

VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the Purdue University Cooperative Extension Service



Issue: 656
April 25, 2019

In This Issue

- [Watermelon Transplant Diseases](#)
- [An Alternative Trellis System may Improve Tomato Yield](#)
- [DIY traps for Striped cucumber beetle Management](#)
- [Welcome to Spring and FoodLink](#)
- [Salmonella Outbreak does not Involve Indiana-Grown Melons](#)
- [Midwest Vegetable Production Guide](#)
- [MW Vegetable Guide Updates](#)
- [Indiana Climate and Weather Report](#)
- [Fungicide Schedules](#)
- [New Phytophthora blight Extension Bulletin](#)
- [Upcoming Events](#)

Watermelon Transplant Diseases

(Dan Egel, egel@purdue.edu, (812) 886-0198)

A recent observation of gummy stem blight on a watermelon transplant has reminded me to remind growers to inspect seedlings. Whether one is growing transplants or receiving transplants for delivery, seedlings should be inspected for possible disease problems. If one is uncertain of the cause of the symptoms, an official diagnosis can be obtained by sending the sample to the [Plant and Pest Diagnostic Clinic](#). Below I will describe several common transplant diseases of cantaloupe and watermelon as well as management options. I have had similar articles in the Hotline in the past, however, I will use new photos here.

Gummy stem blight on transplant seedlings may be recognized by the water-soaked area of the stem near the seed leaves. In this article, I will show a leaf with a lesion of gummy stem blight (Figure 1). A closer look (one may need a 10X hand-lens) at any gummy stem blight lesion may reveal dark, raised fungal structures.



Figure 1: A leaf lesion of gummy stem blight on a watermelon transplant.

The fungus that causes gummy stem blight (*Didymella bryoniae*) may survive in crop debris, thus overwintering in the field from year to year. This fungus may also be introduced through seed or transplants. It is also possible for the fungus to survive in greenhouse production facilities.

Fungicides that are likely to be effective against gummy stem blight and labeled for greenhouse use include:

- Mancozeb products (e.g., Dithane®, Manzate®, Penncozeb®, Roper®) are contact materials.
- Products with the active ingredient tebuconazole (e.g., Monsoon®, Vibe®, Toledo®)
- Luna Experience®
- Switch®
- Quadris Top®; The Quadris® portion (Group 11) of this product will be more effective against anthracnose; the Top portion (Group 3) will be more effective against gummy stem blight.

Anthracnose of watermelon is another disease that may be observed on transplants. The lesions caused by anthracnose (*Colletotrichum orbiculare*) are often jagged or sharp in appearance (Figure 2). Stem lesions are less common, but if they occur they may appear

water-soaked, light brown and pitted. Such stem lesions will not necessarily appear at the seed leaves.

Anthracoze on cantaloupe transplants is less common.



Figure 2: A watermelon transplant with lesions of anthracnose.

As described above for gummy stem blight, the fungus that causes anthracnose may survive in crop debris such as in transplant production facilities. This fungus may also be introduced through seed or transplants.

Fungicides that are likely to be effective against anthracnose and labeled for greenhouse use include:

- Mancozeb products (e.g., Dithane[®], Manzate[®], Penncozeb[®], Roper[®]) are contact materials.
- Luna Sensation[®]
- Topsin[®] formulations
- Quadris Top[®] (see above);

Watermelon transplants with Fusarium wilt often appear wilted or the plant tops may have died back (Figure 3). Symptoms that appear under humid greenhouse conditions may be accompanied by white mycelial growth of the causal fungus, *Fusarium oxysporum* f.sp. *niveum*. Seedlings with Fusarium wilt symptoms may be clustered in transplant trays.



Figure 3: Fusarium wilt symptoms on watermelon transplant.

Fusarium wilt may be introduced through seed or

transplants. Unfortunately, the fungus that causes Fusarium wilt has long lived spores that may survive for years in soil, equipment or transplant trays.

There are no fungicides that have been proven to be effective against Fusarium wilt of watermelon in the greenhouse.

The symptoms of **bacterial fruit blotch** (BFB) can be difficult to recognize on foliage. Leaf lesions may have a dark necrosis with water soaked margins (Figure 4). Leaf symptoms of BFB are easily confused with angular leaf spot, a disease that is not often economically important. A laboratory analysis may be required to distinguish these two diseases.



Figure 4: Symptoms of bacterial fruit blotch on a watermelon transplant.

The bacteria that cause BFB do not often survive in crop debris; the disease is more often transmitted through seed. Although symptoms are more often observed on watermelon, cantaloupe transplants may also be affected.

To guard against these diseases in your field, carefully inspect transplants regularly during production or upon delivery. If unsure about symptoms, send them in to the Plant Pest and Diagnostic Laboratory or a similar laboratory for an official diagnosis.

Clean and sanitize transplant production facilities and equipment in-between generations. Purchase transplant trays for each generation of transplants or clean and sanitize trays well. Do not use soilless greenhouse mix that has been opened or come into contact with the ground or unclean equipment.

Purchase vegetable seed that has been tested for the diseases described above. Ask your seed company representative if you are uncertain about what tests have been conducted.

Finally, avoid planting transplants grown from seed lots or greenhouses where any of these diseases has been confirmed. Seedlings that appear healthy may in fact have a disease that has spread from a nearby seedling.

In most years, it will be impossible to avoid at least some of the diseases described above. But, as much as possible, do not plant these diseases with your transplants. In particular, avoid using transplants with Fusarium wilt. Since the Fusarium wilt fungus survives many years in the absence of a host, an introduced fungus may last indefinitely. Plus, watermelon transplants with Fusarium wilt may add a new race or strain of the fungus to your field.

Managing these diseases in the field is a different discussion and will be addressed in many articles throughout the year.

An Alternative Trellis System may Improve Tomato Yield

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

The Florida-weave or sometimes called stake and weave is a commonly used tomato trellis system (Figure 1). It has several benefits and is easy to implement. However, sometimes the plants grow too tall and can hardly be supported by the stakes, or they may be too vigorous and break the strings. In this article, we will introduce an alternative tomato trellis system, Spanish-weave, and discuss its usage in tomato production.



Figure 1. Tomato plants trellised with a Florida-weave system.

How to trellis tomato plants with the Spanish-weave system?

1. Materials: tomato stakes, tomato strings, and hooks. We made the hooks from steel wire. They

were made at 4-inch, 8-inch and 12-inch length (Figure 2).



Figure 2. Self-made hooks at 4-inch, 8-inch and 12-inch length.

2. Prune bottom leaves of the tomato plant and suckers until the first flower cluster (Figure 3).



Figure 3. A tomato plant before (left) and after (right) pruning.

3. Install tomato stakes on each side of the rows at every two tomato plants (A); Tie strings across the two wooden stakes at the beginning and the end of each row (B); Set up string on each side of the plants along the rows (C); Tie two strings together at the sides of tomato plants (D); Set up a string from the roof trellis (arrow) and tie it with the bottom strings in the middle of every two tomato plants (E); Connect four stakes in a rectangle shape, and place a 4'' hook between the two tomato plants (E); Cross the hook to the vertical string (F).



Figure 3. Step-by-step instruction of Spanish-weave trellis system.

4. Repeat the above step about every week. As plants grow bigger, using larger hooks.



Figure 4. Connect four stakes in a rectangle shape (A), cross the hook (12'') with the central-string (B) and hook it to the side-strings between the two tomato plants (C).

Why use the Spanish-weave trellis system?

The advantage of using Spanish-weave system is to provide each plant extra above-ground space compared to the traditional Florida-weave trellis system. The Spanish-weave system allows a relatively more open plant canopy, which allows more light to reach the center of plants. Because of less competition for light among the shoots, plants tend to grow not as tall as plants trellised with the Florida-weave system.

We conducted trials last summer comparing yields of tomato plants grown with the two different pruning systems. Interestingly, we found a significant yield increase by using Spanish-weave system compared to the Florida-weave system on grafted tomato plants, but the advantage of using the Spanish-weave system was not that clear on non-grafted tomato plants.

If you have experience growing grafted tomato plants, you may have noticed that these plants tend to be more vigorous, and grow more shoots. It is more than likely that Florida-weave trellis system would limit the growth of very vigorous plants. Other factors such as varieties and fertility management may also play a role in plant vigor.

The take home message from the story is that if you expect vigorous tomato plants, for example, if you are using grafted tomatoes, you may consider the Spanish-weave trellis system, which may increase tomato yield compared to the Florida-weave trellis system. However the alternative trellis system requires more labor, since it needs twice as many stakes than the Florida-weave system needs.

DIY traps for Striped cucumber beetle Management

(Christie Shee, cshee@purdue.edu)

Have you ever wondered how striped cucumber beetles manage to find your cucurbits every year? Striped cucumber beetles rely on sight and smell to find food. They are particularly attracted to the color yellow and to scents produced by cucurbit flowers and male striped cucumber beetles. This summer we studied how we could use lures that imitate cucurbit flowers and live beetles for mass trapping with yellow gallon jugs.

On one farm, 16 traps captured 2,363 striped cucumber beetles from late May through early September (Figure 1). The vast majority of these beetles were captured in May and August. In May, the beetles were most attracted to the control jugs, but in August, beetles preferred jugs containing live beetles and floral lures.

If you place traps early in the season—before or as striped cucumber beetles begin to emerge—we recommend using only yellow jugs without any lures or live beetles. If you trap toward the end of the season to reduce overwintering beetles, we recommend using yellow jugs with the floral lure and potentially live beetles as well, if possible.

Materials needed:

Gallon jugs traps

Gallon jugs

Yellow high gloss spray paint

Drill with 7/32" bit

Dish soap

Water

Stake

Zip ties or wire

Floral lure, string, small plastic bag (optional)

Live beetle containers (optional)

Container

Hot glue

Knife

Rope

High tunnel mesh

Striped cucumber beetles

Beetle food (cucurbit leaf, flower or fruit)

Directions:

Drill two rows of ten holes along each side of the jug.
Based on our experience last summer, we recommend making the holes about halfway up from the bottom of the jug, so that the jugs could hold more water and reduce spillage. Cover all sides of the jug with yellow high-gloss spray paint.

Place the stakes approximately 30 feet apart and use zip ties to hold the jugs several feet from the ground. Add soapy water to the jugs. The soap will break the surface tension and help the insects drown (Figure 2).

For the floral lures, use the corn rootworm lure (TRE 8276) from TRÉCÉ, Inc. (<https://www.trece.com/>). These lures are available for \$2.50 each and last for one month. The lures should be hung from the inside of the jug with a piece string. If you have difficulty getting the lure through the mouth of the jug, the lures can be cut in half and placed in a small plastic bag.

For the live beetle traps, cut out two sides of a plastic container and hot glue mesh in its place to provide ventilation (Figure 3). Drill two holes near the top to attach a rope for hanging and use hot glue to seal any gaps. Each trap should contain ten striped cucumber beetles collected from a field. While we used sugar water to keep the beetle bait alive, a cucurbit leaf, flower, or fruit could be used instead.

Our traps were based on those developed by Dr. Jaime Piñero at the University of Missouri. For more information on their traps and study go to:

<https://ipm.missouri.edu/IPCM/2016/6/A-novel-mass-trapping-system-to-control-cucumber-beetles-in-cucurbit-crops/>.

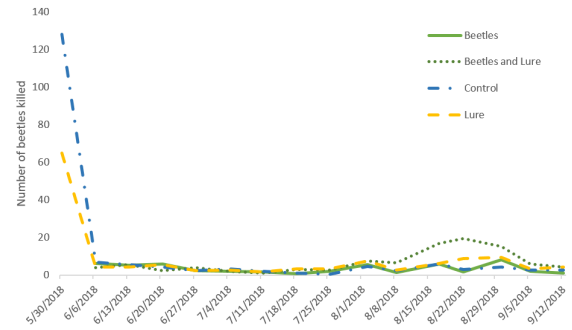


Figure 1. Striped cucumber beetles trapped on one farm throughout one season



Figure 2. Beetles are attracted to the color yellow and to the lures within the jugs. Once they find their way inside, they have difficulty finding their way out, eventually falling into the soapy water to die.



Figure 3. Gallon jug trap plus a container for live striped cucumber beetles. Two sides of the container were removed and replaced with high tunnel mesh to provide ventilation.

Welcome to Spring and FoodLink

(Roy W Ballard, rballard@purdue.edu, (317) 462-1113)

I know as producers of some of the finest fruits, veggies, herbs and flowers in Indiana no one is more excited to welcome Spring and a new market year than YOU!

Whether or not you have used FoodLink in the past as a way to increase consumer knowledge of and interest in your products we wanted to make sure that you have full access to FoodLink resources. We want to give you the resources to reach more customers and bring them to your food and continue to return. You can [order more resources from the Ed Store](#) to help you in your marketing efforts or [print items off using our PDF resources](#).

FoodLink resources are FREE to use and are waiting only for your innovative application in your displays, marketing materials, promotional ads (traditional media OR better...SOCIAL MEDIA) and packaging materials.

Be on the lookout for upcoming social media posts that are rolling out starting this month of April. We are working with a firm in Michigan (Digital Mitten) to create a series of Social media posts to encourage folks to use fresh local produce... please encourage folks to like and follow us on Facebook so they will see these posts. We will let enrollees know in advance what is to be posted and when each month...

<https://www.facebook.com/purduefoodlink/>

Just quickly to say that we have cleaned up the FoodLink site a bit...

- Added some new content
- Added some new tabs
- Aggregated all of the videos in one place for easy access
- Added the entire recipe book with some modification
- Updated the market locator (please check to make sure your information is correct!)
- Added Papaws, maple syrup and persimmons

Additionally we have also now added over 60 recipe/crop cards that can be printed on demand for use in on site educational programs, at Farmers markets, in

community gardens etc... They are available in THREE formats... 1 per page ... 2 per page and 4 per page... front and back... the smaller format may be most useful as a shopping bag stuffer at the market...

These cards will only be available in a print on demand format but could be printed on card stock and or laminated for different applications... perhaps issue them as trading cards and have folks collect them all for a prize at the end of the growing season or use them in your corn maze!!

Card can be accessed here:

https://extension.purdue.edu/foodlink/producers_print_cards.php



Some suggested uses:

- Seasonal produce displays at markets
- Handouts and signage at food pantries distributing fresh produce
- Signage at community gardens
- Handout for educators to emphasize the connection between food preparation and fresh seasonal produce

We are still happy for new users to enroll in FoodLink (no cost) and we will keep them in the loop with newsletters as the season progresses...enroll here...

<https://extension.purdue.edu/foodlink/enrollment.php>

Tell us how you use FoodLink and send us pictures and we will share on the Facebook!

Salmonella Outbreak does not Involve Indiana-Grown Melons

(Scott Monroe, jsmonroe@purdue.edu, (812) 886-0198)

On Friday, April 12, the FDA and CDC announced an outbreak of *Salmonella* Carrau in pre-cut melon products distributed by Indianapolis-based Caito Foods. While an Indiana company has been implicated in the outbreak, the melon product used to create the pre-cut products were not from Indiana and were likely imported from outside of the United States. Indiana growers are currently preparing to plant Indiana's 2019 cantaloupe

and watermelon crops in Southwestern Indiana and other parts of the state. Growers are anticipating a safe, bountiful harvest.

Indiana melon growers take food safety very seriously and implement many on-farm practices aimed at reducing the risk of a foodborne pathogen contaminating the crop. “Indiana growers use a variety of practices that reduce the risk of contamination at the farm level. Among these are testing of irrigation water, use of sanitizers in wash water, and employee training programs”, said Scott Monroe, Food Safety Educator with Purdue Extension.

According to Dr. Amanda Deering, Clinical Assistant Professor in Purdue’s Department of Food Science, most Indiana watermelon and cantaloupe are produced on farms where food safety practices are confirmed by third-party audits. “Growers are audited annually to insure that they are implementing and maintaining aggressive food safety programs on their farms”, said Deering. Deering also pointed out that in most cases, requirements of third-party audit schemes are more stringent than current FDA regulations.

“Our Indiana growers are doing everything they can to reduce the risk of on-farm contamination by a foodborne pathogen to the lowest level possible”, said Monroe. In spite of the recent outbreak in imported melons, watermelon and cantaloupe lovers across the state will be able purchase and enjoy Indiana melons with confidence once the 2019 crop is ready for harvest.

Midwest Vegetable Production Guide

(Dan Egel, egel@purdue.edu, (812) 886-0198)

The *Midwest Vegetable Production Guide for Commercial Growers 2018* is available for sale as a hardcopy (\$15) or free on-line (be sure to check the article in this issue about changes that have been made to the on-line version). Actually, the *Vegetable Guide* has been available since last December. The guide may be purchased through the Education Store, at various extension meetings held around the state or from your Purdue University county educator. The website to either view or purchase the Guide, known in Indiana as the ID-56, is mwveguide.org. The *Midwest Vegetable Production Guide* is a collaboration of 8 states and 9

institutions.

Are you thinking that you already have a *Vegetable Guide* from a past year and wondering if it is worth getting a new one? The article below represents just some of the changes to this year’s *Vegetable Guide*.

New and Revised Sections

- The three new tables created last year — Selected Information About Recommended Insecticides (page 54), Herbicides (page 69), and Fungicides (page 79), were modified to be sorted by trade names instead of common name.
- The pesticide information and safety section has an updated discussion of precautions and signal words.
- The organic Vegetable production section has updated contacts for certifiers.
- A new searchable, mobile friendly version of the *Midwest Vegetable Production Guide for Commercial Growers* is expected this year. Guide your browsers to mwveguide.org

Disease Management

- An updated discussion of Tomato Spotted Wilt and Impatiens Necrotic Spot Viruses is included in the tomato section (see also the tomato insect section).
- An updated discussion of blackleg of potato is included in the potato section.

Weed Management

- Quinstar 4L® (quinclorac) added to Asparagus chapter for postemergence weed control.
- Caparol® (prometryn) added to Okra chapter for preemergence weed control.
- Fusilade® (fluzazifop) for post-emergence grass control added for lettuce, green onion and leeks, and rhubarb.
- Satellite Hydrocap® (pendimethalin) added to Cole Crops and Brassica Leafy Greens, and Dry Bulb and Green Onion chapters for preemergence weed control.
- Poast® (sethoxydim) for postemergence grass control in the Root Crops chapter now includes celeriac and rutabaga among listed crops.
- SHIELDDEX 400® (toppyralate) added to Sweet Corn chapter for postemergence weed control

Insect Management

- A new discussion of cucumber beetle thresholds is included in the cucurbit section.
- Exirel® and Minecto® have been added to the onion section for thrips management.

MW Vegetable Guide Updates

(Dan Egel, egel@purdue.edu, (812) 886-0198)

From time to time, I will make changes to the MW Vegetable Production Guide. These changes will appear automatically in the on-line version. For those who purchase a hard copy, watch the *Vegetable Crops Hotline* for changes. See below for the changes that have been made to the Production guide for 2019

Page	Comment
1	Add "Anthony Hanson, IPM program" under contributors, University of Minnesota
117	Under powdery mildew, last sentence in disease notes—"Protect pumpkin vines until approximately 21 days from last harvest."
128	FRAC code for Actigard should be P01
147	Buckeye rot products, Orondis Opti 3-day PHI .
148	Under late blight, Orondis Opti 3-day PHI .
164	Footnote 2 should read "X=permitted for at least one crop." Footnote 3 should read "X=may be used for that crop. *=processing crops only."
226	Define herbicide should be omitted.

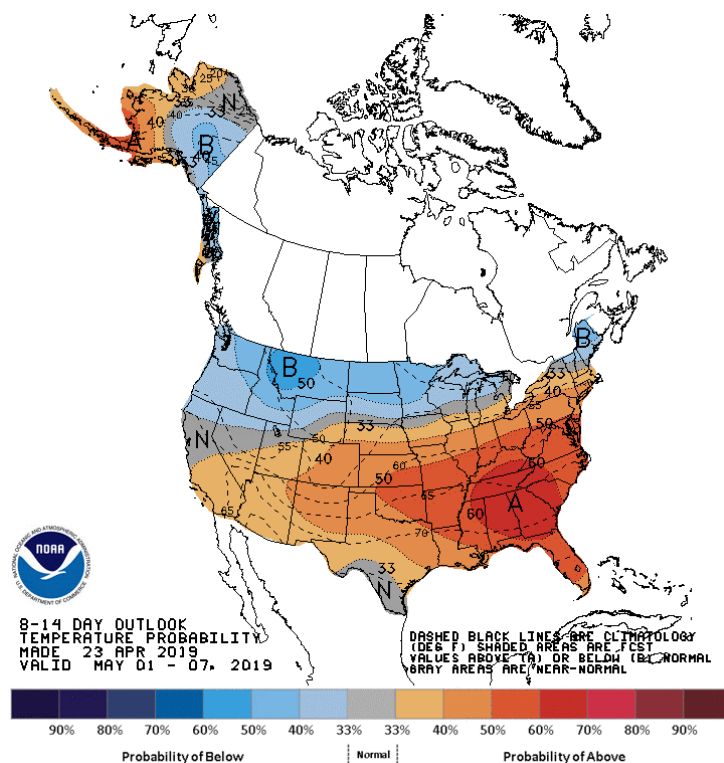
Indiana Climate and Weather Report

(Hans F Schmitz, hschmitz@purdue.edu, (812) 385-3491)

No reason exists to expect drought anytime soon in Indiana, with much of the state remaining rather wet after last weekend's showers. One good new development exists. The precipitation pattern that has existed since nearly January seems to be becoming a little less predictable, which could mean more periods of drier weather between fronts on the horizon. Another bit of good news exists in above normal temperatures predicted on both the 7-10 and 8-14 day forecasts, according to the Climate Prediction Center (<https://www.cpc.ncep.noaa.gov/>), which would allow for quicker drying of soils after any precipitation that does

fall.

Current growing degree days (base 50) for 2019, as of April 22, vary from 206 in Indianapolis to 322 in Evansville to 111 in Angola, marking a clear gradient in insect development and greening from south to north. The entire state is now monitoring conditions for issuance of frost/freeze warnings from the NWS, as sensitive vegetation exists state-wide.



Fungicide Schedules

(Dan Egel, egel@purdue.edu, (812) 886-0198)

Every year, I put together fungicide schedules for cucurbits. These may be found at purdue.ag/pumpkinfs and purdue.ag/melonfs. They may be downloaded as PDFs on legal sized pages. Please use these tables along with the *MW Vegetable Production Guide* and the fungicide label. If you have trouble with accessing the tables or have other questions, please let me know.

New Phytophthora blight Extension Bulletin

(Dan Egel, egel@purdue.edu, (812) 886-0198)

In response to the many questions about this disease on cucurbits, a new extension bulletin has been produced.

The bulletin may be accessed at the link below. Or contact me to get your copy.

<https://www.extension.purdue.edu/extmedia/bp/bp-204-w.pdf>

Upcoming Events

Southwest Purdue Agricultural Center Field Day

Date: June 27, 2019. Registration begins at 8:30 am.

Location: Southwest Purdue Agricultural Center, 4669 N. Purdue Road in Vincennes, IN 47591

Topics related to vegetable production include:

- **Organic Tomato Production:** Dan Egel will discuss the Tomato Organic Management and Improvement Project — including foliar disease management of tomatoes.
- **High Tunnel Grafted Cucumber & Specialty Melon Production:** Wenjing Guan and Petrus Langenhoven will discuss cucumber and melon production in high tunnels.
- **Applying IPM Principles across Cropping Systems to Increase Insect Pollination and Profitability:** Laura Ingwell will discuss best management practices for watermelon production by quantifying pest pressures, pollinator health, and crop yields.
- **Annual Strawberry Production:** Wenjing Guan will discuss annual plastic culture for strawberry production in southern Indiana.

Other topics include:

- **Termites to the Rescue:** In this presentation, Rick Meilan will discuss the use of enzymes derived from termites to control invasive woody species.
- **Removing Invasive and Cultivating Natives:** Join Will Drews to see SWPAC's work to remove invasive plants around the property and create a native pollinator habitat.

- **Growing Hemp in Indiana:** Chuck Mansfield and Valerie Clingerman will offer an update on the use of this versatile plant — grown for its fiber, seed, or oil — across the state.
- **Eyes in the Sky...Decisions on the Ground:** Bob Nielsen discusses the benefit of aerial "reconnaissance" via unmanned aerial drones to scout crop problems or augment data.

A meal will be included, and PARP classes also will be available after lunch. To register, email joynerb@purdue.edu, call (812) 886-0198, or go online at https://purdue.ca1.qualtrics.com/jfe/form/SV_8pnF8z1CwyglrGI by **Monday, June 17.**

Small Farm Education Field Day at Purdue Student Farm

Date: August 1, 2019

Location: Purdue Student Farm, West Lafayette, IN 47907

The Purdue Student Farm is proud to announce its second annual Small Farm Education Field Day. The event is packed with educational sessions during the morning, followed by a tour and hands-on experiences on the farm. Topics of discussion throughout the day include Cover Crop Choices, Scheduling of Crops in High Tunnels, High Tunnel Pepper vs. Tomato Production, Soil Restoration, Dynamic Enterprise Budgets, Food Safety Certification, Rototiller vs. Power Harrow Demonstration, and Postharvest Processing of Fruits and Vegetables with Solar Driers, among other. Stay tuned. There might be more topics added to this very exciting program. Registration details will be announced soon. Please contact Petrus Langenhoven (plangenh@purdue.edu, (765) 496-7955) or Lori Jolly-Brown (ljollybr@purdue.edu, (765) 494-1296) if you have any questions or suggestions. Further details will be published as soon as the program has been finalized. Registration will open in May 2019.

It is the policy of the Purdue University that all persons have equal opportunity and access to its educational programs, services, activities, and facilities without regard to race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability or status as a veteran. Purdue is an Affirmative Action Institution. This material may be available in alternative formats. 1-888-EXT-INFO Disclaimer: Reference to products in this publication is not intended to be an endorsement to the exclusion of others which may have similar uses. Any person using products listed in this publication assumes full responsibility for their use in accordance with current directions of the manufacturer.

Vegetable Crops Hotline © Purdue University - vegcropshotline.org

Editor: Wenjing Guan | Department of Horticulture and Landscape Architecture, 625 Agriculture Mall Dr., West
Lafayette, IN 47907 | (812) 886-0198