Wisconsin Fruit News

Volume 1 Issue 5– June 10, 2016

In This Issue:

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Events this Week

June 14, 2016 – Monroe and Richland County Fruit Field Day
9:30-4:00, Field of Dreams Blueberries, 23897 Destiny Avenue, Tomah
And Lazy Patch Farm, 33351 State Rd 154, Hill Point

June 15, 2016 – Advanced Organic Orchard Management Field Day
9:00-4:30, Atoms to Apples, Mount Horeb and Two Onions Farm, Belmont

June 16, 2016 – WGGA Vineyard Walk
3:00-6:30 pm, Dancing Dragonfly Winery, 2013 120th Ave, St Croix Falls

General Information

UW-Madison/Extension Plant Disease Diagnostic Clinic (PDDC) update

By: Brian Hudelson, Sean Toporek, and Ann Joy

The PDDC receives samples of many plant and soil samples from around the state. The following diseases/disorders have been identified at the PDDC from May 21, 2016 through June 3, 2016.

PLANT/ SAMPLE TYPE	DISEASE/ DISORDER	PATHOGEN	COUNTY
FRUIT CROPS			
Apple	*Black Rot*	*Sphaeropsis sp.*	*Dane*
	Cytospora Canker	*Cytospora sp.*	*Dane*
Blueberry	*Fusicoccum Canker*	*Fusicoccum sp.*	*Winnebago*
Cherry	*Sooty Mold*	*None*	*Dodge*
Grape	*Herbicide Damage*	*None*	*Pierce*

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 the UW-Madison as being active in the state, and have the potential to impact fruit production in the region. If you would like more information about the UW Insect Diagnostic Lab, you can visit our website.

-**Tent Caterpillars** (both Eastern tent Caterpillar and Forest tent Caterpillar) are active. Based on the size of larvae recently spotted, feeding should nearly be done in the southern part of the state. More northern locations may still see some activity over the next few weeks.

-**Rose Chafer** is associated with areas of sandy soil. The first reports for the year have come in to the UW Insect diagnostic lab in the last week. This pest can feed on some fruit, such as grapes and tree fruit. There is usually a short period of activity of 2-3 weeks, so damage only occurs for a short period of time.

-**Scale insects** (such as *Lecanium* scales) had a great year in 2015, and I'm still getting reports of honeydew production this spring. These insects can attack hardwood landscape trees and also fruit trees.

-**Speckled Green Fruitworm** was very abundant and widespread in 2015, but has been quieter in 2016. A report came in this week from Door County.

Berry Crops

New Strawberry Plant Care in the Field

By: Brian R. Smith, State Extension Fruit Specialist, UW-River Falls

Proper establishment of new junebearing strawberry plants in the field is critical to the success of the strawberry business. It is very easy to delay or omit the important cultural procedures involved in new field establishment, especially when older bearing beds begin to fruit. However, new plantings will have much greater productivity with sound establishment procedures. Longevity is a product of optimum plant densities, plant vigor and productivity and successful annual and perennial weed control. Up to a point, greater planting longevity will translate naturally to lower growing costs. The question of longevity, though, must be tempered with sustainable practices. If you plan on keeping a bed more than three fruiting seasons (my recommendation for long-term farm sustainability to prevent pest build-up and allow for possibly shorter rotations) then you should have sufficient land available to allow for longer rotation periods.

A short-term benefit of optimum first year plant establishment will be that the first bearing year yields and fruit size should be the best of the life of the planting. If your first year yields are **not** the best of any successive years, some cultural aspect was not addressed, assuming winter injury, spring frosts, or other stresses did not play a role. Although variables such as time of planting and initial plant spacing are very valid aspects of successful first year establishment, it is assumed that your actual planting date was four to six weeks ago. If you have not planted yet, all is not lost, but you will probably not have that first bearing year performance that growers would experience from planting in April or early May. The goal is to obtain the desired daughter plant pegged-down plant density by June 25th, so that they will eventually develop the optimum crown size/number and leaf mass by August 15th in order to initiate a maximum number of flower buds throughout the fall. Junebearing strawberries are short-day plants and as photoperiod (daylength) falls below 13 hours and temperatures cool, they start initiating flower buds for the crop next year.

Young, newly-planted junebearing strawberry plants will flower the first year; the objective is to prevent them from fruiting so they can divert their energy to vegetative growth. Flower removal is a critical step in establishment success to

prevent young plants from becoming stunted, right at the time of year they should be growing the fastest. Depending on the crown size at planting, there may be from one to three inflorescences (flower scapes) that appear. In addition, if there was significant variability in plant grading size (one or more crowns per plant), there may be an even greater need to make multiple passes through the field in order to remove all of the inflorescences that might appear. They should be picked off as soon as they appear and never be allowed to get to the point where young fruit can be observed. Do not try to pinch or pull them off with one hand unless scissors are used; otherwise, stabilize the plant with one hand and remove the inflorescence with the other. Some growers purchase a tow-behind harvest platform that allows a blossom-picker to recline while cutting inflorescences instead of all that bending over…

The basic idea for fertilizing and watering young plants versus an established bed is that young plants should always have "less and more often" for both variables. Drip irrigation is ideal in that very low concentrations of fertilizers can be added at every watering, usually about 3-4 lbs of actual nitrogen/acre/week. Use a soil moisture sensor (measures soil moisture based on electrical resistance) or tensiometer in order to make informed decisions on soil moisture levels, and maintain between 50-65% of field capacity for optimum growth. If drip irrigation is not used on your farm, sprinkler irrigation should be applied with the same principles in mind.

Most fertilizing post-planting consists of nitrogen side-dressings (assuming that a soil test was taken and recommendations were duly followed for the less mobile nutrients). Common nitrogen sources include urea, potassium nitrate, calcium nitrate and ammonium sulfate. The ideal schedule should be 10-15 lbs of actual nitrogen per acre, every 2-3 weeks on sands and every 4- to 5-weeks on clays and loams. Typically, most growers end up applying fewer times, broadcasting 30 lbs actual nitrogen per acre 4- to 6-weeks post planting and two more applications of the same rates around July 15th and August 20th. In addition, a mid-September application of nitrogen to support flower bud formation later in to the fall can be very beneficial as strawberries can initiate flower buds in temperatures as low as 42^0F. Foliar feeding with a sprayer can work but I do not like this method because the extra trips across the field can cause compaction problems.

Growers can fine-tune a nutrition program by taking leaf tissue samples and having them analyzed. Remember that different labs have different recommendations on when to take samples for first year plants. Boron is a micronutrient that tends to be overlooked; it is quite mobile and needed for flower bud initiation and fruiting. It is applied at least once per year, and sands are most likely to be deficient.

Plant density and runner placement should be monitored on a regular basis. The optimum plant density depends on the cultivar as some cultivars have very large crowns, like 'Valley Sunset', while others have small plants/crowns, like 'Glooscap'. A general guideline is that daughter plants should be 4-6" apart. As soon as daughter plants have one to two fully-expanded leaves and strong root initials are showing, it is time to place and anchor the runners. In the past, when labor was not so expensive, growers would use hairpins to anchor the plants but just about anything will work, including a little soil mounding, rocks or whatever is available. Typically, plant density can become too high later on in the season and excess runners may need to be pulled to the aisles and cut off with coulters, a multivator, or hoe.

The actual row may also need to be narrowed, which should take place no later than September 20th, in order to allow the planting to recover before winter. Row width should not be allowed to widen past 18inches. The picture at right of plants in the foreground is about how they should look by the end of June.

Weed control is of utmost importance for the first year. Young strawberries have virtually no competitive ability when it comes to even small weeds. Some version of glyphosate is usually used to help prepare the bed for planting, especially if perennial weeds were a problem. Unfortunately, glyphosate does not take care of perennial weed seeds and does not always fully kill well-established perennials like quackgrass and field bindweed. It

is always a good idea to scout for hot spots of perennial weeds and kill them with spot sprays, even if it means having to kill some strawberry plants in the process. Quackgrass rhizomes can spread over 50' in one growing season if given a chance, so before you know it, one small hot spot can become a very large one by the end of the first year.

There are several herbicides that can be used in first year strawberry fields but my top pick is no herbicides. Even with herbicides labeled for first year strawberry weed control, there is a high likelihood that there is going to be a certain amount of negative effect on the strawberry plants also, even though labeled rates are typically carefully studied before a label is developed. Ideally, shallow mechanical weed control should be utilized. Running through the field with a Buddingh In-row weeder (shown in picture at left), multivator, basket weeders, rotary hoes or the like can do wonders when the weeds are still in the "white thread" stage and have not emerged yet. Shallow cultivation has the added advantages of less root damage to the young strawberry plants, and fewer weed seeds being lifted up to germination depth from lower in the soil profile. With the right mechanical equipment, it is surprising how little the old hand hoe has to actually be used and how significantly labor costs can be minimized. Once the plant-stand starts building up within row, straw can be used as an organic approach to control weeds within the aisles.

Some of the insect pests one could likely encounter in new plantings are potato leafhoppers, leafrollers, aphids and white grubs. One of the serious diseases that appears in new plantings is Verticillium wilt. There are a number of good IPM manuals available for pest identification and control recommendations. Once you accurately ID a pest, refer to the 2016 Midwest Fruit Pest Management Guide that can be downloaded free as a pdf. Strawberries can be a profitable and rewarding crop to grow but only if good cultural procedures are followed in the establishment year. Your efforts the first year will be multiplied many times in the future.

Mild winter and risk of spotted wing drosophila infestation

By: Christelle Guédot

This past winter has been relatively mild, which raises concerns across the country (see recent article in Fruit Growers News) about the potential for early season infestation of fruit crops by spotted wing drosophila (SWD). For caneberry growers, this could translate to earlier and heavier infestation levels. For strawberry and cherry growers, this could be a serious problem, as SWD may be present in high enough numbers at harvest time to cause significant damage to these fruit.

Spotted wing drosophila male (left) and female (right). Note the spot on the male wings and the ovipositor on the female

In fact, we received information from Matt Stasiak, superintendent of the Peninsular Ag. Research Station, on June 8th that they caught the first SWD female in Wisconsin for this year in a cherry orchard in Door County. Michigan reported their first SWD in northwest and southwest Michigan on June 3rd. Since its arrival, SWD has not been seen in susceptible fruit crops until the end of June or early July in Wisconsin, which has allowed strawberry to escape SWD infestation.

The growing degree days (GDD) in Door county are exactly the same as in 2015 (~398 GDD) and are very close between years in Dane county (612 GDD in 2016 vs. 660 GDD in 2015). However, we have not caught any SWD in Dane county as of June 8, 2016. This raises a lot of questions that we do not have the answers to right now: why are they showing

up in Door county before other parts of the state this year?; why are they detected much earlier (2-3 weeks) than previous years when GDD are not ahead of last year?…

As we try to answer these questions, it is important that strawberry and bramble growers this year think about monitoring for SWD and scout berries for SWD damage and the presence of SWD larvae in berries. Fruit should be sampled for the presence of larvae regularly. To do so, simply cut fruit open and look for larvae, or place suspected fruit in a Ziploc--type bag, slightly crush the fruit and add a salt water solution (1/4 cup salt and 4 cups water). Leave the fruit in the mixture for one hour so that dislodged larvae will float.

If you detect infested fruit, practice sanitation by removing overripe and damaged fruit. Destroy unmarketable fruit by freezing, solarizing inside a clear plastic bag, or burying the fruit at least two feet deep. Do NOT compost infested fruit as it will provide a warm place for SWD to develop! Freezing berries will kill SWD and refrigerating berries (<40F) will stop further development of eggs and larvae inside the fruit, and may kill eggs and larvae after longer refrigeration periods. It is thus recommended to keep berries cool as much as possible, from processor to market to consumer, as this will minimize the chance that larvae will continue to develop inside fruit.

There is no economic threshold for SWD, so if fruit is ripening and SWD flies are trapped in your monitoring traps or larvae are detected in the fruit, you may need to apply some chemical controls. If you decide to spray, apply insecticides in short intervals (5-7 days) to prevent crop infestation, and continue to spray from when the fruit is beginning to ripen until harvest is completed (taking pre-harvest intervals into account). A list of insecticides that have been shown to be effective against SWD in strawberry is provided below.

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	No more than 10 quarts/acre/year Max of 5 application/year 7-day interval between applications **Caution:** may injure Early Dawn and Sunrise varieties
Organo-phosphates (1B)	Malathion	Malathion	12hrs	3	1.5 – 3.2 pints	Excellent	No more than 2 lbs. a.i./year No more than 4 applications per year 7 day interval between applications
Pyrethroids and Pyrethrins (3A)	Brigade WSB	Bifenthrin	12hrs	None	6.4 – 32 oz.	Good	Max of 80 oz./acre/year 7-14 day interval between applications
	Danitol 2.4EC	Fen-propathrin	24hrs	2	10 ⅔ – 21 ⅓ fl. oz.	Excellent	Max of 42 ⅔ fl. oz./acre/year Max of 2 applications/year
	Pyganic **OMRI**	Pyrethrum	12hrs	12hrs	16 – 64 oz.	Good	Recommended that final spray mix be buffered to pH of 5.5 - 7.0 day interval between applications
Spinosyns (5)	Entrust **OMRI**	Spinosad	4hrs	1	1.25 – 2 oz.	Good	Max of 9 oz./acre/season Max of 5 applications/year or 3 applications/crop 5 day interval between application

This is not a comprehensive list. Trade names are provided as examples of specific active ingredients. Other products may be registered with the same active ingredient and no endorsement or recommendation of a particular trade name is implied. Research is ongoing and recommendations for SWD are constantly changing as research results become available. Please, make sure to always read and follow label instructions carefully. Human error happens, so please double check rates and other information on the label! Happy growing season!

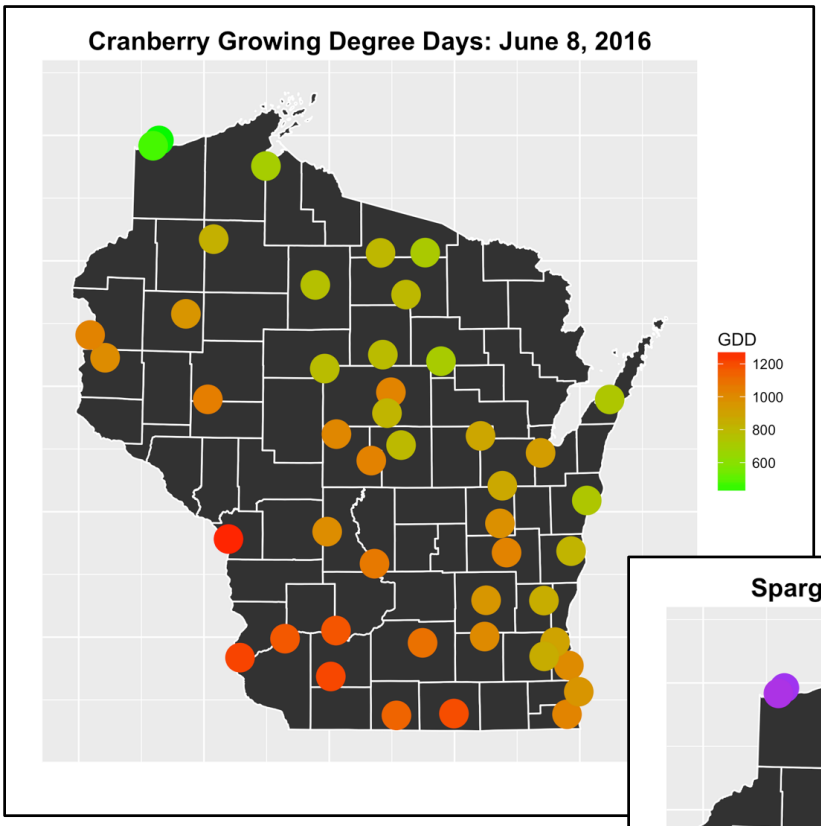
Cranberries

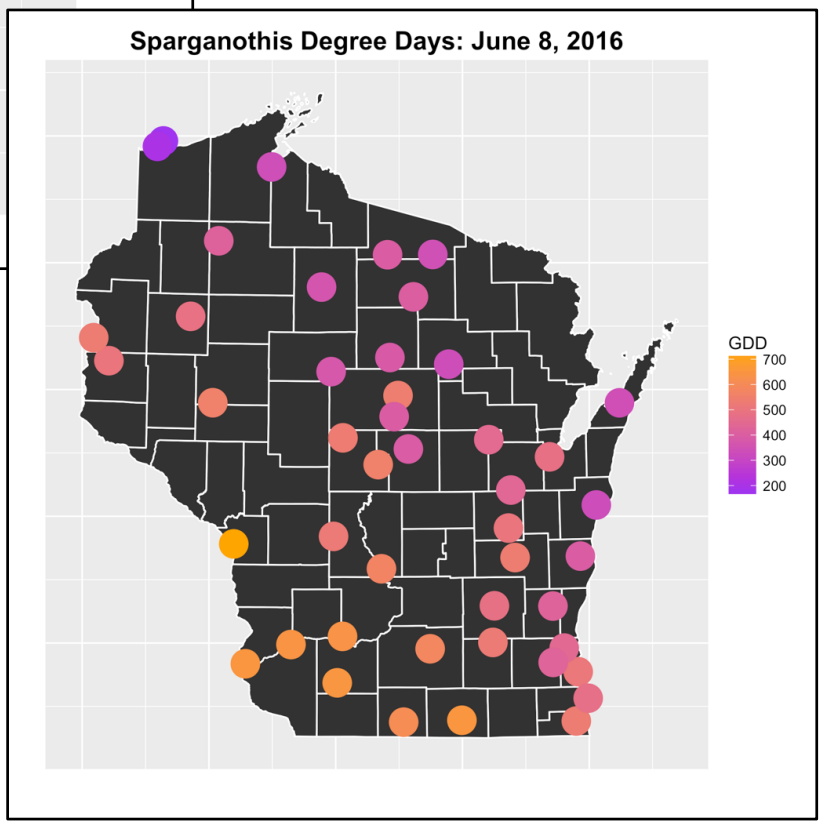
Cranberry Degree-Day Map and Update: as of June 8, 2016

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 June 8, 2016. Temperature thresholds used for these calculations are 41 °F and 85 °F for the plant, and 50 °F and 86 °F for *Sparganothis*.

Throughout WI, plant degree-days ranged from a low accumulation of 426 DD to a high of 1293, while Sparganothis degree-days ranged from a low of 177 DD to a high of 716 DD.





The image at right details life history benchmarks of interest for *Sparganothis* fruitworm and associated degree-day estimates. With flight initiation around 595 DD, *Sparganothis* flight is predicted to have started in parts of WI. **Indeed, we did see the first *Sparganothis* moths in some parts of central WI in the past week.** Reminder that insecticide applications aimed at *Sparganothis* adults will have the greatest effect on population reduction if timed for peak flight (approximately 885 DD).

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

* Egg hatch window: 895 – 1,890 DDs

The table below allows for comparison of degree-days over the past three years. Observations from the past couple of years suggest that, in central WI, most beds may be beginning to enter bloom. In northern WI, plants are more likely in roughneck and hook.

June 8	Cranberry Growing Degree Days			Sparganothis Degree Days		
	2014	2015	2016	2014	2015	2016
Central WI (Wisconsin Rapids)	902	1093	1037	494	595	553
Northern WI (Minocqua)	738	821	806	395	408	397

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 May 30th, 2016 issue of the Cranberry Crop Management Journal you will find information about: Upcoming degree-day benchmarks, viruses, observations from the field, the insecticide Intrepid, and grower updates.

Grape Disease Update

By: David S. Jones and Patty McManus

Summer temperatures have arrived for most of Wisconsin, with daily temperatures climbing into the 70s and 80s over the past week in most grape-producing regions of the state. In addition to the warm temperatures, we have had numerous rain events over the past two weeks across the state. While this weather has sped up grape growth, these warm, wet conditions have also been ideal for disease development.

PARS. As of June 8th we had accumulated 340 GDD (base 50) and had recorded 10 rain events in the previous two weeks, with more in the forecast in the next several days. Development is slower than at WMARS in this region. Shoots are between six inches and one foot in length, and early bloom is several days away. No disease has been detected at this site thus far. Growers in this region should be monitoring wild grape blooms in addition to weekly scouting to keep tabs on when bloom will occur. Wild grapes bloom several days before our cold-climate wine hybrids, so tracking wild grape development is a useful tool for initiating a spray schedule. A protective spray against downy mildew and black rot will need to be made shortly before bloom.

WMARS. As of June 8th we had accumulated 503 GDD (base 50), and had recorded 9 rain events in the previous two weeks, again with more rain on the forecast for the next several days. Most cultivars are in bloom at this time, and shoots are between one to three feet long. Black rot symptoms were detected for the first time on 'Marquette' and 'Valiant' at WMARS on May 31st. Leaf lesions were widespread on the first 2-3 expanded leaves of shoots on both of these cultivars. This concentration on the oldest expanded leaves in the canopy is typical of early season black rot, so make sure that you are checking the oldest leaves on your shoots for lesions when scouting. Also make sure to look for the small, black "pimples" inside of the lesions. These are pycnidia (fungal fruiting bodies), and are used to diagnose black rot in the field.

Above: black rot lesions on a fully expanded young Marquette leaf. Check for black rot lesions on the oldest leaves (those near the base of the shoots), as infection is concentrated on these oldest leaves at this time of the season. *Photo by D.S. Jones*

Above: black rot lesions on a fully expanded young Valiant leaf. Notice the rings of tiny, black pycnidia (fungal fruiting bodies that are characteristic of black rot infection) as you scout. *Photo by D.S. Jones*

Growers across Southern Wisconsin should make sure they have a cover out for black rot over the next several weeks as grape blossoms open up. Research has indicated that grapes are at their peak susceptibility between early bloom and about 4- to 6-weeks post-bloom, and the weather we have been having throughout the region is highly conducive for black rot development. Black rot can infect in as little as 6 hours of leaf wetness at 80° F, so extreme care should be taken at this time of year to prevent crop loss.

Mancozeb provides excellent control for black rot, but remember that its use is restricted by a 66-day pre-harvest interval (PHI). Sterol-inhibitor fungicides also provide control against black rot, providing several days of post-infection activity. Several generic fungicides contain tebuconazole, a sterol-inhibitor chemistry. Strobilurin fungicides containing azoxystrobin are also effective, but should only be used as protectants, as the post-infection activity of these products is limited. It is also important to remember that several of these fungicides, such as Flint and Pristine, can cause severe injury to concord grapes. Many of the cold-climate wine grape varieties have concord grape (*Vitis labrusca*) or other American grape heritage, so great care should be used when selecting the appropriate product. Comments on phytotoxicity may be found in the 2016 Midwest Fruit Pest Management Guide.

Conditions across southern Wisconsin have also been ideal for downy mildew infections. Make sure that you are also inspecting the undersides of leaves throughout your vineyard as you scout. Remember that downy mildew will sporulate in white patches on the undersides of leaves. Additionally, we have found that some of our cold-climate cultivars can have sporulation on leaf undersides without the "oil spots" on the tops of leaves that are often also associated with this pathogen.

Ridomil Gold MZ and Ridomil Gold Copper provide excellent downy mildew control, but their uses are restricted by a 66-day PHI, and are meant for use only prior to bloom. Products containing phosphorous acid are also effective, but do not control other fungal diseases of grape and should only be used to control downy mildew rather than as a broad spectrum management practice. Strobilurin fungicides used as protectants (such as Sovran and Abound) provide good control with additional effectiveness against black rot and powdery mildew, but as previously mentioned it is critical to check for phytotoxic effects before applying strobilurin products because several other products (such as Flint and Pristine) can cause severe phytotoxic effects on cold-climate hybrid grapes. Copper-based fungicides are effective against downy mildew, and some formulations are approved for organic production. However, in our research on sensitivity of cold-climate cultivars to copper, 'Brianna' was highly sensitive, sometimes showing injury after just one application. Several other varieties showed injury, but only after four to six applications. See the Northern Grape News, February 18, 2016 for more on copper fungicide use (northerngrapesproject.org).

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 and Amaya Atucha, UW-Extension

All cultivars at the West Madison Agricultural Research Station (WMARS) have entered bloom and are beginning to reach early fruit-set; development spans from E-L* developmental number 18 (flower caps in place but fading from green) to 21 (30% flower caps off). At the Peninsular Agricultural Research Station (PARS) inflorescence are expanding, but individual flowers have not open yet; development at PARS spans from E-L* developmental number 14 (7 leaves separated, inflorescence clear) to 16 (10 leaves separated, single flowers in compact groups).

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

Some caterpillars have been found at both PARS and WMARS, including Grape Plume Moth (see following article for more information) and the Oblique Banded Leaf-roller. However, grape vines are able to recover quickly from these mostly-foliar-feeding insects, so even a large number of caterpillars are unlikely to cause significant yield loss.

The first week of June we started shoot thinning at WMARS, when shoots were 5-7" long, at this time it is really easy to remove the shoots, if we wait for longer it might require more time and labor to shoot thin. The main goal of shoot thinning is to create an open canopy to increase airflow and sunlight exposure, by evenly spacing shoot across the cordons. The general rule of thumb is to leave 4-6 shoots per foot-length of trellis. For more vigorous varieties, like Marquette, its recommended to leave more shoots (5-6 shoots/foot of trellis) to help control some of the vegetative vigor and avoid the formation of "bull" canes. Varieties that are less vigorous, like Foch, it is recommended to keep less shoots (4 shoots/foot of trellis), to encourage those shoots to achieve a final length of 4-5 feet (15 leaves per shoot) that will support good fruit quality.

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

Brianna at WMARS; "flower caps in place but fading from green" E-L number = 18

La Crescent at WMARS; "10% flower caps off" E-L number = 20

La Crosse at WMARS; "10% flower caps off" E-L number = 20

Marquette at WMARS; "30% flower caps off" E-L number = 21

Frontenac at WMARS; "flower caps in place but fading from green" E-L number = 18

Frontenac leaf damage at WMARS

St. Croix at WMARS; "flower caps in place but fading from green" E-L number = 18

Somerset at WMARS; "30% flower caps off" E-L number = 21

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

Brianna at PARS; "7 leaves separated, inflorescence clear" E-L number = 14

La Crescent at PARS; "10 leaves separated, flowers in compact groups" E-L number = 16

La Crosse at PARS; "7 leaves separated, inflorescence clear" E-L number = 14

Marquette at PARS; "10 leaves separated, flowers in compact groups" E-L number = 16

Frontenac at PARS; "8 leaves separated, flowers in compact groups" E-L number = 15

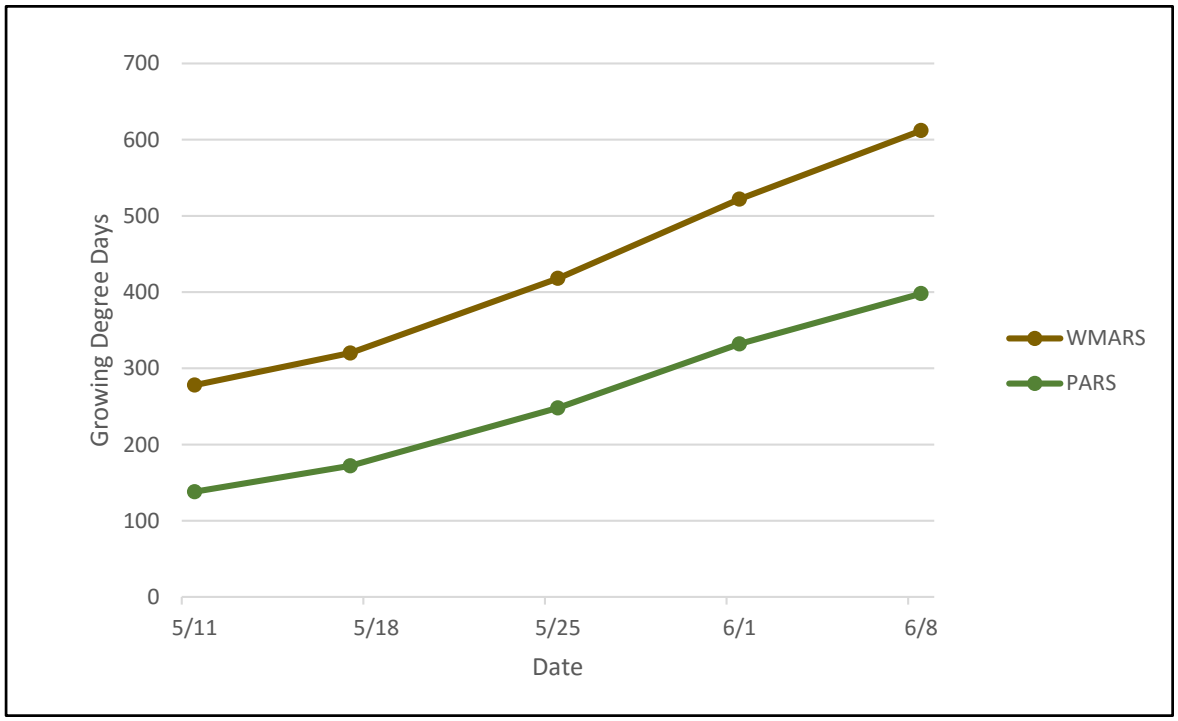
St. Croix at PARS; "8 leaves separated, flowers in compact groups" E-L number = 15

The growing degree day accumulations as of June 7th for this year are: 612 GDD at WMARS and 398 GDD at PARS. These are very close to the degree days accumulated this time last year, although at WMARS we are a little bit behind last year's accumulation. Degree days are calculated using a base of 50°F.

Grape Growing Degree Days

April 1 - June 7 2016

	2106	2015
WMARS	612	660
PARS	398	396



Grape plume moth

By: Janet van Zoeren and Christelle Guédot

Grape plume moth is a sporadic pest of grapes in the Midwest, and has been seen in rather high numbers for the past couple weeks at the West Madison Agricultural Research Station, and at other local vineyards. Larvae can be easily spotted because they web together the terminal leaves on a shoot, so that they can feed protected between the leaves. Peak infestations in southern Wisconsin occurred over the past couple weeks, and will probably occur in northern Wisconsin in the next week or so. Although many larvae may be present, the vines generally regrow fairly well, and grape plume moth rarely reaches an economic threshold.

Larval grape plume moth. ***Photo by D.S. Jones***

Identification: Larvae are light green with long white hairs (see photo above), and reach about ¾ inch before pupating. They are most easily identified by looking for the characteristic webbed up leaves on the tip of the grape vine (see photo below); however, these webbed areas should always be opened up and checked for the caterpillar, as other pests can cause similar webbing in grapes. The adults are brown and white striped, with a feathery look to them.

Webbed up leaves, containing a larval grape plume moth. ***Photo by D.S. Jones***

Biology: Grape plume moths overwinter as pupae in the ground below vineyards. Adults emerge in the early spring and lay eggs on vines. When they hatch, the caterpillars feed on the upper surface of grape leaves, and sometimes on the terminal bud. Occasionally, feeding occurs on flower buds as well, which may directly reduce yield. The caterpillars will then drop off the leaves and burrow underground to pupate by mid-summer. There is only one generation per year, so pupae survive for most of the summer, the fall and the winter before emerging into an adult moth the following early spring.

Monitoring: Monitoring should focus on the perimeter rows nearest to woodlands, where grape plume moth is likely to show up in greatest numbers. The caterpillars may begin to appear in late spring, and will have pupated by the time the fruit is setting.

Control: Generally grape plume moth does not cause enough damage to require control. Research has shown that vines with up to 20% infested shoots do not show reduced yield (Cornell). However, for small scale growers, a simple cultural control is to simply remove the affected leaves and caterpillars. If you experience an especially severe infestation, Danitol and Pyganic should provide control of grape plume moth. Other products registered for grape berry moth should also be efficacious on grape plume moth.

Happy growing season!

Scab, frost… Now what?

By: Patty McManus, UW-Extension Fruit Crops Plant Pathologist

We are at that point where it will soon be clear how effective apple growers' early-season scab management programs were. Your program from here on out will depend on whether or not you see scab lesions and how much crop loss you expect from the recent frost events.

Scouting for early-season scab. The "rules" are that primary scab lesions show up most frequently on cluster leaves and the undersides of leaves, especially at the margins, because these are the parts that are first exposed when buds break (see photo at right). On young fruit, lesions often are clustered closer to the blossom end, and sometimes appear on pedicels (see photos below). There are of course exceptions to the rules, so don't count out the upper surfaces of leaves, and keep in mind that at this point in the season, some lesions we are seeing are likely from secondary infections, which tend to be located anywhere on leaves and fruit.

Primary scab lesion (arrow) on underside of cluster leaf. ***Photo from University of Vermont.***

Frost! A complicating factor this year is that the significant frost event a couple of weeks ago might have injured infected tissues, so rather than appearing soft and fuzzy with scab spores, lesions are dark and crunchy. Does this mean all early-season scab froze to death? Don't count on it – scab is not that stupid. During the freeze there were other infections just getting started. They were likely put on hold, but once things warmed up, lesion development resumed.

Scab lesion on apple fruit pecidel (arrow). ***Photo from Cornell University.***

Scab lesion near blossom end of apple fruit. ***Photo by A.L. Jones.***

Why scab control fails. Apple scab is a manageable disease, but it does generally require spraying scab-susceptible varieties at the right time with the right fungicides. The following factors, alone or in combination, lead to apple scab control failures:

1. **Not spraying early enough.** Apple leaves are susceptible to scab infection as soon as green tissue emerges. Infections that happen at green tip or up to half-inch green can produce secondary spores by the time of bloom. Fruit is highly susceptible at bloom and a few weeks thereafter. An individual leaf of a susceptible variety remains susceptible until about 17 days after unfurling.

2. **Using the wrong products at the wrong time.** There are a lot of fungicides that are highly effective on scab, but you need to know their relative strengths and weaknesses to develop an optimal spray program. The broad-spectrum contact fungicides, such as captan and mancozeb, are good products to use on emerging leaves up until about the pink bud stage. Copper is an excellent scab fungicide, but the risk of injury to fruit increases if applied later than about the tight cluster stage. These contact, protectant fungicides are tenacious and will redistribute during rain and in dew to cover new growth. But at pink-bud and during bloom, which is the time of peak scab susceptibility of the plant, and peak spore release in the scab fungus, scab control is enhanced by using fungicides with some post-infection activity, notably the sterol demethylation inhibitors (SIs), strobilurins, and succinate dehydrogenase inhibitors (SDHIs). See the *2016 Midwest Fruit Pest Management Guide* for more details on fungicides.
3. **Using rates that are too low and/or spraying at intervals that are too long**. When shoots are rapidly elongating, and leaves rapidly expanding, contact fungicides need to redistribute in dew or rain to cover new growth. In doing so, they become diluted. Captan redistributes well, but it doesn't last as long as mancozeb. Mancozeb is durable, but it doesn't redistribute as well. Systemic fungicides become diluted internally as leaves expand. So if you start with a low rate, the amount of fungicide available on the surface or inside leaves will only go down. Likewise, heavy rainfall will remove some residues.
4. **Asking too much of the post-infection properties of fungicides.** When the SI fungicides were new in the early 1990s, you could eradicate scab by spraying 4-days after infection took place. After many years of use, however, the scab fungus is developing resistance. While this has been formally tested for only a small handful of Wisconsin orchards, at many more sites there is strong circumstantial evidence that the SIs are not as potent as they once were. In most cases the SI fungicides will still inhibit scab, especially if higher rates are used, but they will not eradicate an infection. And their "kickback" potential to inhibit the fungus after infection has been reduced from 4-days to no more than 1- or 2-days post-infection.
5. **Poor coverage.** Too low volume, poorly calibrated sprayer, driving too fast, spraying in windy conditions, alternate-row spraying… it's no secret what leads to poor coverage.
6. **High levels of scab the previous fall.** Apple scab overwinters on leaves on the orchard floor. However, there is much evidence and some research that following mild winters, scab can also overwinter underneath bud scales. This probably happens only when scab is very severe in fall, but late-season scab is very common and, in my opinion, underappreciated. The cool, sometimes wet weather of September and October, combined with increased susceptibility in aging leaves can lead to very high levels of scab, especially on the undersides of leaves, even in orchards where the fruit was clean. Not really much you can do about it that late in the season, except possibly shredding leaves to hasten their decomposition. But, if you are aware of it in fall, you can be extra diligent the following spring.

What to do if you see scab now? First question—how much loss do you expect from frost? If you do not expect to harvest a crop, then spray programs can be cut back and cheaper products can be used, but some level of control will probably be needed to avoid a late-season season epidemic (see #6 above). Dave Rosenberger, now retired from the Cornell Hudson Valley research station, wrote a good article on disease management in frost-damaged orchards in 2012. See Scaffolds Fruit Journal Volume 21, No. 8.

You might have some trees whose crop is a loss, whereas others you are counting on for a decent harvest. Obviously, you don't want scab running rampant on the "lost cause" trees, but keep in mind that secondary scab spreads mostly within a tree canopy. That is, most spores don't blow very far. So a little scab in the lost cause trees won't sabotage scab control in other trees. That said, the more spores you have in the lost cause trees, then the greater the risk of some escaping into nearby "good" trees.

Controlling a scab epidemic in June is two-pronged. First, you need to protect fruit, because they remain quite susceptible until a waxy cuticle develops. Second, you want to shut down sporulating lesions. For conventional growers, fruit are protected best by higher rates of captan. As mentioned previously, it redistributes well on leaf and fruit surfaces. For more information on the pros and cons of captan, I refer you to another Rosenberger Scaffolds article Volume 22, No. 12.

Shutting down sporulating scab lesions is not cheap. One option is to mix dodine (most common brand is Syllit) with a high rate of captan. Dodine is an excellent anti-sporulant, unless the scab fungus has developed resistance to it. Unfortunately, there is no easy way to tell beforehand if you have resistance. Many growers in Wisconsin, however, have told me that they get good results, even though it was used extensively in their orchards in the 1970s and 1980s, before the SIs came along. However, recognizing its value for scab "bail out," they reserve it only for such emergencies. Another approach is to use high rates of both captan and an SI fungicide. This approach would only work where the scab population has not become notably resistant to SI fungicides. Hot, sunny days are scab's worst nightmare, and there is some evidence that captan acts synergistically with hot temperatures in shutting down scab lesions. Fortunately, by the time trees set terminal buds (late June/early July), leaves are fairly resistant to further infection, at least until they start ageing in late summer.

What to do if the orchard is clean? You're not out of the woods yet! On susceptible varieties, it would be risky to cut off protectant fungicides (e.g., captan, strobilurins) until middle to late June. First, early lesions may still be lurking out there, but are not yet obvious. Second, fruit is still really susceptible, and as long as new leaves are emerging, they too are susceptible. But if lesions are not visible on leaves by middle to late June, then there will be no source of spores and the risk of scab diminishes. You might need to consider captan and/or strobilurin fungicides for summer disease control, but the risk of scab has past.

Update – Spotted wing drosophila in Wisconsin cherries

By: Christelle Guédot and Janet van Zoeren

The now infamous invasive pest, spotted wing drosophila (SWD), has devastated yield and marketability of raspberry crops across Wisconsin, and also has the potential to damage other Wisconsin crops, including cherries. This has been seen in Oregon, Washington and California's sweet cherry producing regions, starting in the summer of 2009 immediately following its introduction. More recently, and hitting closer to home, significant losses have been reported in Michigan and Wisconsin tart cherry production. In 2015, SWD caused an estimated 10-15% crop loss in tart cherry production in Door County, with some growers suffering complete crop loss. So, what is the likelihood that SWD will cause damage in Door County cherries this year, and what can be done to protect our crops?

In the Guédot Lab, when we began tracking SWD populations in 2013, we hoped that early ripening fruit such as strawberries and tart cherries would be harvested before SWD populations start to build up to levels that could cause significant damage. However, according to Matt Stasiak, Peninsular Ag Research Station Superintendent, the arrival time of SWD in cherry orchards has been earlier each year (July 21 in 2013; July 11 in 2014; and July 3 in 2015).

This year we have already seen the first SWD in Door County – a female was trapped in early June in Door County and another female has recently been trapped in Michigan. This earlier arrival of SWD means that infestations are likely to coincide with cherry ripening and harvest this year and in the future. For this reason, we would advise you to monitor for the arrival of SWD in Door County cherry orchards, and to be prepared to take appropriate control measures when necessary.

Monitoring for larval SWD

Monitoring is a crucial element of Integrated Pest Management for SWD in cherry, especially since SWD is not yet an established pest of cherries in Wisconsin, and some orchards will experience little or no damage while others may experience significant damage. The easiest way to monitor for SWD is to trap the adults; however, this can be misleading since adult presence does not necessarily indicate that the larvae are feeding on or damaging cherries. To be sure whether SWD is in fact in your fruit, it is best to monitor for SWD eggs and larvae in the cherries themselves, as well as monitoring

for adults in the area.

Egg breathing tubes at the surface of the berry.

To see the presence of eggs on the fruit surface, look for breathing tubes (image at right) and pits on the outside of the fruit. For larval detection, place suspected fruit in a Ziploc-type bag, slightly crush the fruit and add a salt water solution (1/4 cup salt and 4 cups water). Leave the fruit in the mixture for one hour. Dislodged larvae will float. Backlighting the bag should facilitate detection. Another method is to boil suspected cherries in 150 milliliters (approx. 5-6 ounces) of water for one minute, then gently crushing the cherries over a 4 mesh screen with a spoon, and finally rinsing the fruit under cold water with a dark tray underneath to collect the juice and larvae. The dark tray should facilitate detection of larvae.

Larvae from a number of species of fly could be present in already damaged or diseased cherry fruit. To confirm that the larvae you find in the fruit are SWD, first collect coloring damaged fruit and place them in a Ziploc bag to let the adults emerge (less than 10 days, depending on the size of the larvae). When the adults emerge, place the bag in the freezer to stun the flies. The flies can then be identified (see SWD adult identification guide below).

Monitoring for adult SWD

Along with larval monitoring, it is recommended to also monitor for SWD adults during the growing season, to be able to detect presence of SWD as quickly as possible. Adult SWD traps are available commercially, but are also simple and inexpensive to make: simply use a 32 oz. clear plastic deli cup with a lid, and drill or melt ten 3/16" inch holes around the top of the cup to allow adults to enter. Larger holes will allow larger insects to enter and will make counting SWD more difficult. Leave ~3-4 inches without holes to allow easy pouring of the liquid bait. Traps can be baited with ~1 inch of a yeast-sugar mix (1 Tbsp. active dry yeast: 4 Tbsp. sugar: 12 oz. water: a couple drops of unscented soap). The soap will break the surface tension of the liquid bait and allow the flies to drown. If you would prefer to buy commercially-prepared traps and lures, they are available from Great Lakes IPM, Scentry and Trece.

Whether you use commercially bought or home-made traps, they should be hung in the shaded plant canopy where fruit are present. Place about one trap per acre. Check traps weekly. Lures are generally replaced every 3-4 weeks, although you should check with the product information for exact directions. If using a home-made liquid bait, replace it weekly. Do not pour yeast-bait out at the base of the trap as it will confuse the adults and reduce the effectiveness of the trap. You can dispose of the bait either in a bucket or on the ground away from the monitored crop. A hand-lens (at least 30x magnification) or a microscope will be useful for identifying male SWD and required for identifying female SWD.


Spotted wing drosophila male on left and female on right.

SWD adults have certain characteristic features that help with identification. Males generally have a single dark colored spot at the tip of each wing, and always have two dark colored bands on each foreleg (only visible with magnification). Females lack the wing spots, but possess a unique, serrated ovipositor (egg laying device), which distinguishes them from other vinegar flies. The serrated ovipositor is also only visible with magnification.

Cultural controls for SWD in cherry

Minimize the buildup of SWD: Minimize the buildup of SWD by removing native wild hosts such as blackberries, plums, dogwoods, and honeysuckle. Schedule timely harvests and remove over-ripe or infested fruit from the orchard as soon as possible to prevent the development of eggs and larvae.

Dispose of infested fruit: You can place infested fruit inside a plastic bag, seal the bag, and solarize the bag. If you have a lot of infested fruit, you can lay them on the ground in a sunny area, cover all the fruit with a piece of clear plastic, and seal the plastic with soil around the edges. You can also bury the fruit, at least 2 feet deep. Important note: DO NOT compost

fruit, it might actually speed up SWD development in warm areas of the compost piles! Freezing cherries will kill SWD and refrigerating cherries (<40F) will stop further development of eggs and larvae inside the fruit and may kill eggs and larvae after longer refrigeration periods. It is thus recommended to keep cherries cool as much as possible, from processor to market to consumer, as it will minimize the chance that larvae will continue developing in fruit.

Biological controls for SWD in cherry

To date there has not been a lot of research into the potential for biological control as a viable method of control for SWD in Wisconsin. However, biocontrol could be a particularly suitable control tactic since, unlike chemical controls, high numbers of biocontrol agents could control SWD on non-crop hosts in the surrounding landscape, as well as in the cherry crop. Data from other states and from Europe has shown that pupal parasitoid wasps are able to reduce SWD numbers (Wang et al. 2016, Rossi Stacconi et al. 2013). Larval parasitoids show less promise, since SWD larvae have a highly effective immune response against parasitoids (Chabert et al. 2012). However, no research has yet taken place to determine whether these parasitoid wasps are present in the upper Midwest, or what level of parasitism of SWD is naturally occurring now that this pest has been established here for over four years.

Hopefully future work will elucidate if there are naturally occurring biocontrol agents we can encourage in Wisconsin, and will provide us with commercially available biocontrol agents of SWD. For now, some general techniques to sustain your naturally occurring biocontrol agents include planting continually-blooming wildflower areas to provide nectar, pollen and shelter resources for adult predators and parasitoids (and pollinators!), and avoiding broad-spectrum insecticide applications whenever possible.

Chemical controls for SWD in cherry

A list of insecticides that have been shown to be effective against SWD in cherry is provided below. Spray in short intervals (7-10 days depending on product used) to prevent crop infestation from when the fruit is beginning to ripen until harvest is completed (taking pre-harvest intervals into account). Make sure to calibrate your sprayers to provide thorough coverage, especially in the center of the canopy where flies like to hide in the shade.

Class (IRAC)	Trade name	Active ingredient	REI	PHI (days)	Rate (per acre)	Comments
Organophosphates (1B)	Diazinon	Diazinon	4 days	21	½ - 1 lb/100 gals water	Max of 4 lbs./acre/application. Max of 2 applications/year. (max of 1 as dormant application and max of 1 as in-season foliar application). **Caution:** Closed cab required.
	Imidan 70W **highly effective**	Phosmet	3 days*	7	2 ⅛ lbs	TART CHERRIES ONLY! Max of 7 ½ lb/acre/year *** "Pick your own" REI = 14 days**
Pyrethroids / Pyrethrins (3A)	Asana XL	Esfenvalerate	12hrs	14	4.8 – 14.5 fl. oz.	Max of 72 fl. oz./acre/year, with no more than 57.6 fl. oz./acre between bloom and harvest.
	Baythroid XL	Beta-cyfluthrin	12 hrs	7	2.4 – 2.8 fl. oz.	Max 5.6 fl. oz./acre/year. Max 2 applications/season.
	Danitol 2.4EC **highly effective**	Fenpropathrin	24hrs	3	10⅔ – 21⅓ fl. oz.	Max of 42⅔ fl. oz/acre/year. Max 2 applications/season. **Caution:** Do not apply as ULV spray. Do not allow livestock to graze on cover crops from treated orchards.

	Mustang Max o.8EC **highly effective**	zeta-Cypermethrin	12hrs	14	4 oz.	Max of 24 oz./acre/year. 7-day interval between applications. **Caution:** Do not apply as ULV spray. Do not allow livestock to graze on cover crops from treated orchards.
	Warrior II **highly effective**	Lamda-cyhalothrin	24hrs	14	2.56 fl. oz.	Max of 12.8 fl. oz/acre/year. Max 10.24 fl. oz./acre/year post-bloom. 5-day interval between applications.
	Pyganic **OMRI**	Pyrethrum	12hrs	0	16 – 64 oz.	Recommended that final spray mix be buffered to pH of 5.5 - 7.0. 0 day interval between applications.
Spinosyns (5)	**Delegate WG** **highly effective**	Spinetoram	4hrs	7	4.5 – 7 oz.	Max 28 oz./acre/season. Max 4 applications/year. 7-day interval between applications.
	Entrust **OMRI** **highly effective**	Spinosad	4hrs	7	1.25 – 2.5 oz.	Max of 9 oz./acre/season. No more than 2-3 consecutive applications of group 5 insecticides/season. Rotate with Pyganic for resistance management in organic production. 7-day interval between applications.
METI-acaricides and insecticides (21A)	**Apta** **highly effective**	Tolfenpyrad	12hrs	14	21 – 27 oz.	Max 54 oz./acre/season Max 2 applications/season
Diamides (28)	**Exirel** **highly effective**	Cyantraniliprole	12hrs	3	13.5 – 20.5 oz.	Max 3 applications/season.

This is not a comprehensive list. Research is ongoing and recommendations for SWD are constantly changing as research results become available. Please, make sure to always read and follow label instructions carefully. Human error happens, so please double check rates and other information on the label! Experience from other states suggests using the full label rate for each product against SWD, until we have more information on pesticide efficacy.

Cherries for export have to follow the MRLs guidelines on pesticide residues set by the country of destination. Check with your packinghouse when choosing your SWD spray program to comply with the MRL requirements of the country of destination. Additionally, this MRL Chart for Tart Cherry created at Michigan state University provides a handy guideline for export residue limits, but you should always double check with your packinghouse for the most up-to-date information.

Organic Production

Two insecticides, Entrust and Pyganic, are OMRI approved. Rotate Entrust (5- to 7-day residual) with Pyganic (2- to 3-day residual) to achieve some resistance management. Organic insecticides are less effective than conventional insecticides, and so requires more intensive monitoring, more timely application, and shorter intervals between sprays. Cultural controls are even more important to help reduce overall SWD population levels. Using these recommendations, experience from some West Coast states suggests that SWD populations can be successfully managed in organic production.

References Cited:

Chabert, S., R. Allemand, M. Poyet, P. Eslin, and P. Gibert. 2012. Ability of European parasitoids (Hymenoptera) to control a new invasive Asiatic pest, *Drosophila suzukii*. Biological Control 63:40–47.

Rossi Stacconi, M. V., A. Grassi, D. T. Dalton, B. Miller, M. Ouantar, A. Loni, C. Ioriatti, V. M. Walton, and G. Anfora. 2013. First field records of Pachycrepoideus vindemiae as a parasitoid of *Drosophila suzukii* in European and Oregon small fruit production areas. Entomologia 1:3.

Wang, X.-G., G. Kaçar, A. Biondi, and K. M. Daane. 2016. Foraging efficiency and outcomes of interactions of two pupal parasitoids attacking the invasive spotted wing drosophila. Biological Control 96:64–71.

Brown Marmorated Stink Bug look-alike

By: Christelle Guédot

The brown marmorated stink bug (BMSB) monitoring project is underway and, as of June 8th, we have not caught any BMSB in the pheromone traps. The traps are deployed at 12 locations in counties that were confirmed for the presence of BMSB in recent years. Traps are checked weekly and we will keep you informed of any detection in traps, particularly in apple orchards.

About 10 days ago, we had a suspected specimen that got us a little puzzled from the picture we received. The stink bug in question (left on the photo below) looks very similar to BMSB (right on the photo) with a similar checkered pattern along the abdomen and similar tan color. Once we received the specimen, PJ Liesch, the UW-Madison insect diagnostician (aka the Bug Guy!) was able to identify this specimen to dusky stink bug, *Euschistus tristigmus luridis*.

Several features can help separate dusky stink bug from BMSB. The main characteristic is the size, hence the need in this case to see the specimen in person as opposed to a picture (a reference such as a ruler or a coin could help determine that in a picture). The dusky stink bug specimen is smaller (less than ½-inch long) compared to BMSB (more than ⅗-inch long). The second characteristic is the antennal banding: the antennae on the dusky stink bug do show some colored bands, but these are a reddish in color contrasted with black. On BMSB, the bands are much more discrete and whitish. For more info on BMSB look-alike insects, check out this link http://www.stopbmsb.org/stink-bug-basics/look-alike-insects/

Dusky stink bug (left) and BMSB (right)

Dusky stink bug can be found in most fruit-growing regions in Eastern North America. It can cause fruit damage in all tree fruit, especially peaches and apples. Adult feeding during bloom can cause the fruit to abort. Feeding later in the summer can lead to deep cat-facing injury or depressed, corky or water-soaked areas on the skin of the fruit. For management, removing broadleaf weeds that are alternate hosts, especially legumes, can help lower populations. If insecticides are needed they should be applied when adults are immigrating in the orchards. From the lack of information available on dusky stink bug, it seems unlikely to be major pest of apple in Wisconsin. If you suspect damage from dusky stink bug, please let us know at guedot@wisc.edu.

Happy Growing Season!

Calendar of Events

June 14, 2016 – Monroe and Richland County Fruit Field Day
9:30-4:00, Field of Dreams Blueberries, 23897 Destiny Avenue, Tomah and Lazy Patch Farm, 33351 State Rd 154, Hill Point

June 15, 2016 – Advanced Organic Orchard Management Field Day
9:00-4:30, Atoms to Apples, Mount Horeb, WI and Two Onions Farm, Belmont, WI

June 16, 2016 – WGGA Vineyard Walk
3:00-6:30 pm, Dancing Dragonfly Winery, 2013 120th Ave, St Croix Falls

June 16-19, 2016 – Cranberry Blossom Festival
Wisconsin Rapids, WI

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

July 12, 2016 – WAGA Summer Field Day
Apple Holler, Sturtevant, WI

July 14, 2016 – PARS Vineyard Walk
Peninsular Agricultural Research Station, 4312 Hwy 42 North, Sturgeon Bay, 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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