatures predispose woody plants to canker pathogens and opportunistic fungi that infect branches and trunks through winter cracks. Apple is at its northern limit of production in northern Wisconsin, so it's not surprising that from time to time we will see losses caused directly by low temperatures and indirectly by fungi that invade weakened trees. We are fortunate that the ground was protected by snow last winter

when the cold weather hit, or we'd be seeing whole-tree decline from root injury as well.

What can you do at this point? Keep in mind that while canker pathogens proliferate in bark tissue, they also can invade xylem (water-conducting tissue). If a tree has enough water, it can often "wall off" the canker pathogen and thrive as normal. But if the tree is under drought stress, the canker fungus will continue to invade and encircle branches or trunks.

Powdery mildew. This one is a good news/bad news story. The good news: apple powdery mildew overwinters in living tissues of buds, but it dies at temperatures of minus 15 to minus 20 F, which were common last winter. The bad news: apple buds die at those same temperatures. Of course, not *every* bud was killed, and some cultivars and trees will fare better than others. Nothing we can do about this, but keep it in mind if you notice a light bloom. If you have cherry trees, you can expect powdery mildew as usual, because the cherry mildew pathogen overwintered in leaves on the ground protected by snow, similar to apple scab.

Other diseases such as rust and sooty blotch/flyspeck are not appreciably affected by unusually cold winters. Rust diseases overwinter on alternate hosts (junipers, which are sometimes called cedar) in a dormant phase that is well-adapted to cold and desiccation. The many fungi that contribute to the sooty blotch/flyspeck complex overwinter on a wide variety of woody plants, including brambles and wild grape that are protected by snow cover. As with most other diseases, it's conditions during the growing season that determine how much sooty blotch/flyspeck develops on fruit.



Powdery mildew

Managing San Jose scale in your orchard

By: Christelle Guédot, UW-Madison Department of Entomology

San José scale is a tree fruit pest that has become increasingly problematic for apple growers in Wisconsin and all other tree fruit production regions. Once established, it can be difficult to control despite the use of control measures. Losses resulting from the presence of scale insects and the red spots on fruit can lead to severe economic losses (see pictures below). For more information on the biology and monitoring of San José scale, please refer to this [factsheet](#).



San José scale damage on apple fruit (left). San José scale black cap stage (center), female (upper right) and male (lower right).

Photos courtesy of Greg Krawczyk (Penn State University), E. Beers (Washington State University), and S. Schoof (North Carolina State University).

It is important to scout for the presence of scales in the spring before adults emerge. Scouting should occur on the woody parts of the tree, on the branches and trunk, in the spring. At

this delayed dormant period (green tip to pink stage), an application of a superior horticultural oil with an insecticide can be effective at controlling this pest, though control can be difficult to achieve due to cold temperatures in the spring.

Oils should be applied when the temperature is above 40°F (never during freezing weather) and under calm conditions to allow for thorough coverage of woody tissue. Thorough coverage is particularly important with horticultural oils as they work at this delayed dormant stage by smothering overwintering scales that are on and under bark and nestled behind buds in spurs. European red mites would also be targeted by this application which would help in orchards that saw high populations of European red mites last year. Oil can cause phytotoxicity on green tissue and should be avoided by not spraying 48 hours before and after a frost event or in very hot (over 85°F) and humid conditions. In addition, sulfur and Captan should not be applied within several days of oil applications to avoid phytotoxicity.

Oil can be applied in combination with an insecticide. The most effective insecticides for San José scale early in the season include Lorsban (chlorpyrifos), Esteem (pyriproxyfen) and Centaur (buprofezin). Esteem and Centaur are both insect growth regulators (IGR) and both provide excellent control for San José scale alone when applied at half inch green and can benefit from adding oil to increase penetration when conditions are right. Refer to the [2019-2020 Midwest Fruit Pest Management Guide](#) for more information. Always follow all label guidelines and use oils with care to avoid phytotoxicity.

Happy growing season!

Pollen Tube Growth Model- A New Tool for bloom thinning

By: Amaya Atucha, UW-Madison Department Horticulture

This model is a new tool, available through NEWA, that provides more precision during bloom thinning. This has generally been a time in which many growers prefer not to apply thinners because of the uncertainty on potential late spring frosts. However, early thinning has tremendous benefits for the current year production, but most importantly for return bloom, specially in biennial bearing cultivars as Honeycrisp and Fuji.

The pollen tube growth model (PTGM) predicts, based on ambient temperature, the time it takes for flowers of multiple cultivars to be fertilized (union of sperm and egg) after they have been pollinated. Fertilization happens in flowers when a pollen grain lands in the flower stigma and grows down through the style to be able to reach the ovules in the flower's ovary and fertilize them to produce fruit (Figure 1). However, the time it takes for the pollen tube to reach the ovules will depend on ambient temperature, as well as the length of the style, which is cultivar dependent. The model accounts for a set number of flowers to be fertilized, based on the target crop for a specific block, and then a bloom thinner is applied to remove all the rest of the flower.

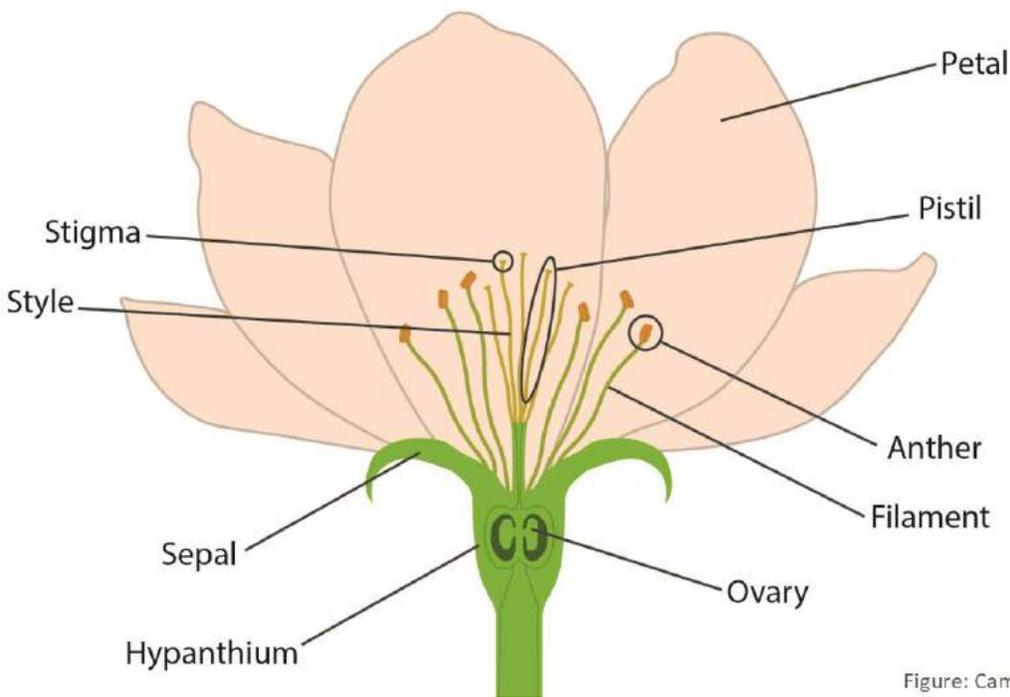


Figure: Camilo Villouta

Figure 1. Apple flower sketch depicting the style which needs to be measured to use the pollen tube growth model.

Here are the steps needed to use the model:

- 1) First you need to determine your target crop for the block (see article [Target crop load-Supplemental issue May 11, 2018](#)).
- 2) As soon as the trees begin to bloom, the grower should measure the longest style on 25 to 50 blossoms throughout the block to calculate the average style length, which is entered in the model.
- 3) Then count the total number of open flowers on five to ten representative trees in the block, and when there are enough blooms open on the trees to achieve the target yield (for example, 100), the model should be started. It will predict pollen tube growth (as a percentage of the average style length), based on the weather data.
- 4) The grower should check the model routinely, and once the pollen tube model predicts 100-110% of mean style length, apply a chemical thinner. At this point, the desired number of blooms should be fertilized and the thinning product should prevent further fruit set.
- 5) After the chemical thinner is applied, the model will reset the pollen tube growth to zero, this will allow further thinner application to prevent later opening blossoms from being fertilized. For this continue to run the model, but apply bloom thinning sprays when the model predicts pollen tubes are less than 75 percent of the average style length, this will ensure that those flowers will not be fertilized.

How to measure the length of style?

To measure the styles, remove the petals from the flower, followed by removing the sepals to be able to see the base of the styles. Then measure the longest style from each flower with a digital micrometer, caliper, or ruler. Unfortunately, the length of the style from the same cultivar will vary from year to year, so this measurement must be done annually if using the model.

The PTGM is available on the NEWA website. Here's a link to one of the blog posts from NEWA that provides instruction and technical information about the PTGM.

[NEWA Pollen Tube growth Model](#)

Calendar of Events

May 7, 2019 - Early Season Grower Workshops

Valley Corporation, Tomah WI
Elm Lake Cranberry, Wisconsin Rapids, WI

May 22, 2019 – Berry Spring Field Day

Witte's Vegetable Farm, Cedarburg, WI

July 11, 2019 – Apple Summer Field Day

Bushel & a Peck Market, Chippewa Falls, WI

August 14, 2019 – Cranberry Summer Field Day

Dubey Cranberry, Junction City, WI

August 19-21, 2019 – NACREW conference

Vancouver, BC, Canada



Grape flea beetle

Useful Links:

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

You can purchase (\$10) the 2019 Midwest Fruit Pest Management Guide: <https://ag.purdue.edu/hla/hort/documents/id-465.pdf>

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

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

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

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

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If you have any questions or comments about the Wisconsin Fruit News issues, please contact Elizabeth DiNovella at edinovella@wisc.edu.