PURDUE UNIVERSITY

FACTS FOR FANCY FRUIT

Issue: 23-07
June 22, 2023

A Newsletter for Commercial and Advanced Amateur fruit growers.

In This Issue

Crop Conditions

(Chloe Richard, richa267@purdue.edu)

At the Meigs Horticultural facility, we have been busy completing cover sprays and with crop maintenance. The total rainfall at Meigs this June has totaled a half inch. We need rain to help with fruit development. As a result of very little rainfall, we've had very little disease pressure. The last harvest of our Strawberries was this previous week. Our Black Currants and Red Raspberries are the first to start ripening in our small fruit patch.

Watermelons- Starting to vine/ vine touch

Floricane Fruiting Blackberry- bloom/ green fruit

Black Currant- fruit development

Grapes- buckshot/ berry touch

Apple: (Rosalee): fruit development

Pears- fruit development

Plums- fruit development

Drought Expands and Expected to Continue

(Austin Pearson, pearsona@purdue.edu)

Below-normal temperatures continued through the first 21 days of June as the state average temperature was 68.3°F, which was 1.8°F below the 1991-2020 climatological normal. Temperature departures were 1-5°F below normal across the state, with larger departures in eastern and southern Indiana (Figure 1, Left). Maximum temperatures were near normal for the entire state, and minimum temperatures ran 1-9°F below normal (Figure 1, Right). Dry air and limited overnight cloud cover are to blame. Several locations measured minimum temperatures in the 40s at some point this month, but Franklin County recorded a chilly 36°F on June 9th. This station also tied with Shelby County for the second highest temperature recorded so far this month, 95°F, which occurred on June 3. Dubois County hit 97°F on June 4th. There were more than 20 daily low temperature records broken or tied during the second week of June. Over the last week, maximum temperatures ran 1-3°F above normal stretching from west central to northeast Indiana, and 1-6°F below normal to the southern and eastern portions of the state. Modified Growing Degree Days (MGDDs) have accumulated between 600 and 1300 units in the state (Figure 2, Left), which is near normal to over 120 units below normal (southeastern Indiana).

Last week, the state had some relief as the rain returned for most. The state average precipitation (June 1-21) was 1.33 inches, which was 1.63 inches below normal or 45 percent of normal. The heaviest precipitation fell in eastern and southern Indiana, where more than 1 inch fell in spots (Figure 3, Left). Still, all locations received below-normal precipitation. West-central and other isolated areas received less than 25 percent of normal precipitation (Figure 3, Right). Warren, Benton, and Tippecanoe Counties were the driest, receiving less than 10 percent of normal precipitation for the period. Johnson County had the highest precipitation total in the state, 2.90 inches (June 1-21), most of which (1.95 inches) was measured on June 12.

The June 20 US Drought Monitor brought expansions of Severe Drought (D2) and Moderate Drought (D1) categories in the state and some improvement in the east (Figure 4). Over 10 percent of the state is in D2, which doubled in size from the previous week. Eastern Indiana saw a 1-category improvement due to the rain last week and even introduced no drought in portions

of Adams, Jay, Randolph, and Delaware Counties. Southern Harrison County also improved to no drought this week. Overall, conditions continue to worsen as most locations have burned through the moisture that arrived last week. Yards are dormant, crops are stressed, water levels are low, and producers are concerned about hay production, and burn bans have been enforced in Newton, Jasper, Benton, Warren, Fountain, and Vermillion Counties. Keep in mind, the ongoing drought is a regionwide issue. Over 92 percent of the Midwest is at least Abnormally Dry (D0) or in some level of drought. Unfortunately, the pattern is not expected to change much.

The precipitation forecast through June 29 calls for less than 0.75 inches for the entire state (Figure 5). Notice that forecast precipitation amounts are less than 0.25 inches for areas in D2 and D1 drought categories. The Climate Prediction Center has elevated confidence in continued below-normal to near-normal temperatures and near-normal precipitation through July 5th. The US Seasonal Drought Outlook, released on June 15, expects persistence and development of drought in the state through September (Figure 6). Drought conditions will likely worsen before it gets better.

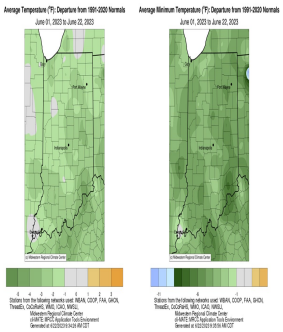


Figure 1: Average temperature (left) and Average Minimum Temperature (right) for June 1-22 represented as the departure from the 1991-2020 climatological normal.

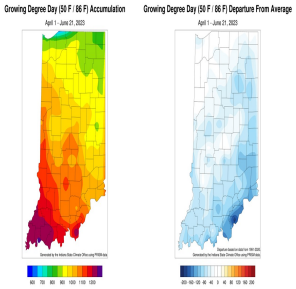


Figure 2: Total Accumulated Indiana Modified Growing Degree Days (MGDDs) April 1-June 21, 2023 (left) and Total Accumulated MGDDs represented as the departure from the 1991-2020 climatological normal (right).

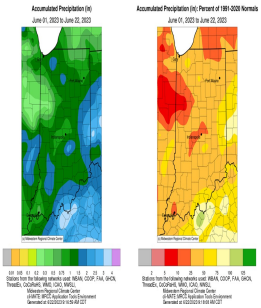


Figure 3: Interpolated map displaying accumulated precipitation for June 1-22, 2023 (left). Interpolated map displaying accumulated precipitation as a percent of the 1991-2020 climatological normal (right).

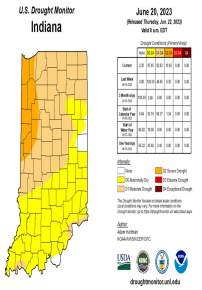


Figure 4: June 20, 2023, US Drought Monitor. The US Drought Monitor is released every Thursday morning by 8:30 AM.

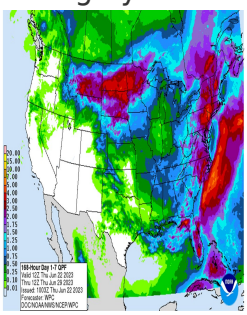


Figure 5: NWS Weather Prediction Center 7-day

quantitative precipitation forecast for the continental United States, valid June 22-29, 2023.

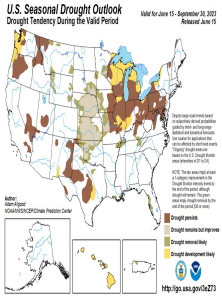


Figure 6: US Seasonal Drought Outlook valid for June 15-September 30, 2023, which is available via the Climate Prediction Center.

Grapevine Canopy Management

(Miranda Purcell, mrpurcel@purdue.edu)

Shoot Thinning

The optimum shoot density is 5-6 shoots per foot of row. Thinning to this density can help reduce shading, adjust the crop, lower the risk of disease and improve spray penetration. The optimal time for shoot thinning is before the shoots reach 12 inches. Much of the state is past this point, so removing shoots may be more difficult requiring the shoots to be cut.

Shoot Positioning

In high cordon-trained systems, shoot positioning and pulling shoots off the tops of the rows can help improve sunlight exposure to the leaves at the base of the shoots. These basal nodes will be retained at pruning and will provide next year's crop; increasing sun exposure has been shown to improve bud fruitfulness as well as cane hardiness. These practices may need to be done multiple times throughout the season.

Leaf Removal

Cluster zone leaf removal can lower risk of disease, increase spray penetration and even improve fruit quality. The period immediately after bloom to 3 weeks post-bloom is the most effective time for leaf removal. Leaf pulling after this time can increase the risk of sunburn, especially on the west side of the canopy. Many growers only leaf pull on the east side of the canopy (on north-south rows) to avoid this. The removal of the basal 3-5 leaves in the cluster zone can reduce the risk of bunch rots, especially in tight clustered varieties such as Vignoles, Seyval and Chardonel. Increasing sun makes the berries less susceptible to disease and allows for rapid drying after rain or dew. Leaf removal can also improve fruit quality in aromatic varieties, such as Traminette, and can improve anthocyanin development in red varieties.

Cluster Thinning

Cluster thinning is recommended on large clustered varieties. On average, each shoot should only have one or two clusters on it. You will want to remove clusters on any short and/or weak shoots as well. The best timing for cluster thinning wine grapes is after bloom and fruit set. Cluster thinning prior to bloom can result in compact clusters prone to disease.

Orange Rust

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

When Neil Young was singing about "Rust Never Sleeps," I doubt he meant orange rust, caused by the fungus *Gymnoconia nitens* (formerly *Arthuriomyces peckianus*). But who knows? Maybe he did? And he'd be right: This rust is definitely not sleeping! Despite unusually dry conditions throughout much of the state, orange rust is still making its presence known (Fig.1).

Symptoms of orange rust-infected brambles include spindly shoots with clustered, pale green to yellowish leaves on the upper surface (Fig.

1,2). Turning the leaf over is awe-inspiring: Early in the infection process, leaves look shellacked with orange paint, the diagnostic sign of the disease (Fig. 2). As the lesions mature, smooth waxy blisters develop into bright orange, powdery pustules giving the disease its name "orange rust" (Fig. 3). Lower leaves that are retained may develop dark brown to black pustules (telia) on the lower leaf surface and may get confused with cane and leaf rust (Fig. 4) caused by a different fungus, *Kuehneola uredinis*, which rarely infects red and black raspberries, and is rarely reported in Indiana.

Symptoms of orange rust infection vary between bramble hosts: Red raspberries are apparently immune to the disease. Black raspberries are highly susceptible, and infected leaves in the lower canopy wither and drop by early summer. At the same time, new leaves produced on the growing tips of the canes appear normal. Blackberries vary in susceptibility, but reliably susceptible blackberry cultivars include Black Diamond, Chester, Chickasaw, Ebony King (conflicting reports), Navaho, Ouachita, and Triple Crown; Primocane-fruiting cultivars Prime-Ark Traveler and Prime-Ark Freedom have also been found to be infected. Note: Not all of these varieties are winter hardy in Indiana.

Although it may appear that the plant has "grown out" of the disease, the disease is systemic: Canes will remain infected, producing infected, blossom-less canes the following spring (Fig. 1). Some primocanes and floricanes may even look healthier later in the season, giving the illusion that the plant 'got better'. As a systemic infection, those 'recovered' but still infected primocanes will produce pustules (aecia)on the underside of leaves, and form spores on newly emerged shoots in the spring, beginning the process anew.

Management:

Despite the dramatic nature of the disease, orange rust can be managed successfully, and reliable crops of black raspberry and blackberry can be obtained!

1. Scout for the disease during spring and summer. Inspect planting thoroughly when new canes are between 12 to 18 in.
2. Quickly remove and destroy infected plants (to the roots) that show symptoms of spindly growth, or signs of infection. Infected plants culled in early spring limits any spread of orange rust on resprouts in June. Hand-pull stems and uproot the root ball with first year plants. Manual removal works best after rain or in loose soils. Use of a adze, claw mattock or pulaski is recommended. Recheck area because any large root fragments remaining can re-sprout and continue the disease cycle.
3. Consider the careful application of systemic herbicides to eliminate any rust-infected root suckers. If systemic herbicides must be used, glyphosate in fall is the most effective for selective plant removal. Apply to infected plants only.
4. Be sure to plant resistant cultivars, including Arapaho, Apache, Ouachita, Osage, and Natchez, which are erect and thornless. Other options include Cherokee, Cheyenne, Choctaw, Comanche, Shawnee and which are erect and thorny.
5. Wild blackberries should be eradicated within the planting, however, the disease can spread within a quarter mile radius, making 'true' eradication unlikely.
6. Preventive fungicide applications are effective, and recommended fungicides include FRAC 3 fungicides like Rally and Tilt. FRAC 11 containing fungicides include Abound, which performs wells, whereas the pyraclostrobin-containing fungicides Pristine and Merivon are considered

suppressive, despite performing as well. The premix Quilt Xcel (FRAC 3+11) is also labeled. Keep in mind that once a plant shows symptoms, it cannot be cured with fungicides and eradication is the only option. Fungicides should be applied every 10-14 days if conditions are dry (including a lack of morning dew) and 7-10 days if conditions are wet, or dew production is heavy.

7. Establish new plantings from a clean source or from certified, culture-indexed, tissue-cultured plants.

1. 

Figure 1. Systemic orange rust infection last year led to dramatic symptoms and signs in 2023. No flowers were observed on the infected plant. Photo by Laura Jollie.

1. 

Figure 2. Early infections resemble a coating of orange paint. Photo by Janna Beckerman.

1. 

Figure 3. As lesions(aecia) mature, they turn powdery, releasing aeciospores to infect neighboring plants. Photo by Janna Beckerman.

1. 

Figure 4. Cane and leaf rust presents with yellow, inconspicuous pustules, unlike orange rust. Image from Jan Ole Kriegs from Observations.org.

Weed Management at Strawberry Renovation

(Stephen Meyers, slmeyers@purdue.edu) & *(Jeanine Arana, jcordone@purdue.edu)*

As strawberry harvest winds down, attention turns to strawberry renovation.
Renovation consists of mowing existing strawberry foliage (Figure 1) and, in matted row systems, cultivating to reduce row width. When combined with strategic herbicide applications, this can be a great time in the production cycle to catch up on weed management or maintain your level of weed control. One way to break down the weed management options is by weed life cycle.

Figure 1. Mechanical renovation of plasticulture strawberry plants at Meigs Horticulture Research

Farm, Lafayette, IN. Photo by Jeanine Arana

Manual renovation of plasticulture strawberry plants at Meigs Horticulture Research Farm, Lafayette, IN. Photo by Jeanine Arana

Winter annuals:

If you have escaped winter annual weeds like field pennycress, henbit, or chickweed, they should have seeded out and died back by now. Mowing and cultivating will remove what's left. If your control of winter annuals this year was less than desirable, consider a fall pre-emergence herbicide application. More on this in a future issue.

Perennials/Biennials:

If perennial weeds are growing above the strawberry canopy, consider a post-emergence herbicide application prior to mowing. 2,4-D amine (Embed® Extra, others) or clopyralid (Stinger®, Spur®) can be used to manage broadleaf weeds while clethodim (SelectMax®, others), sethoxydim (Poast®, others), or fluazifop (Fusilade®) can be used to manage grasses. Clopyralid works well on composite weeds (dandelion, Canada thistle), nightshades, and legumes (clovers). It also works well on Carolina geranium. 2,4-D will provide better control of many other perennial broadleaf weeds. Clethodim generally provides the best control of perennial grasses with the exception of quackgrass, which is best controlled with fluazifop. Grass herbicide application should include an appropriate non-ionic surfactant or crop oil to facilitate herbicide uptake. If applications are made prior to mowing, allow several days between application and mowing. This gives ample time for these systemic herbicides to be absorbed into the weeds and moved to the growing points.

Annuals:

In well-canopied matted row strawberries, annual weeds are generally out-competed by the established strawberry plants in the spring. However, mowing at renovation opens a window for weed emergence and growth. Pre-emergence herbicides can help to prevent weed emergence while strawberries regrow. Pre-emergence herbicides should be applied to a weed-free soil surface, for example immediately following cultivation. *S*-metolachlor (Dual Magnum®), pendimethalin* (Prowl® H_20, others), terbacil (Sinbar®), and acifluorfen (Ultra Blazer®) can be applied over-the-top of rows and row middles of matted row strawberries at renovation. *S*-metolachlor, pendimethalin*, acifluorfen, flumioxazin (Chateau®), napropamide* (Devrinol®), and bicyclopyrone (Optogen®) can be applied as directed applications to row middles in plasticulture systems. Tank-mixing combinations of these products can improve the spectrum of weeds controlled. Consult product labels for more information. Strawberry cultivars differ in their tolerance to terbacil. To reduce the risk of injury, apply terbacil just prior to a rainfall or overhead irrigation event, and do not apply terbacil on soils with less than 0.5% organic matter. All pre-emergence herbicides will require rainfall or overhead irrigation for activation- to move the herbicide into the soil where weed seeds are actively germinating.

In plasticulture strawberry, emerged annual weeds can be managed with row-middle applications of carfentrazone (Aim®), paraquat (Gramoxone®), glyphosate (Roundup®), or pelargonic acid (Scythe®). Carfentrazone, paraquat, and pelargonic acid are contact

herbicides, “burning” green tissues they contact. They work best on small weeds and require adequate spray coverage. Glyphosate is systemic. Although it can be effective on larger weeds, it also has greater potential to injure strawberry plants if it drifts into the row or comes in contact with runners in the row middles. For this reason, we generally discourage using glyphosate in row middles during the growing season. Include non-ionic surfactant or crop oil according to the product label. Ammonium sulfate may also be necessary when hard water is used.

A Note on Strawberry Herbicides and Carryover:

If you plan to take strawberries out of production following the 2024 season, be mindful of rotation restrictions of the herbicides referenced above. Sinbar® has a two-year rotation restriction for most crops. Clopyralid (Stinger®, Spur®) rotation restrictions vary from “anytime” for (cole crops and sweet corn) to 18 months for peas and potatoes.

Non-Herbicide Options:

For those who choose to grow without using chemical weed control, straw can be used to mulch row middles following mowing and/or cultivation. In plasticulture production systems, row middles can be planted with low-growing cover crops (such as white clover) (Figure 2). We are currently researching both chemical and non-chemical row middle weed control in multi-year plasticulture strawberry production systems and look forward to sharing our results in the future and at these upcoming field days:

Purdue Fruit and Vegetable Field Day. July 20, 2023. Meigs Farm. Lafayette, IN. Purdue Fruit & Vegetable Field Day 2023 | Purdue University Facts for Fancy Fruit

Southwest Purdue Agriculture Center Field Day. June 28, 2023. Vincennes, IN. Southwest Purdue Agricultural Center Field Day Registration Open | Purdue University Vegetable Crops Hotline (vegcropshotline.org)

Figure 2. Plasticulture strawberry with white clover planted in the row middles at Meigs Horticulture Research Farm, Lafayette, IN. Photo by Jeanine Arana

Plug? Bare-root? What Other Options for Plasticulture Strawberry Planting?

(Wenjing Guan, guan40@purdue.edu)

The harvest season may not have ended yet; it is time to plan for the new planting. This article summarizes options for planting materials and considerations for plasticulture-grown strawberries in the region.

Purchasing plug plants

Plug plants are like vegetable transplants with actively growing root systems. Plug plants are much easier to establish than bare-root plants in the plasticulture system. They are fast planting and easily survive. The drawbacks of purchasing plug plants are the high cost and a short planting window. One plug plant costs twice as much as one bare-root plant, making the plant cost for one acre of plasticulture strawberry reach $5,000 and above.

The number of branch crowns grown in the fall is

essential in determining the yield of plasticulture strawberries in the following year. To achieve adequate fall growth, ideally, growers in central to northern Indiana should target to plant by the end of Aug, and growers in southern Indiana should plant before the middle Sep. Plug plants are grown from runner tips, and runner tips are harvested in summer from colder climates in commercial production. Thus, plug plants are not commercially available until about the middle of August. Supplying the large amounts of plug plants required by field strawberry growers in a short window is one of the significant challenges in using plug plants in plasticulture strawberries in our region.

Purchasing runner tips

Because of the limited supply of plug plants in a short window and the high price, some farmers choice to purchase runner tips and grow their own plugs. This extension bulletin described the method of growing plug plants from runner tips. The process takes about four weeks, and a misting system is usually needed in the first few days after planting. In addition to the required misting irrigation system, grown own plug plants require greenhouse space and labor. Another barrier is that commercial runner tips is often sold in large quantities that may exceed a single grower's need. Growing your own plug plants from commercial runner tips may allow fruit growers a few days to a week earlier in planting. But the planting window is still narrow and limited by runner tips' availability and arrival date.

Harvesting runner tips from the established strawberry field

Some wonder if it is okay to produce their plug plants by harvesting runner tips from established strawberry fields. Although this approach saves costs in planting materials and could have an early start, I do not recommend so, particularly if the strawberries are grown in the open field. The runners are lying on the ground and have potentially been exposed to diseases and insect pests. Furthermore, the cultivars still in the patent period can not be propagated without a license agreement with the patent holder, even for small acreage use. This extension publication provided a comprehensive list of cultivars and their patent expiration dates.

Bare-root Plants

Bare-root plants can also be used in plasticulture production. Not only is the planting cost much lower compared to purchasing plug plants, but farmers would have a longer window to plant. Bare-root plants are typically available from the beginning of the year to June. In the plasticulture system, farmers usually order the plants in June and wait for a cool period to plant. Planting bare-root on plasticulture is a tedious job and needs to be done by experienced workers. Even so, if there was not enough water or too high temperatures after planting, significant plant loss is possible. Most farmers would choose white plastic instead of black plastic when planting bare-root plants.

Crown Plugs

Crown plugs refer to plug plants grown from bare-root plants. I am not aware of commercial supplies of crown plugs, but farmers can grow their own crown plugs if space and labor are available. Dr. C.A. Weber from Cornell University described the method of growing crown plugs in this article: Cold-stored bare-root plants were placed in 50-cell deep plug trays after trimming the roots to approximately 2 inches. The cells are filled with potting mix halfway before planting and then filled with potting mix around the roots. After watering, add additional potting mix to cover any exposed roots. The trays are watered daily and fertilized weekly. It takes about six weeks to grow crown plugs in the trays. In this

period, flowering trusses and runners should be removed. Crown plugs provide farmers flexibility and the potential to plant plug plants in the middle of summer. But the additional work required to grow crown plugs limits their wide use by commercial fruit growers.

Each option has its pros and cons. Choosing the one fit best in your system and the resources you have is the key to achieving success.

Farmers Shared Experiences in Plasticulture Strawberry Production

(Wenjing Guan, guan40@purdue.edu)

Strawberries are traditionally grown with a matted-row system in Indiana. Plasticulture is relatively new. It brings market opportunities and potentially high income. However, growing strawberries in plasticulture is much more expensive than the matted-row system. Farmers need a good understanding of the system to avoid significant economic loss.

In the Strawberry Chat Podcast episodes, you will hear interviews with two Indiana strawberry growers, Calvin Beasley at Beasley's Orchard and Richard Ritter at Ritter's Farms. Their farms vary in size, and they sell through different markets. After many hard lessons learned over the years, they have adapted the plasticulture strawberries in their farming business. In these interviews, they generously shared their experiences, thoughts, and ideas, which can be extremely valuable for others interested in growing this crop.

Do you know your beneficial insects in fruit plantings?

(Elizabeth Yim Long, long132@purdue.edu)

There are so many different kinds of insects, but we often focus on the ones that cause damage (for obvious reasons). However, there are many beneficial, predatory insects you can be on the lookout for in your fruit plantings! These insects can be seen throughout the season, attacking aphids, mealybugs, caterpillars, mites, and even scale insects in your fruit plantings! Because they may look totally different between the immature and adult stages, I wanted to highlight a few common predatory insects in this issue, so you can learn to recognize 'who' the good insects are, and rest assured they are doing their good works in your orchard!

Figure 1. Pink spotted lady beetle (left) and an immature lady beetle larva (right). Photo credit: John Obermeyer

Lady beetles (and their larvae) (Figure 1):

Ahh, the charismatic lady beetle! Both the adult and immature life stages of lady beetles eat small, soft-bodied insects, like aphids, mealybugs, and even the eggs of some pest insects. I think the larvae look like little alligators, and some might be surprised to learn that lady beetle larvae look so different from the adult beetles that we recognize so easily. Some lady beetles also eat pollen to get a healthy dose of protein! There are many different species of lady beetles, some that are native and some that are not native. If you'd like to learn more about the different lady beetle species you might spot, you can take a look at the Buckeye Lady Beetle Blitz Identification Guide. See how many of these lady beetles you can find throughout the season!

Figure 2. Lacewing larvae eating an aphid (left) and an adult green lacewing (right). Photo credit: Brian Christine

Lacewing larvae (Figure 2, left): Also known as 'aphid lions,' lacewing larvae are fierce predators that also crawl along on plants to find soft-bodied insects, like aphids, mealybugs, or eggs to eat. These insects may be missed more easily if you don't take a closer look, because they are pretty small and not as colorful – but they are so cool! When lacewing larvae complete their development, they emerge as these cool-looking brown or green winged-adults that do not feed (Figure 2, right), besides sipping a bit of nectar to fuel their flight. The adults may be spotted hanging on the undersides of leaves of plants/trees during the morning and evening hours.

Figure 3. Hover fly larva eating an aphid (left) and an adult hover fly on someone's arm (right). Photo credits: North Carolina State Extension and John Obermeyer.

Hover fly larvae (Figure 3, left): We all know the adult hover flies, as they are often mistaken for bees given their black and yellow coloring. If you listen carefully though, you'll notice the hover flies don't make the same buzzing noise that most bees do as they fly around you. Adult hover flies are important as pollinators, but the larvae are another fierce predator of soft-bodied insects, especially aphids! Unlike the lacewing larvae, hover fly larvae look more like a typical maggot; that is, there's no obvious head and they don't have legs. So, they may appear like slugs, wriggling along the top or bottom of leaves in search of prey! They are small and easy to miss, but if you do see one, leave them be (even if they are a bit strange looking!).

Figure 4. An assassin bug (in this case a wheel bug) (left) eating a spotted lanternfly, and a damsel bug eating a plant bug (right). Photo credits: James Occi and Ralph R. Berry

Damsel bugs & Assassin bugs (Figure 4): These predatory insects eat other insects by first piercing them with their beak- or straw-like mouthparts and then sipping out their body fluids! Many assassin bugs are colorful, often with warning colors like red, black, or yellow, while damsel bugs are more drab in color and easy to miss. Regardless of their coloration, these insects are also fierce predators and can be seen eating anything from other insect's eggs to caterpillars, stink bugs, aphids and more! I'm always amazed to see these insects take down prey that are bigger than they are themselves! Just a note if you see assassin bugs and want to get a closer look, take care because they may bite (i. e., stab your finger with their beak-like mouthpart, ouch!!)

Figure 5. A parasitoid wasp looking for a San Jose scale to lay its egg in (left) and a samurai wasp laying eggs in a clutch of stink bug eggs (right). Photo credits: Jack Kelly Clark and Chris Hedstrom

Parasitoid wasps and flies (Figure 5): Parasitoids are insects that require only a single host to complete their entire life cycle, and this is different from predatory insects listed above, which must eat many insects to complete development from egg to adult. Parasitoid wasps and flies can be *tiny* or large and their colors vary

a lot too. Parasitoid wasps are often referred to as ‘stingless wasps’ because they don’t often sting people; instead, they are looking to sting other insects to lay an egg (or many eggs) inside them! The egg hatches within the insect and the larva feeds on the insect internally, eventually killing it and emerging out of its body cavity as an adult (like in the Alien movies, eep!)! Parasitoid flies have a similar strategy as parasitoid wasps, except that the flies cannot sting, so their egg is often laid directly on or near the insect host rather than inside it. Many of you may be familiar with the parasitoid wasps that attack aphids, or the parasitoid flies that attack monarch caterpillars. One group of parasitoid wasps that may be particularly exciting to readers are the samurai wasps, which attack the eggs of brown marmorated stink bugs!

Keep a lookout for these good insects in your fruit orchard and before you know it, you may have a favorite one to watch – one of my favorites are the lacewing larvae!

Purdue Fruit & Vegetable Field Day 2023

(Lori K Jolly-Brown, ljollybr@purdue.edu)

REGISTER HERE

Purdue Fruit & Vegetable Field Day 2023
Thursday, July 20, 2023
Purdue Meigs Ag Center
9101 S. 100 E, Lafayette, IN 47909

Coordinator: Petrus Langenhoven
Extension Staff: Lori Jolly-Brown, Jay Young, Chloe Richard, and Paul Howard

FIELD DEMONSTRATIONS

 Sweet Corn Pest Management Updates
 Silage Tarps for Weed Management in Potatoess
 Watermelon Weed Management
 Summer 2023 Collard Insect Management Trial
 Black Soldier Fly Composting and Specialty Crop
Production
 Two-year Plasticulture Strawberry Research Update
 High Tunnel Diversification and Biological Control
 Does Increasing Soil Health Improve Pepper Yield?
 Unmanned Aerial Vehicle Demonstration

Contact Lori Jolly-Brown or Petrus Langenhoven if you have any questions.

Purdue Small Farm Education field day 2023

(Lori K Jolly-Brown, ljollybr@purdue.edu)

REGISTER HERE

2023 FIELD DAY SCHEDULE

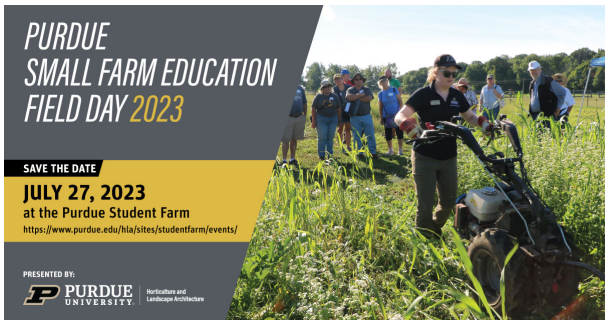
Thursday, July 27, 2023
Registration 8:00 – 9:00 am EST
Demonstrations at 9:00 am – 12:00 pm EST
Coordinator: Petrus Langenhoven
Extension Staff: Lori Jolly-Brown, Lais McCartney, and Patrick Williams

Please join us for the 2023 Small Farm Education Field Day!
The EMT food truck will be on site for those who would like to purchase lunch after the educational demonstrations end. The Kona Ice truck will also be on site for a FREE cool summer treat for all attendees, compliments of Purdue

Extension and Purdue Horticulture and Landscape Architecture!

Demonstrations at the Field Day

- High Tunnel Table Grape Production
  Miranda Purcell
- High Tunnel Pepper Production and Variety Selection
  Petrus Langenhoven and Dennis Gustavo Toc Mo
- Growing Grains on the Small Farm – Dry Edible Bean Variety Trial
  Wil Brown-Grimm and Ashley Adair
- Predator-Prey Dynamics in High Tunnel Crop Production
  Sam Willden
- Biorational Pesticide Efficacy for Controlling Caterpillars and Flea Beetles in Crucifer Crop Production
  Laura Ingwell
- Black Soldier Fly Composting and Specialty Crop Production
  Milena Agila and Laura Ingwell
- Raised Garden Beds for Vegetable Production
  Amy Thompson and Nathan Shoaf
- Postharvest Food Safety Demonstration
  Scott Monroe and Amanda Deering
- Silage Tarps and Their Potential Uses on Small Farms
  Steve Meyers and Josue Cerritos
- Choosing Fertilizer Injectors for Drip Irrigation for Small Plots
  Wenjing Guan



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