PURDUE UNIVERSITY
PURDUE EXTENSION
FACTS FOR Fancy Fruit
Issue: 20-07
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In This Issue

Crop Conditions

(Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212)

Apples fruits, where you can find them are about 1.5 inches in diameter. We have a very light to no crop on varieties in Lafayette. Grapes are past shatter for the most part, but there is a lot of late blooms on shoots from latent buds. The Minnesota varieties have a good crop as do the Tom Plocher varieties Petite Pearl, Crimson Pearl and Verona. Most others will have a very light crop if anything. Red raspberries are ripening, but we have a very light crop due to the freezes. Black raspberries look okay. Niwot in particular looks excellent and some floricane fruit are starting to turn red. Blackberries, as mentioned in the last issue were severely damaged by the freeze and cane blight so there will be no floricane crop. It is time to tip primocanes in blackberries and black raspberries. Goose berries and currants are ripe.

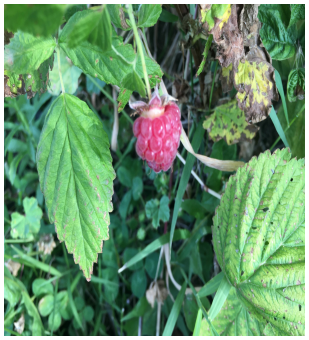
Honey Crisp

Pixie Crunch

Crimson Pearl grape

Itasca grape

Verona grapes

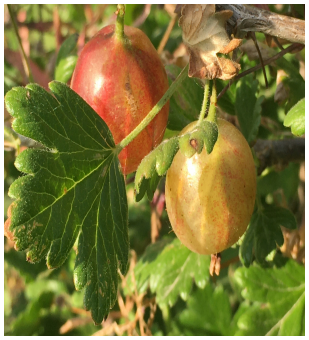


Ripe red raspberry

Severe freeze damage to red raspberry floricanes

Floricane fruit on Niwot black raspberry

Blackberry primocane after tipping



Tixia Gooseberry

Primus white currant

Warm, Dry Weather Causing Abnormally Dry Conditions Across Indiana Beth Hall Indiana State Climate Office

(Beth Hall, hall556@purdue.edu)

Indiana has been very dry the last several weeks (Figure 1) and conditions are starting to show in lawns and fields. This dryness has been exacerbated by low humidity and warmer temperatures (Figure 2). After a nice respite this past weekend, temperatures will start rising again into the weekend, but may not seem too uncomfortable with humidity remaining low at the front end of that warming period. The short-term forecast is calling for a slight chance of precipitation over the next seven days, but expect it to be light and spotty. The good news is the climate outlooks for the rest of June is showing increased probabilities of above normal precipitation (Figure 3), ... but will it be enough to compensate for the deficit we have been facing these past few weeks? It is too early to know for sure, but there are no major storm systems on the horizon, nor jet stream patterns that indicate a lot of precipitation is on its way.

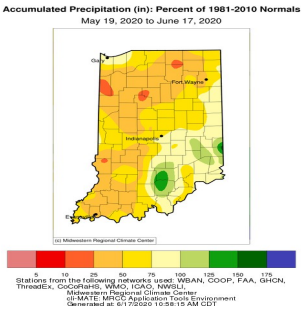


Figure 1. Accumulated precipitation from May 19 through June 17, 2020 presented as the percent of the 1981-2010 climate normal period.

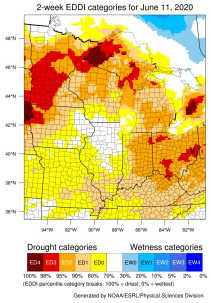


Figure 2. The Evaporative Drought Demand Index (EDDI) representing the level of modeled dryness based on recent precipitation, temperature, humidity, and other evapotranspiration factors. Period covers May 28 through June 11, 2020.

Figure 3. The 8-14-day climate outlook for precipitation representing June 24-30, 2020 where shading indicates the probability of above- or below-normal precipitation occurring during that time period.

Twig and blossom blights in Michigan blueberries

(Janna L Beckerman, jbeckerm@purdue.edu, (765) 494-4628)

Our colleagues at Michigan State posted an excellent article on twig and blossom blights in blueberries. Follow the link to read the article:

https://www.canr.msu.edu/news/twig-and-blossom-blights-in-michigan-blueberries

Timothy Miles, Mark Longstroth, Michael Reinke and Laura Miles, Michigan State University Extension

Canopy management in grapes

(Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212)

Canopy management is a critical production practice for improved sunlight exposure. Pulling shoots off the top of the rows in high cordon-trained vines improves sunlight exposure to the leaves at the base of the shoots. Those basal nodes will be the ones saved as spurs next year during pruning, and sunlight improves bud fruitfulness and cane hardiness. Shoot positioning is normally started as shoots toughen enough to resist breakage and before tendrils attach tightly. It usually has to be repeated a couple of times. Even in a year like this with a light crop, canopy management is still critical for bud fruitfulness next year.

Cluster zone leaf removal is another important canopy management practice on tight clustered varieties such as Vignoles, Seyval, and Chardonel. Immediate post-bloom through about 3 weeks post bloom is the most effective time for leaf removal. Removal of 3 to 5 basal leaves in the cluster zone can greatly reduce risk of bunch rots. Exposure to sun makes the berries less susceptible to disease and allows more rapid drying after rain or dew. Spray penetration in the cluster zone is also improved. Leaf removal also improves fruit quality in aromatic varieties such as Traminette, and most red varieties, where sunlight exposure improves anthocyanin development. Delaying leaf removal increases the risk of sunburn, as does removal of too many leaves, especially on the west side of the canopy. Many growers remove leaves only on the east side (on north-south rows) to take advantage of morning sun for drying, but keep leaves in place on the west side to avoid excessive heat buildup.

Raspberry and Blackberry Pricing Survey

(Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212)

The North American Raspberry & Blackberry Association (NARBA) is conducting a survey of growers' raspberry & blackberry pricing and what they are doing for COVID-19 in relation to their marketing this year. NARBA urges producers of all sizes and in all regions to participate, whether or not they have started harvesting. Growers who have not yet settled on their 2020 prices can report their 2019 prices or their best estimates. All responses are anonymous, and anyone who participates can request to receive a report of the results. The survey closes on Monday, June 22.

Click here for the survey:
https://ncsu.qualtrics.com/jfe/form/SV_cIVQbVyaGsI23BP

What Factors Affect Strawberry Flavor?

(Wenjing Guan, guan40@purdue.edu)

Strawberries have rich flavor; sugar, acid, phenolic content, and aroma all together make the wonderful fruit. Many factors are assumed to affect strawberry flavor. Some are supported by scientific evidence, some may be simply people's impressions. In this article, we discuss some of the factors that are more likely to affect strawberry flavor.

Locally grown strawberries often taste better than strawberries purchased from grocery stores. Part of the reason is that strawberries shipped long distances are harvested a few days before they are fully ripe. The fruit has longer shelf-life but the flavor is sacrificed.

We are testing ten strawberry varieties in a high tunnel and in open-field in southern Indiana this spring. Regardless of cultivars, we consistently noticed better fruit quality (higher sugar content, softer, and much cleaner) for strawberries grown inside high tunnel than grown in the open-field (Figure 1). I do not think it is fair to say the high tunnel itself makes the berry taste better. The conclusion would be too blank. Let's look further to see potential reasons.

Figure 1. Strawberries are growing in a high tunnel.

One big difference is the management system. We used a more intensive fertility management system inside the high tunnel than in the field. In the high tunnel, plants were fertigated during all the irrigation events starting in February (from once a day to three times a day). Plants grown in the open field depended on preplant fertilizers applied in the fall until April and then fertigated once a week. Another difference is temperature. In general, the high tunnel has a greater day/night temperature difference until more recently, this is another factor known to favor sugar accumulation. Strawberries grown in the open-field have been exposed to strong wind several times at the fruit forming stage. Many Immature fruit are injured by sand (Figure 2). The injured fruit tend to change color earlier, but with lower sugar content, less flavor and firmer flesh.

Figure 2. Sand injury on immature strawberry fruit.

Variety is a well-known contributor to strawberry flavor. When growing the ten varieties together, sometimes we can immediately tell what the variety of the berry is by looking at the appearance of the berry or smelling it. Some varieties are associated with very favorable aroma. Strawberry lovers can surely tell them apart. Unfortunately, fruit aroma is not easy to be measured by instruments. We focused on measuring sugar content and fruit softness. We noticed that the varietal difference was more pronounced for field-grown strawberries than high tunnel strawberries. In general, high tunnel strawberries all taste good. A noticeable difference existed for field-grown strawberries.

Another interesting thing I want to share happened when I grew strawberries in North Carolina, where day-neutral strawberries were harvested for several months. At the beginning and the end of the season, when the yield was low, the fruit tasted great. Sugar content reduced when large amounts of berries were maturing at the same time. This happened in an organic system, lack of fertility during the peak season likely contributed to the reduced strawberry flavor.

Surely, there are more environmental factors unique to a year or to a farm that may affect fruit flavor, such as the amount of sunlight, or rainfall before harvest. I also heard comments that the late frost this past season may also play a role in affecting strawberry quality depending on the stage of the plant growth when the frost happened.

We probably can not do much in front of the environmental factors. But healthy plants with well-balanced fertility and well-controlled disease and insect pests will surely bring outstanding strawberry fruit.

Dicamba Herbicide Updates and New Resources Stephen L. Meyers and Bill Johnson

(Stephen Meyers, slmeyers@purdue.edu)

Dicamba has been in the headlines the last two weeks. In case you've missed it, here are the highlights:

On June 3 the United States Court of Appeals for the Ninth Circuit ruled against the Environmental Protection Agency and its 2018 registration of over-the-top dicamba products Xtend, Engenia, and FeXapan and vacated their registrations. The suit did not include a fourth over-the-top dicamba herbicide, Tavium. The ruling can be viewed here: https://cdn.ca9.uscourts.gov/datastore/opinions/2020/06/03/19-70115.pdf

Between June 3 and June 8, state regulators across the middle part of the country were forced to interpret the ruling, with some choosing to ban the products and others continuing to allow them. Extension row crop weed scientists across the county pulled together recommendations for managing broadleaf weeds without dicamba, including Purdue (https://extension.entm.purdue.edu/newsletters/pestandcrop/article/well-now-what-do-i-do-if-i-cant-spray-a-dicamba-product-in-xtend-soybean/).

On June 8 the EPA issued a cancellation order for the three dicamba products, but allowed applicators to use products in their possession. The product had to be purchased on or before June 3 and must be used by July 31. The full order can be found here: https://www.epa.gov/sites/production/files/2020-06/documents/final_cancellation_order_for_three_dicamba_products.pdf

What does all of this mean for the future of over-the-top auxin herbicides and off-target risk to sensitive crops?

The Indiana cut-off date for over-the-top dicamba application was June 20. This date has not changed. Many other states have similar cut-off dates well before the EPA deadline of July 31.

The three dicamba herbicides affected by the court's ruling and the EPA cancellation order were only registered for two years with their registrations ending in 2020. It is expected that there will be new formulations of dicamba for over-the-top use in 2021.

Time will tell what effect these events will have on off-target movement to sensitive crops. For this reason it is important for applicators to practice good herbicide stewardship and for producers of sensitive crops to remain vigilant.

New fact sheet series about dicamba and 2,4-D drift now available online.

Scientists with Purdue University, Ohio State University, along with the North Central Integrated Pest Management Center and a nation-wide working group of weed scientist have developed a series of fact sheets to help specialty crop producers navigate issues related to dicamba and 2,4-D drift. Although the emphasis is on auxinic herbicides, the principles laid out in the fact sheets can be more broadly applied to other types of herbicide drift. Printed versions of the fact sheets will be available this fall.

Overview of Dicamba and 2,4-D Drift Issues:
https://ipm-drift.cfaes.ohio-state.edu/dicamba-and-24-d-fact-sheet-series/overview-dicamba-and-24-d-drift-issues

Frequently Asked Questions:
https://ipm-drift.cfaes.ohio-state.edu/dicamba-and-24-d-fact-sheet-series/frequently-asked-questions

Preparing for Drift Damage:
https://ipm-drift.cfaes.ohio-state.edu/dicamba-and-24-d-fact-sheet-series/preparing-drift-damage

Responding to Drift Damage:
https://ipm-drift.cfaes.ohio-state.edu/dicamba-and-24-d-fact-sheet-series/responding-drift-damage

More Resources:
https://ipm-drift.cfaes.ohio-state.edu/dicamba-and-24-d-fact-sheet-series/more-resources

A tomato displaying epinasty (stem and petiole twisting), a symptom of auxinic herbicide exposure.

XAPped again!

(Janna L Beckerman, jbeckerm@purdue.edu, (765) 494-4628)

Warm, wet weather has led to an uptick in bacterial shot hole disease, caused by the bacterium *Xanthomonas arboricola* pv. *pruni* (XAP). We started to see a significant uptick in shot hole on peaches, nectarine and plum before conditions turned dry. Leaves and fruit susceptibility to XAP infection decreases after pit hardening (if you were lucky enough to even have fruit this year). Keep in mind that any change to warm, wet weather can drive this disease.

Symptoms

Symptoms of this disease includes circular to irregular, water-soaked spots about 1 to 5 mm in diameter on leaves. Spots often turn red, purple or brown and can be seen surrounding the infected tissue along with surrounding healthy tissue. Eventually, the leaf spot will drop out, leaving a hole (Fig. 1). Leaves can have one to multiple shot holes and/or spots, and severely infected leaves may prematurely drop (Fig. 2). After the bacteria get into the leaves and begin to reproduce, symptoms develop. These symptoms usually appear between the leaf veins resulting in discrete, angular spots. Yellow or red halos often develop around the lesion. As lesions coalesce, the damage may appear more like blight, as opposed to a discrete spot

On fruit, dark brown or black spots sunken, cracked spots develop with a water-soaked margin (Fig. 3). These spots may be surrounded by a yellow halo. On cherry, fruit infection that occurs early in the season often results in distorted fruit; in peach and plum, larger spots may crack and ooze a combination of bacteria and gum. Peach scab is often confused for bacterial spot (Fig. 4) but will not have the oozing and gummosis.

In summer, other cankers may develop as dark water- soaked lesions around infected lenticels (Fig. 5). On twigs, gum may ooze from cracks when humidity is high and cracking or pitting may be observed between infected and healthy tissue. As these cankers increase in size, they become darker and sunken. As they expand and girdle the twig, dieback ensues. For apricot and plum, cankers persist and continue developing in younger (2- to 3-year-old) twigs and branches.

Laboratory diagnosis is necessary for confirmation of the bacterial pathogen; the fungal pathogen *Wilsonomyces carpophilum* also causes similar symptoms on leaves, as does copper phytotoxicity. Other bacterial pathogens, like *Pseudomonas syringa*e, cause bacterial shoot blight and can also be confused with XAP.

Lifecycle

The bacterium persists and overwinters in small lesions and cankers on the twigs and branches. In the spring, bacteria ooze from the cankers and spread to additional branches or trees by wind-driven rain, insects, birds, and pruning tools. The bacteria infect via blossoms, lenticels and cracks on trees, and can easily infect through natural openings, wounds, and leaf scars. A weakened tree is much more prone to the infection than vigorous ones.

Bacteria are microscopic, single-celled microorganisms. Their lives are sort of boring: They take in nutrients, they grow, and

when the get to a certain size, they split in two. This can happen in as little as 20 minutes, and twenty minutes later, those two daughter cells split into four, and twenty minutes later, those four are eight…and by the end of the day, the bacteria could have reproduced to a degree (2^{72} = 4,722,366,482,869,645,213,696) that makes rabbits seem like underachievers. It is important to understand this level of bacterial growth for two reasons: 1) you realize that the bacteria are everywhere, even when you don't see symptoms, and 2) they will become epidemic quickly when conditions meet their needs.

Bacteria enter through wounds, and natural openings in the plant, including stomata (microscopic openings on leaves). Once inside the plant, they produce toxins that kill cells, enzymes that turn cells into mush, hormones that make cells grow in odd ways, chemicals called effectors that suppress plant defense, or a type of slime (called exopolysaccharides) that block water conducting vessels. You might know this slime by another name—xanthum gum—a food additive used in salad dressings to thicken it, and make it stick to the leaves. Yum! These bacteria stick to plants as well as French dressing sticks to lettuce!

Even with a microscope, most plant infecting bacteria look surprisingly boring, like a pill–A very, very small pill. A key point to remember is that different species of *Xanthomonas* infects different plants, which is indicated by the term 'pathovar', meaning variety of bacteria pathogenic to one host. *Xanthomonas arboricola* pv. *pruni* infects stone fruit, whereas *Xanthomonas vesicatoria* infects tomatoes and peppers. So, if you have infected peaches, this pathogen will not spread to your tomatoes or peppers, but will spread between stone fruit. Keep in mind that conditions that favor any bacterial disease (warm, wet, humid conditions) pretty much favors them all.

Management

Regardless of which bacteria you are battling, there are certain key management strategies that reduce bacterial growth and spread. Bacterial diseases of the foliage are favored by prolonged periods of leaf wetness, and high relative humidity. Due to bacterial reproduction, they are everywhere, including all over asymptomatic plants. With a stressed or injured host, and wet conditions, splashing water easily spreads bacteria to overlapping and nearby plants. These bacteria then enter the leaf through injuries and natural openings, with water facilitating spread and infection. Thus, the longer the plants are wet, the greater the opportunity there is for infection to occur, and the more you handle or work around plants, the more likely they will end up damaged.

Susceptibility to this pathogen varies between species of stone fruits and varieties (Table 1). Some varieties react to infection with necrotic leaf spots, yellow halos and yellow leaf tips, and others may exhibit only necrotic leaf spots. Varieties with greater fruit resistance may show only slight skin-flecking.

Table 1. Reportedly XAP resistant and susceptible varieties.

Fruit	Resistant Cultivar	Avoid (Susceptible)
Peach	Belle of Georgia, Biscoe, Bounty, Candor, Comanche, Contender, Desiree, Garnet Beauty, Harbrite, Harken, Late Sunhaven, Loring, Madison, Norman, Pekin, Raritan Rose, Redhaven, Redskin and Sunhaven	Babygold S, Blake, Elberta, Halehaven, Jersey Queen, Jerseyland, July Elberta, J.H. Hale, Kalhaven, Rio-Oso-Gem, Suncling, Suncrest, Sunhigh.
Plum, European	Bradshaw, Bruce, Green Gage President, Robusto, Segundo, 98 Rubysweet, Shropshire, Yellow Gage; Blue Damson	Abundance, Formosa, Frontier,
Plum, Japanese		Black Amber, Early Golden, Queen Rosa, Ruby Queen, Satstuma, Shiro*, Wickson
Nectarine	Avalon, Brigantine, Silver Gem	Easternglo, Sunglo, Flavortop, Redgold,

Cultural practice is very critical to reduce the severity of the disease. Always avoid overhead irrigation to reduce transmission of the disease between branches or trees. If a new tree is scheduled to be planted, avoid planting it adjacent to a diseased tree.

Control of shot hole disease is not easily achieved through chemical sprays. The antibiotic oxytetracycline (Mycoshield or FireLine) provides good control when properly applied. For best results, use oxytetracycline at 12 oz. per 100 gals. of dilute spray. Use dilute or 2x; higher concentrates are not effective and may be phytotoxic. Spraying the entire tree once per week is essential. If you spray only one side of the tree (alternate row middle), make certain to spray the other side of the tree within 3-4 days.

Further protection against plant diseases can be provided by the use of copper-based pesticides. Copper is a multi-purpose biocide, capable of killing bacteria, water-molds and fungi—and damaging plants if care isn't taken. When using copper, be sure to use non-acidified water to minimize the risk of phytotoxicity. Keep in mind that this is copper, and it is definitely not a 'silver bullet', or even a copper one! Copper sprays, applied for peach leaf curl at leaf drop, also may help control bacterial spot. Copper can also be applied until pit hardening to suppress outbreaks, with the rate of copper decreasing over the growing season. On peaches, copper can cause injury to leaves and appears as reddish spots and shot-holes with some very mild defoliation when using an effective rate of copper. In peach, the multiple (5+) copper applications for bacterial spot suppression makes it likely that the pathogen will evolve significant resistance to copper. There are no pesticides that will cure plants or provide perfect protection from bacterial diseases. Thus, prevention, suppression and eradication are key management strategies.

When pruning, any tools used to prune out cankers should be disinfected (bleach, trisodium phosphate, or commercial disinfectant).

For more information and excellent images, see: https://planthealthportal.defra.gov.uk/assets/factsheets/x-arboricola-pv-pruni-factsheet.pdf

And Learning from Peach Bacterial Spot Epidemics: Potential Strategies for Reducing Fruit Losses" (David Ritchie, North Carolina State University) at https://plantpathology.ces.ncsu.edu/wp-content/uploads/2013/06/Learning-from-Peach-Bacterial-Spot-Epidemics.pdf?fwd=no

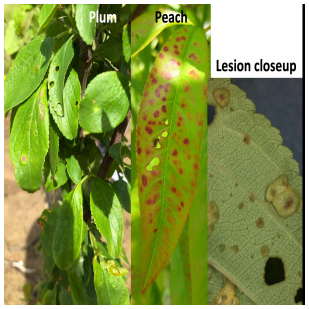


Figure 1. Bacterial shot hole symptoms. Photo by Janna Beckerman.


Figure 2. Leaf spot and drop caused by XAP. Photo by Janna Beckerman


Figure 3. Fruit infection by XAP. Photo by U. Mazzucchi, Istituto di Patologia Vegetale


Figure 4. Peach scab is commonly confused with bacterial spot, especially when shot hole is present. Photo by Janna Beckerman.


Figure 5. Cankering caused by XAP. Photo by U. Mazzucchi, Istituto di Patologia Vegetale.

Organic Aphid Control Update

(Laura Ingwell, lingwell@purdue.edu)

Aphids have been a particularly challenging pest to get under control in our high tunnel strawberries this year. They quickly colonized the strawberries we had growing all winter and took off as the weather warmed (Fig. 1). In my first attempt to knock them back I introduced 2,000 lacewing larvae (22-Apr), too little too late.


Figure 1: An example of the level of aphid infestations experienced in the high tunnel strawberries prior to treatment applications.

I decided to take the 'opportunity' at hand to evaluate four OMRI approved insecticide options. Applications began when populations were much higher than what growers should tolerate, so I would anticipate you would see even better results if you intervene at the first signs of infestation. Table 1 shows the products, active ingredient (A.I.), application rate and dates of applications. The change in aphid populations over the course of this trial are shown in Fig. 2. In entomological tradition, I surveyed the aphid population prior to treatment (1-May) to get a baseline. As you can see in the figure, populations were higher in the Grandevo® and BotaniGard® treated rows, prior to the start of applications.

Two of the tested products are biological pathogens, which we can expect to take some time to negatively impact the population. BotaniGard® typically takes 7-10 days to see control, according to the label. The Grandevo® product label recommends a knockdown is applied prior to or in a tank mix application at high populations, which was the case here. The label also suggests application of the high rate with increased volume to ensure coverage and short intervals between applications. In this study we applied the high rate for all products and used an electro-static sprayer to optimize coverage of the product. The results shown here indicate good control being achieved with the Azera® and Pyganic® products, when applied at levels of high population infestations. Over time, Azera® maintains the highest

level of control. However, BotaniGard®, Grandevo® and Pyganic® provide the same level of control at the most recent survey (8-Jun).

Product	Active Ingredient (A.I.)	Application Rate	Application Dates
Azera®	Azadirachtin 1.20 % Pyrethrins 1.40%	2 fl. Oz. / gal.	5-May, 8-May, 15-May, 26-May, 5-Jun
BotaniGard®	*Beauveria bassiana* Strain GHA	3 lbs. / 100 gal.	5-May, 8-May, 15-May, 26-May, 5-Jun
Grandevo®	*Chromobacterium subtsugae* strain PRAA4-1	3 lbs. / 100 gal.	5-May, 8-May, 15-May, 26-May, 5-Jun
Pyganic®	Pyrethrins	1.4 fl. Oz. / gal.	5-May, 8-May, 15-May, 26-May, 5-Jun

Table 1: Pesticide products and application details.

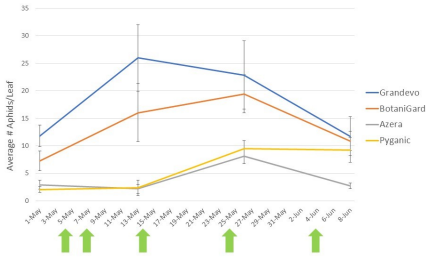


Figure 2: Changes in aphid populations across time for the four insecticide treatments. Means are calculated based on number of plants sampled within each treatment on each sampling date + standard errors. Arrows along the x-axis indicate pesticide application timing.

Some unique symptomology observed in the row treated with Grandevo® are shown in Figure 3. There were desiccated aphid bodies that appeared white in color with dark black spots on the back side. This was not observed on aphids in any of the other treated rows.

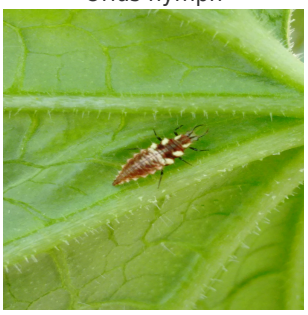
Figure 3: Aphid carcasses observed on Grandevo®-treated strawberry plants (a; left) and observed under a microscope (b; right).

Observations of Other Pests and Natural Enemies

In addition to monitoring the changes in aphid populations during our insect surveys, we take note of other pests and beneficial insects encountered. In terms of pests in our strawberry plot, we occasionally encounter whiteflies, green planthoppers and some caterpillars but none of these pests have reached economically damaging levels. In terms of natural enemies, we have seen a wide variety including lacewings (eggs and larvae), lady beetles (larvae and adults), syrphid fly larvae, orius nymphs, parasitized aphids and nabid bugs, shown in Fig. 4. These natural enemies occur more frequently in the area treated with Grandevo® and to a lesser extent BotaniGard®. This is likely a combination of more prey items available in these treatments and less impact from the pesticide applications. Azadirachtin (neem) and Pyrethrins are toxic to the pests and beneficial insects. ***Food for thought when designing your pest management program.***

Ladybeetle

Orius nymph



lacewing larva

syrphid fly larva

nabid bug predators of aphids

Figure 4: Ladybeetle, Orius nymph, lacewing larva, syrphid fly larva, and nabid bug predators of aphids found in strawberry plot. Photos by John Obermeyer and Laura Ingwell.

Extension Events

(Bruce Bordelon, bordelon@purdue.edu, (765) 494-8212)

Due to the COVID crisis, all Purdue Extension meetings have been cancelled through June. After July 1, in-person meetings may be held and will follow state and local guidelines. Most Purdue Extension staff are working from home and we are available to answer your questions by email, phone or through social media. Our contact information is at the end of the newsletter.

June 24, 2020 Greenhouse and Indoor Production of Specialty Crops Webinar Series
Registration:
https://purdue.ca1.qualtrics.com/jfe/form/SV_eJRqQ2LzGi0jtyd
Contact: Krishna Nemali knemali@purdue.edu

June 30, 2020 Indiana Hort Society summer field day
(Virtual, hosted by Beasley's Orchard) More details to come.

July 30, 2020 Small Farm Education Field Day
Daniel Turf Center, Purdue Student Farm
Contact Lori Jolly-Brown, ljollybr@purdue.edu

September 10-12, 2020 Purdue Extension Master Gardener State Conference
Sponsored by the Hamilton and Howard County Master Gardener Associations
Hamilton County Fairgrounds, Noblesville, IN (September 10 and 11)
Tours of Howard County gardens, Kokomo, IN (September 12)
https://hcmga.org/2020sc
(Registration open to Purdue Extension Master Gardener volunteers and Extension staff only)

September 10, 2020 Hydroponics Workshop
Hosted virtually
Contact Lori Jolly-Brown, ljollybr@purdue.edu

January 19-21, 2021 Indiana Green Expo
Indiana Convention Center, Indianapolis, IN
Contact Brooke Ponder, bponder@purdue.edu

January 20 & 21, 2021 Indiana Horticultural Conference & Expo
Indianapolis Marriott East
Contact Lori Jolly-Brown, ljollybr@purdue.edu

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