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Wisconsin Fruit News

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In This Issue:

General Information

Is it a brown marmorated stink bug? If you are wondering, check out these new apps!

By: Christelle Guédot, UW-Madison Department of Entomology

You may have seen some stink bugs crawling around in your house, trying to get out in the last couple of months, especially if you live in the Madison area. You now have probably heard about this latest invasive insect, brown marmorated stink bug (BMSB) threatening many of our agricultural crops and ornamentals, in one format or another, whether it is a newsletter article, a publication, an email, or a talk. We have discussed its biology and status, as well as how to identify, monitor, and manage this insect in this journal in previous issues and you can find most of this info in this UW-Extension publication.

Brown marmorated stink bug adult. Photo courtesy of Susan Ellis, Bugwood.org.

Introducing the BMSB apps!

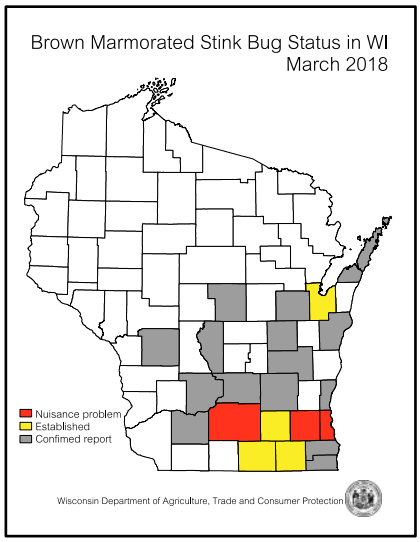
The University of Minnesota recently developed some apps for Android and Apple platforms to help identify BMSB and other native stink bugs and help with its detection in the Midwest by reporting their presence directly on the apps. For more information, these apps are discussed in the following two articles:

http://blog-crop-news.extension.umn.edu/2018/04/new-app-for-mn-farmers-consultants.html
http://blog-yard-garden-news.extension.umn.edu/2018/04/help-identify-invasive-stink-bugs.html

We will be continuing our monitoring program in collaboration with DATCP and IPM Institute and will keep you posted of any new detection as regularly as possible.

In addition, Krista Hamilton at DACTP has been populating a map based on our state records that shows the distribution but also pest status of BMSB in Wisconsin. This map will be updated as new reports come in and the status of this pest changes.

Have a great growing season and happy spring!



UW-Madison/Extension Insect Diagnostic Lab update

By: PJ Liesch

Here's a fruit insect update from the diagnostic lab for the past two weeks and a few things to keep an eye out for:

Recently Seen:

Eastern Tent Caterpillars: These caterpillars have been active for several weeks in the southern part of the state, and silken tents can be quite noticeable in orchard trees and wild hosts (like black cherry).

Grape Flea Beetle: A few reports of the grape flea beetle have come into the UW Insect Diagnostic Lab so far this year. These beetles can be a concern when they feed on young, developing buds.

Grapevine Epimenis (*Psychomorpha epimenis*): An identification request came into the lab recently from southern Wisconsin of an adult grapevine epimenis moth. The unusual-looking caterpillars are most likely active as well at this time on grape plants (both wild and cultivated). The caterpillars are covered in thin black and white stripes with a distinct orange patch over the head and at the posterior end of the body. The caterpillars tend to be minor/occasional plant pests, but typically cause minor damage.

Grapevine epimenis caterpillars.

Upcoming Pests:

Insects After Petal Fall: In southern Wisconsin, many trees are quickly approaching bloom, so growers should be on alert for key pests that tend to pop up shortly after petal fall, such as the plum curculio and codling moth.

Rose Chafer: I haven't had any reports of activity yet at the UW Insect Diagnostic Lab, but these beetles will become active in the near future in parts of the state with sandy soil. Growers with a history of problems with rose chafers should be on the look-out in the coming weeks.

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

By: Brian Hudelson, Sue Lueloff, John Lake 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 April 28, 2018 through May 18, 2018.

PLANT/ SAMPLE TYPE	DISEASE/ DISORDER	PATHOGEN	COUNTY
FRUIT CROPS			
Apple	*Phomopsis Canker* *Sooty Mold*	*Phomopsis sp.* *Miscellaneous Sooty Mold Fungi*	*Washington (MN)* *Washington (MN)*
Cranberry	*Phyllosticta Leaf Spot*	*Phyllosticta sp.*	*Dane*

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

Berry Crops

Tarnished plant bug – a strawberry menace

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

Common Names: Tarnished plant bug, Lygus bug
Order: Hemiptera
Family: Miridae
Scientific Name: *Lygus lineolaris*

Tarnished plant bug nymphs and adult. Photo courtesy of University of Georgia, Bugwood.org.

Tarnished plant bug is a season-long pest of strawberry, with both adults and nymphs causing misshapen or poorly-developed fruit. Spring is a good time to begin monitoring and, if necessary, controlling for tarnished plant bug, since early-season feeding is more damaging to your production than late-season feeding, and insecticide controls are most effective against the nymphs.

There are many pests to be aware of this time of year in strawberry production. To learn more about other spring strawberry pests, visit our previous articles published in this newsletter about: strawberry root weevil, black vine weevil, eastern flower thrips, two spotted spider mites, and cyclamen mites.

Identification and life cycle

Tarnished plant bugs overwinter as adults in leaf litter, generally in wooded areas, along fence lines, or in alfalfa fields. The adults are ¼ inch long, green with brown and yellow markings, and have wings. They could be confused with big-eyed bugs and other beneficial bugs – look for the yellow v-shaped marking just behind the head and yellow triangle-shaped markings along the margin of the wings to identify tarnished plant bug.

Eggs are laid in early spring, and nymphs begin to appear shortly after temperatures reach 68°F, generally in mid-

May. Tarnished plant bug nymphs are green and wingless. Nymphs could be confused with aphids, but move more quickly and, under magnification, do not have "cornicles" (a pair of backward-pointing structures on the abdomen that are characteristic of aphids). There are four to five overlapping generations per year in the Midwest.

Both adults and nymphs feed on foliage, flowers and fruit of strawberry, and both cause damage to the fruit, but the nymphs are more voracious of feeders and so are generally more damaging. Nymphs are also more sensitive to insecticides, so controlling earlier in the season if you have a history of tarnished plant bug damage will greatly help in managing populations.

A tarnished plant bug feeding in the most characteristic way on a strawberry. Photo courtesy of Dan Mahr, UW Extension.

Damage symptoms

Tarnished plant bugs feed on the strawberry directly, causing "catfacing" (misshapen fruit). Catfacing can also be caused by frost damage or poor pollination. However, catfacing caused by tarnished plant bug tends to be on the tip of the strawberry where they prefer to feed. Most frequently they feed in an upright position on an upright berry, feeding at the tip of the berry (see picture at right). The presence of hollowed-out seeds is very characteristic of tarnished plant bug damage, as they often feed by piercing and sucking out the seeds.

Monitoring and control

Monitor for tarnished plant bug using a small beating sheet, which can be any white piece of paper or cloth, secured on a clipboard in an embroidery hoop (or a white plate or a Frisbee turned upside down would work great too!), placed under the strawberry plant. Then tap the plant firmly against the beating sheet, and inspect for bugs. An Ontario Ministry of Agriculture, Food and Rural Affairs video, available at https://www.youtube.com/watch?v=88yzxn_G3Xs, shows how to monitor and identify tarnished plant bugs. As mentioned in the "Identification" section, tarnished plant bug may be confused with big-eyed bugs, which are a beneficial species. Big-eyed bugs have big, conspicuous eyes, and lack the yellow markings.

Monitoring should begin before first-flower, and ideally should be done twice per week until you begin to harvest. The action threshold for tarnished plant bug is an average of one bug per four strawberry plants. Tarnished plant bug prefers alfalfa over strawberry and can become problematic if you have an alfalfa field near your strawberry farm. Monitor for tarnished plant bugs closest to alfalfa fields, and keep in mind that when alfalfa gets cut for hay, tarnished plant bugs may move to strawberries for food.

Cultural control: Tarnished plant bugs are polyphagous, also feeding on a range of weeds common to strawberry production. For that reason, good weed control can help reduce the likelihood of issues with tarnished plant bug. Additionally, they often lay eggs on weedy patches or cover crops in spring, so weed removal and discing under cover crops in the spring can help reduce tarnished plant bug pressure. However, avoid mowing weeds during strawberry bloom or while fruit is developing, since removing weeds may push the tarnished plant bugs to feed only on strawberries.

Earlier-flowering varieties of strawberry may escape the worst of tarnished plant bug damage, so planting more early-season varieties could provide host-plant resistance. Floating row cover placed over strawberry plants can be effective at a small-scale. Cover the plants in the early spring, but be sure to remove the cover during bloom to allow pollinators access to the flowers.

Chemical control: Insecticides are more effective against nymphs rather than adult tarnished plant bugs. For that reason, early-season monitoring and prompt insecticide applications are recommended once you reach the action threshold of one bug per four plants. The following table contains information on some insecticide options available for use on tarnished plant bug in strawberry in Wisconsin. We do not recommend these chemistries above other options, and all product recommendations can be found in the 2017 Midwest Fruit Pest Management Guide. As always, it is the law to read and follow the label.

Class (IRAC code)	Tradename	Active ingredient	PHI (days)	Efficacy
Pyrethroids (3A)	Danitol 2.4 EC	Fenpropathrin	2	Excellent
	Brigade WSB	Bifenthrin	0	Good
Neonicotinoids (4A)	Actara 59 WDG	Thiamethoxam	3	Good
	Assail 30 SG	Acetamiprid	1	Good
Carbamates (1A)	Sevin XLR Plus	Carbaryl	7	Good

Cranberries

Pheromone loading in cranberry insect lures

By: Shawn A. Steffan, Elissa M. Chasen, and Christelle Guédot

In recent years, there has been repeated questioning of whether certain lures provide valid, reliable trap-counts. To provide some answers for the key moth pests being tracked by Wisconsin growers and consultants, we examined the pheromone loads within lures purchased from the four primary suppliers.

We examined the lures for the cranberry fruitworm (CFW), the sparganothis fruitworm (SFW), and the blackheaded fireworm (BHFW). These lures were purchased from ISCA Technologies, Great Lakes IPM, Scentry, and Trécé. Based on our first analyses of lure compositions at the University of Wisconsin BioTech Center, we are seeing some significant differences.

In the ISCA Tech lure for CFW, we found that the two primary components were present, and both were loaded in an appropriate ratio. ISCA was the only producer to make this lure this spring. Fortunately, it appears that the important compounds were present and the loading ratio was satisfactory. We were told by Great Lakes IPM that when they are done selling all their current CFW lures (from ISCA), they will begin making their own CFW lures. We will again assess lure loading at that time.

For SFW and BHFW, these lures were manufactured by ISCA, Scentry, and Trécé. Interestingly, Scentry and Trécé didn't offer these directly to consumers—instead, Great Lakes IPM represented the 'storefront' and provided the SFW and BHFW lures for Scentry and Trécé. Looking at the SFW loading, it appears the right pheromone compound was present in the ISCA, Scentry, and Trécé lures. However, the ratios were strikingly different. The Trécé SFW lures had 11 times higher loads than the ISCA SFW lure, and 2.3 times that of the Scentry SFW lure. Looking at the BHFW lures, Trécé again had the highest loading, with 9 times that of the ISCA lure, and 17 times that of the Scentry lure. Do these differences matter for monitoring our cranberry pests? While we do not have a direct comparison of their effectiveness in the field, it is very possible that the loading may affect attractiveness. More moths might be attracted to the Trécé lures, and the lures will likely last longer. If there are issues with SFW or BHFW lure longevity, the loading amount should explain the differences.

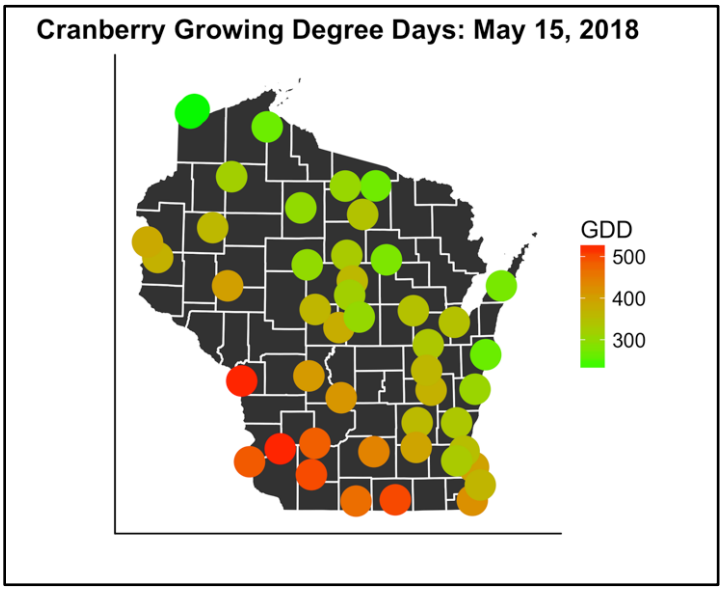
Trécé also loaded a second compound in its BHFW lure that, according to McDonough et al. (1987), is a key synergist (greatly enhances the effectiveness of the primary compound). Neither ISCA nor Scentry loaded this synergist, although these two manufacturers did load a third pheromone that may or may not enhance moth capture. In the older literature, this third compound was thought to enhance moth capture, but more recently was shown to be neutral/redundant with the primary pheromone. It will be interesting to see if Trécé BHFW lures are providing higher moth counts.

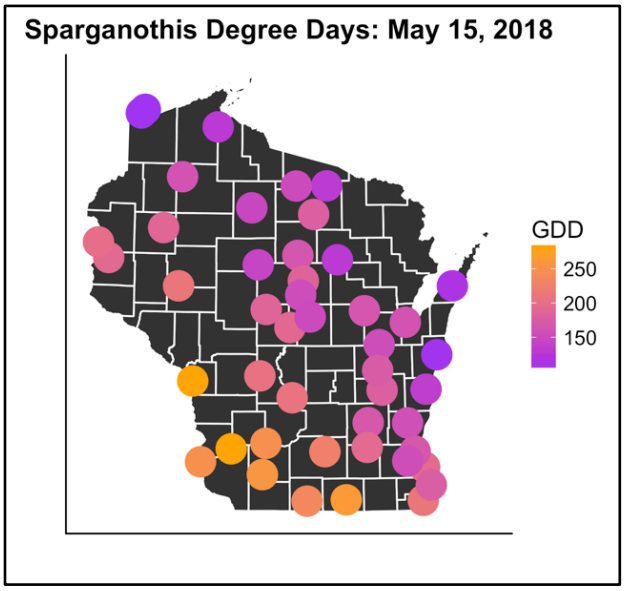
At this point, we recommend purchasing lures for SFW and BHFW from Trécé and CFW lures (only ones available right now) from ISCA. Lures can be purchased directly from Great Lakes IPM and ISCA Tech.

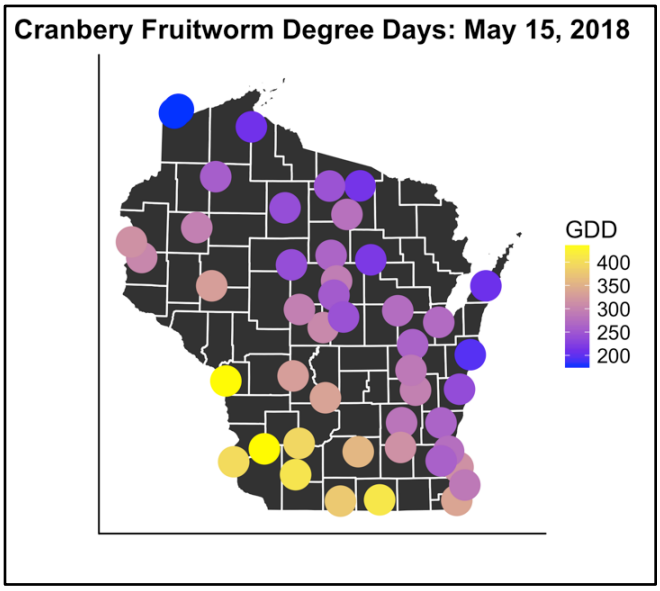
Cranberry plant and pest degree-days: May 15, 2018

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

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







We are still lagging a bit behind degree-day accumulations from the last couple of years, but with the warm days we are having now, it is still possible to catch up. You can see that in the table below.

May 15	Cranberry DDs			Sparg DDs			CFW DDs		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
Northern WI (Minocqua)	368.4	318.9	310.5	145.6	117.3	154.4	277.8	236.8	250.8
Central WI (Wisconsin Rapids)	501.7	508.5	375.1	215.7	230.3	188.6	385.4	399.9	302.5

Grapes

Grape Variety Developmental Stages: May 17, 2018

By: Janet van Zoeren, Annie Deutsch, Jacob Scharfetter, and Amaya Atucha

At the West Madison Agricultural Research Station (WMARS) shoot development this week is highly variable across cultivars, with some ranging from E-L 3 ("woolly bud") to E-L 9 ("2-3 leaves separate, shoots 1-2 inches long". Interestingly, buds are both ahead of and behind the developmental stage from this week last year – in 2017 all cultivars ranged from E-L 4 to E-L 5. Even within each cultivar there is some variability in shoot developmental rate.

At the Peninsular Agricultural Research Station (PARS), cultivars range from E-L 2 ("bud scales opening") to at E-L 3 ("woolly bud"), which is similar to their developmental stage at this time of year last year, and about two weeks behind in development compared to WMARS. Especial attention should be paid to buds at wooly stage, since this is when buds are most susceptible to flea beetle and cutworm damage. You can read more about flea beetle in the previous issue of the newsletter.

Across the state, spring is a good time to get started on pruning, training and thinning the vines.

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

Following photos taken on May 14th at West Madison Agricultural Research Station.

Brianna at WMARS; "first leaf separated" E-L number = 7

La Crescent at WMARS; "first leaf separated" E-L number = 7

Itasca at WMARS; "2-3 leaves separated" E-L number = 9

Marquette at WMARS;
"bud burst"
E-L number = 4

Frontenac at WMARS;
"first leaf separated"
E-L number = 7

Foch at WMARS;
"first leaf separated"
E-L number = 7

Petite Pearl at WMARS;
"wooly bud"
E-L number = 3

Following photos taken on May 16th at Peninsular Agricultural Research Station (PARS)

Brianna at PARS;
"bud scales opening"
E-L number = 2

La Crescent at PARS;
"woolly bud"
E-L number = 3

La Crosse at PARS;
"bud scales opening"
E-L number = 2

Marquette at PARS;
"bud scales opening"
E-L number = 2

Frontenac at PARS;
"woolly bud"
E-L number = 3

St Croix at PARS;
"bud scales opening"
E-L number = 2

April 1 - May 16	Grape Growing Degree Days (Base 50, BE)		
	2018	2107	2016
WMARS	**235**	246	196
PARS	**126**	96	89

The growing degree-day accumulations as of May 16th for this year are: 235 GDD at WMARS and 126 GDD at PARS. We are now at a similar degree day accumulation in Dane County in previous years, and have passed the degree day accumulation for the past two years in Door County.

We calculated degree-days using a base of 50°F, starting on April 1st as a biofix. "BE" (Baskerville-Emin) refers to a specific way in which to calculate degree days, using a sine wave instead of a simple average temperature calculation – this gives 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 formulas they use for their calculations (http://newa.cornell.edu/index.php?page=about-degree-days).

Tree Fruits

Killing Them Softly: Do Soft Fungicides Work on Apple Diseases?

By: Patty McManus

Most apple growers, whether conventional or organic, novice or experienced, want to produce attractive fruit in a manner that will minimize negative impacts on the environment. Over the past decade several "soft" chemistries and biological control products have been marketed for control of several apple diseases. How do they stack up to conventional fungicides? A few years ago at the Wisconsin Fresh Fruit and Vegetable Conference, I summarized research on soft fungicides and apple diseases. In this article I present an updated summary.

For purposes of this summary, a product is considered "soft" if one or more of the following criteria are met: (i) the manufacture makes "soft" or "green" claims in their advertising; (ii) the product is a biological control; and/or (iii) the product is approved by the Organic Materials Review Institute. Generally, products that meet any of these criteria have relatively low risk to human health and non-target organisms in the environment. This discussion will not include: (i) fungicides that are considered "reduced risk" by EPA's conventional pesticide program (e.g., Pristine, Vangard); (ii) copper and sulfur fungicides, even though they are effective in controlling certain diseases and some forms are approved for organic production; or (iii) biocontrols for fire blight, a bacterial disease. Regarding fire blight, research has shown biocontrols and other soft products range from not effective to moderately effective in the eastern US. They are consistently less effective than streptomycin, the longtime standard for fire blight control.

Three soft fungicides—Oxidate, Serenade, and Regalia—are the focus here because they meet the following criteria:

1. EPA registered for use on apple and commercially available.
2. Tested in randomized, replicated, and statistically analyzed field trials.
3. Tested in more than one year, on more than one variety, and usually by more than one group of researchers.

4. Tested alone (usually), rather than mixed or alternated with conventional fungicides. As discussed later, however, they might fit best in a rotational program.
5. Test results have been published in *Plant Disease Management Reports*, a repository for results of field trials on fungicide and bactericide efficacy.

Field trials were conducted over the past decade by university researchers in various states east of the Mississippi River. For each field trial and each disease, a soft product was rated "good" if it controlled disease better than the untreated control AND was similar to the standard conventional fungicide treatment. A soft product was rated "fair" if it was better than the untreated control, but not as effective as the standard conventional fungicide. A soft product was rated "poor" if its performance was similar to or worse than the untreated control. The results from multiple trials were tabulated to produce an overall performance rating (Table 1) for each of the three soft fungicides as "stand alone" products (i.e., not alternated or mixed with conventional fungicides).

Table 1. Summary of soft fungicides for disease control efficacy

Soft fungicide	Disease	Performance Rating
Oxidate (2.0, Broad Spectrum Bactericide/Fungicide)	Powdery mildew	Fair-Poor
	Scab	Fair-Poor
	Sooty blotch/flyspeck	Fair
Serenade (ASO, MAX, Optimum, Opti)	Sooty blotch/flyspeck	Variable, Good-Fair-Poor
Regalia (alone or mixed with JMS Stylet Oil)	Powdery mildew	Fair-Poor
	Scab	Fair
	Sooty blotch/flyspeck	Fair-Poor
	Fruit rots	Fair-Poor
	Rusts	Good, but tested in few trials

A glance at Table 1 could be quite discouraging for an apple grower who wants to use soft fungicides. However, several points need to be considered:

1. The trials were often done in "high inoculum" research orchards on varieties that are highly susceptible to the various diseases. In a commercial setting, the disease inoculum pressure would probably be lower, and at least some varieties might have some resistance to the diseases. For example, scab research is usually conducted on highly susceptible varieties such as Delicious and Rome, rather than the more resistant Honeycrisp. In a low inoculum orchard and/or on varieties that are only slightly or moderately susceptible to scab, such as Honeycrisp, products with a "fair" rating might be good enough.
2. Table 1 summarizes the efficacy of soft fungicides as "stand alone" treatments. This was done because when soft fungicides are integrated into a program with other products, it's impossible to determine "who's doing the work." But in fact, several research trials have shown that alternating soft and conventional fungicides can result in excellent disease control. Those trials, however, usually do not take into account costs of the different spray programs.
3. The trials summarized here were not done in organic orchards. Some critics would argue that biocontrols (e.g., Serenade) and inducers of plant defense (e.g., Regalia) perform better when the entire orchard system is organic.

In summary, the soft fungicides reviewed here were generally less effective in controlling apple diseases than conventional fungicides. Season-long reliance on such products would be risky. However, if your orchard has not had significant levels of a particular disease and/or your varieties are at least somewhat resistant to that disease, then the soft fungicides might provide adequate control. Likewise, if your customers are forgiving of a few blemishes and value your efforts to use low-impact disease control methods, then soft fungicides might be a good fit.

Precision apple thinning part III: ***Running the carbohydrate model***

By: Janet van Zoeren and Amaya Atucha

This article is part of a series we are running this spring discussing the precision apple thinning process. In part I of the series we gave an overview of what precision apple thinning is and how it works. In part II we discussed how to calculate the target crop load of a tree, and how to determine what percent of fruitlets should be removed during the thinning process to achieve that target crop load. Today, in part III, we will discuss **how to run the carbohydrate model** on the NEWA webpage, how to interpret the results, and **the implications for deciding how much thinner to spray** this spring.

The NEWA Carbohydrate model:

As orchards are reaching king bloom or full bloom, it is now time to discuss how you can use the NEWA carbohydrate model on your orchard. As a reminder, the background for this model was presented in part I of this series, linked to above. The model can be accessed on the NEWA website, under "Crop Management", "Apple Carbohydrate Thinning". You will need to enter, for you own orchard or block of interest, **the date when trees reached green tip and full bloom**. Once trees reach full bloom, the model will show a 4-day running average tree carbohydrate balance, which is based on temperature and solar radiation data (from the weather station closest to your orchard), in order to calculate the estimated carbohydrate balance of the trees in the block. To the right of the carbohydrate balance, the model provides a thinner application rate recommendation (Table 1), based on the carbohydrate balance. So, during cool and/or sunny periods, trees have a positive balance of carbohydrates and are less responsive to a chemical thinner, so the model recommends an increased thinner rate. Conversely, during warm and/or cloudy periods (like we have had recently), trees have a negative balance of carbohydrates and are more responsive to a chemical thinner, so the model recommends a decreased thinner rate.

Table 1: carbohydrate balance as it related to thinner rate recommendations. Table originally provided on the NEWA website (http://newa.nrcc.cornell.edu/apple_thin_help.html)

4-day Av. Carb. Balance	Thinning Recommendation
> 20g/day	Increase Chemical Thinner Rate by 30%
0g/day to 20g/day	Increase Chemical Thinner Rate by 15%
0g/day to -20g/day	Apply Standard Chemical Thinner Rate
-20g/day to -40g/day	Decrease Chemical Thinner Rate by 15%
-40g/day to -60 g/day	Decrease Chemical Thinner Rate by 30%
-60g/day to -80 g/day	Decrease Chemical Thinner Rate by 50%
< than -80g/day	Do not thin (many fruits will fall off naturally)

This model can be used to inform every thinner application, beginning with bloom or petal fall thins, and continuing through as many sprays as are necessary to reach the target crop load, which we discussed in the previous issue.

Current carbohydrate model outputs

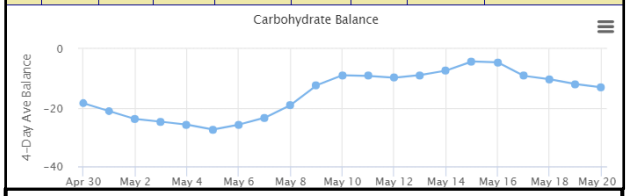
Following are screen shots of the current NEWA carbohydrate model outputs from across the state. The green bar shows the current day's temperature and solar radiation data, and the model's estimate of tree's carbohydrate balance. Below the green bar, in tan, is the forecasted weather data and corresponding forecasted carbohydrate balance. Across all sites (except Door County where Honeycrisp has not yet reached full bloom), the carbohydrate balance ranges from -5 to -20 g/day, giving a thinning rate recommendation to apply the standard chemical thinner rate. This recommendation can change rapidly, so it is always best to run the NEWA model for yourself when you plan to spray, using the closest available weather station as described above.

Richland County

Current phenological stage: full bloom
Green tip: 4/30
Full bloom: 5/16

Apple Carbohydrate Thinning Model Results

Date	Max Temp (°F)	Min Temp (°F)	Solar Rad (MJ/m2)	Tree Carbohydrate Status (g/day)				Thinning Recommendation
				Production	Demand	Balance	4-Day Ave Balance	
5/13	59	43	8.0	3.10	12.75	-9.65	-8.92	-
5/14	71	54	13.6	5.56	20.73	-15.17	-7.39	-
5/15	79	57	25.7	13.35	22.92	-9.57	-4.31	-
5/16	81	52	27.0	17.19	18.49	-1.29	-4.61	Apply standard chemical thinner rate
5/17	77	57	24.1	16.04	19.59	-3.55	-9.19	Apply standard chemical thinner rate
5/18	77	51	24.7	20.20	23.03	-2.84	-10.34	Apply standard chemical thinner rate
5/19	72	52	17.2	15.09	25.87	-10.78	-12	Apply standard chemical thinner rate
5/20	67	55	12.1	9.40	28.98	-19.58	-13.1	Apply standard chemical thinner rate
5/21	75	50	22.5	25.49	33.63	-8.15		
5/22	77	50	23.3	28.40	37.90	-9.50		
5/23	77	52	21.4	27.38	42.55	-15.17		



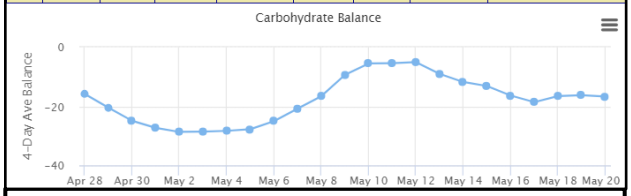
Green tip occurred on 4/30, and full bloom occurred of 5/16. Based on the predicted carbohydrate balance over the next four days, of around -10 g/day, the recommended rate to use is the standard chemical thinner rate.

Trempealeau County

Current phenological stage: full bloom
Green tip: 4/28
Full bloom: 5/16

Apple Carbohydrate Thinning Model Results

Date	Max Temp (°F)	Min Temp (°F)	Solar Rad (MJ/m2)	Tree Carbohydrate Status (g/day)				Thinning Recommendation
				Production	Demand	Balance	4-Day Ave Balance	
5/13	66	48	11.0	6.07	13.06	-6.99	-9.04	-
5/14	69	54	13.1	7.04	14.13	-7.09	-11.79	-
5/15	81	57	24.2	15.05	22.52	-7.47	-13.15	-
5/16	86	55	24.5	16.11	30.72	-14.61	-16.35	Apply standard chemical thinner rate
5/17	82	57	24.5	19.01	36.99	-17.98	-18.59	Apply standard chemical thinner rate
5/18	79	53	24.5	24.52	37.05	-12.53	-16.56	Apply standard chemical thinner rate
5/19	78	54	19.3	20.27	40.54	-20.27	-16.25	Apply standard chemical thinner rate
5/20	67	55	12.4	12.83	36.40	-23.58	-16.69	Apply standard chemical thinner rate
5/21	75	51	22.7	31.82	41.68	-9.85		
5/22	77	52	23.0	33.71	45.01	-11.30		
5/23	78	55	20.8	30.21	52.26	-22.04		



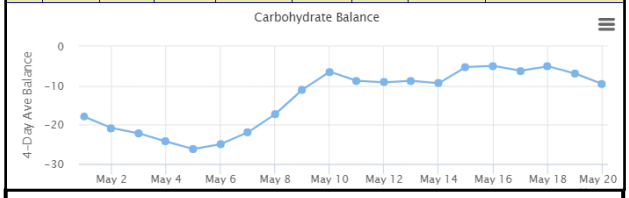
Green tip occurred on 4/28, and full bloom occurred on 5/16. Based on the predicted carbohydrate balance over the next four days, of around -17 g/day, the recommended rate to use is the standard chemical thinner rate.

Eau Claire County

Current phenological stage: full bloom
Green tip: 5/1
Full bloom: 5/16

Apple Carbohydrate Thinning Model Results

Date	Max Temp (°F)	Min Temp (°F)	Solar Rad (MJ/m2)	Tree Carbohydrate Status (g/day)				Thinning Recommendation
				Production	Demand	Balance	4-Day Ave Balance	
5/13	69	37	22.5	11.90	15.75	-3.85	-8.75	-
5/14	75	50	16.1	6.42	24.37	-17.95	-9.38	-
5/15	76	50	27.8	14.69	23.67	-8.98	-5.22	-
5/16	83	43	27.3	16.91	21.14	-4.23	-4.95	Apply standard chemical thinner rate
5/17	80	54	26.0	15.39	21.76	-6.37	-6.21	Apply standard chemical thinner rate
5/18	79	53	24.7	16.81	18.09	-1.28	-5.05	Apply standard chemical thinner rate
5/19	78	54	19.1	13.15	21.07	-7.93	-6.92	Apply standard chemical thinner rate
5/20	67	50	13.0	10.70	19.98	-9.28	-9.59	Apply standard chemical thinner rate
5/21	74	47	22.8	23.52	25.23	-1.72		
5/22	76	50	22.3	23.60	32.36	-8.77		
5/23	77	55	20.2	21.12	39.70	-18.58		



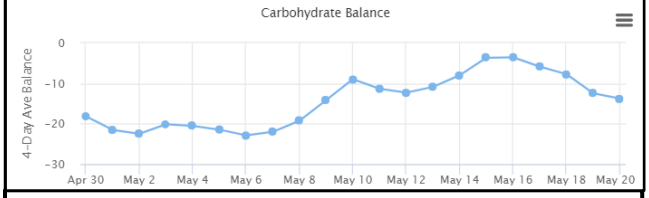
Green tip occurred on 5/1, and full bloom occurred on 5/16. Based on the predicted carbohydrate balance over the next four days, of around -5 to -10 g/day, the recommended rate to use is the standard chemical thinner rate.

Racine County

Current phenological stage: full bloom
Green tip: 4/30
Full bloom: 5/17

Apple Carbohydrate Thinning Model Results

Date	Max Temp (°F)	Min Temp (°F)	Solar Rad (MJ/m2)	Tree Carbohydrate Status (g/day)				Thinning Recommendation
				Production	Demand	Balance	4-Day Ave Balance	
5/13	60	41	10.2	4.80	13.71	-8.91	-10.87	-
5/14	74	50	8.5	0.67	23.82	-23.15	-7.98	-
5/15	72	48	17.0	9.78	20.13	-10.36	-3.65	-
5/16	79	41	25.0	17.57	18.64	-1.08	-3.55	-
5/17	67	48	23.7	18.24	15.60	2.65	-5.86	Apply standard chemical thinner rate
5/18	69	47	12.4	8.82	14.64	-5.82	-7.74	Apply standard chemical thinner rate
5/19	66	52	9.8	5.35	15.29	-9.94	-12.45	Apply standard chemical thinner rate
5/20	69	58	16.0	11.75	22.08	-10.33	-13.75	Apply standard chemical thinner rate
5/21	73	53	22.8	21.67	26.55	-4.87		
5/22	70	54	9.4	5.59	30.27	-24.68		
5/23	73	52	17.9	20.01	35.12	-15.11		



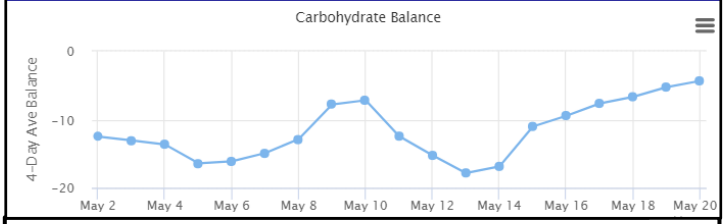
Green tip occurred on 4/30, and full bloom occurred on 5/17. Based on the predicted carbohydrate balance over the next four days, of around -5 to -15 g/day, the recommended rate to use is the standard chemical thinner rate.

Door County

Current phenological stage: early pink
Green tip: 5/2
Full bloom: not yet happened

Apple Carbohydrate Thinning Model Results

Date	Max Temp (°F)	Min Temp (°F)	Solar Rad (MJ/m2)	Tree Carbohydrate Status (g/day)				Thinning Recommendation
				Production	Demand	Balance	4-Day Ave Balance	
5/13	65	38	26.5	6.13	17.13	-11.00	-17.84	-
5/14	75	55	19.6	2.68	32.95	-30.27	-16.86	-
5/15	65	47	26.6	8.55	23.04	-14.49	-11.01	-
5/16	79	38	26.9	10.21	25.83	-15.62	-9.45	-
5/17	62	45	26.3	12.45	19.50	-7.06	-7.63	-
5/18	64	45	25.0	13.40	20.27	-6.88	-6.66	-
5/19	64	47	21.6	12.80	21.06	-8.26	-5.24	-
5/20	60	45	14.1	9.22	17.55	-8.34	-4.33	-
5/21	65	45	22.7	16.82	19.97	-3.15		-
5/22	65	46	23.0	18.60	19.82	-1.21		-
5/23	71	48	22.0	18.35	22.97	-4.62		-



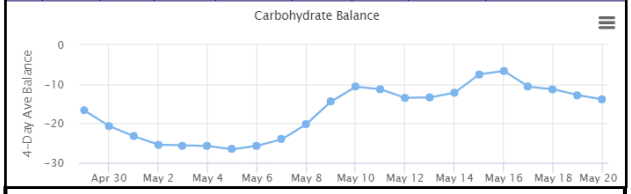
Green tip occurred on 5/2, and full bloom has not yet occurred. Because full bloom has not occurred, there is no thinning recommendation output at this time.

Dane County

Current phenological stage: full bloom
Green tip: 4/29
Full bloom: 5/16

Apple Carbohydrate Thinning Model Results

Date	Max Temp (°F)	Min Temp (°F)	Solar Rad (MJ/m2)	Tree Carbohydrate Status (g/day)				Thinning Recommendation
				Production	Demand	Balance	4-Day Ave Balance	
5/13	58	44	6.6	1.74	12.69	-10.95	-13.37	-
5/14	70	55	7.5	0.00	20.87	-20.87	-12.18	-
5/15	75	58	14.0	5.19	21.42	-16.22	-7.46	-
5/16	80	49	18.4	12.10	17.56	-5.46	-6.65	Apply standard chemical thinner rate
5/17	74	58	21.3	14.49	20.66	-6.17	-10.65	Apply standard chemical thinner rate
5/18	76	50	24.5	21.55	23.55	-2.00	-11.27	Apply standard chemical thinner rate
5/19	72	52	15.8	14.12	27.09	-12.97	-12.78	Apply standard chemical thinner rate
5/20	67	54	10.8	8.27	29.74	-21.47	-13.86	Apply standard chemical thinner rate
5/21	74	51	22.6	26.31	34.95	-8.64		
5/22	75	50	23.3	29.78	37.81	-8.03		
5/23	78	53	21.9	28.28	45.59	-17.31		



Green tip occurred on 4/29, and full bloom occurred on 5/16. Based on the predicted carbohydrate balance over the next four days, of around -10 g/day, the recommended rate to use is the standard chemical thinner rate.

Calendar of Events

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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