

VEGETABLE CROPS HOTLINE

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



Issue: 680
August 13, 2020

In This Issue

- [Cucurbit Downy Mildew](#)
- [Tomato Varieties Differ in Susceptibility to Internal White Tissue Disorder](#)
- [Morningglories](#)
- [Observations of Insect Communities on Outdoor CBD Hemp](#)
- [Monitoring Potential Evapotranspiration Across Indiana](#)
- [Question of the Issue \(8-13-2020\)](#)
- [Answer to Question from Last Issue \(7-30-2020\)](#)
- [Update of the CFAP program on Aug. 11](#)

Cucurbit Downy Mildew

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

Downy mildew has been observed in LaPorte County in northern Indiana on cucumber. In addition, downy mildew on cucumber has been reported in southern Kentucky and on watermelon in the Kansas City area of Kansas. Growers in northern Indiana should manage for downy mildew on valuable cucurbit crops (Figure 1). Growers throughout the state should scout for the disease. Note that the Kansas report is directly west of us and could, eventually, blow this way. Growers should assume that all cucurbit crops may be affected. The cool, foggy mornings we have had recently are conducive for downy mildew.

The organism that causes downy mildew of cucurbits doesn't overwinter in Indiana. It has to be blown in every year. It is common for downy mildew to start the season in the Gulf States and migrate north with the cucurbit crops. Downy mildew apparently overwinters in northern Michigan/southern Ontario in greenhouses where cucumbers are grown year-round. Therefore, downy mildew is often found in Michigan before it is found in Indiana.

For infection to occur, free moisture must be present on leaves for at least 2 hours. The temperature optimum is from 59 to 68 degrees F, however, disease can occur in much warmer temperatures.

Some cucumber varieties have some resistance to downy mildew. For susceptible cucumber varieties or other types of cucurbits, specialized systemic fungicides will help to reduce the severity of downy mildew. Unfortunately, many of the most effective systemic fungicides for downy mildew are not effective on our

more common cucurbit diseases. This is because the organism that causes downy mildew, *Pseudoperonospora cubensis*, is not really a fungus at all. *P. cubensis* is more closely related to a brown alga. This fungus-like organism is related to the organism that causes Phytophthora blight (*Phytophthora capsici*). Therefore, many of the same fungicides that are effective against downy mildew are also effective against Phytophthora blight.



Figure 1. Downy mildew of watermelon causes chlorotic lesions that eventually turn necrotic.

The Midwest Vegetable Production Guide for Commercial Growers lists several products that will help to slow the progress of downy mildew of cucurbits. Contact fungicides such as those with the active ingredient chlorothalonil or mancozeb products may slow down the disease. Systemic products that are listed include: Elumin®, Forum®, Gavel®, Omega, Orondis Opti®, Orondis Gold®, Orondis Ultra®, Presidio, Ranman®, Zampro® and Zing®. Products with the active ingredient phosphite may be helpful. Although it not listed in the *Midwest Vegetable Production Guide*, Previcur Flex is recommended this year by Michigan State University against downy mildew of cucumber; Previcur Flex is not labeled for Phytophthora blight. Be sure to check the label for the re-entry interval, the pre-harvest interval, the FRAC group and other important information. Always alternate FRAC groups.

To see forecasts of downy mildew of cucurbits online go to <https://cdm.ipmPIPE.org/>.

One other item of interest: Downy mildew of cucurbits is not caused by the same organism which causes downy mildew of soybeans. Therefore, downy mildew of soybeans will not spread to the cucurbit field immediately adjacent.

Tomato Varieties Differ in Susceptibility to Internal White Tissue Disorder

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

A common problem tomato growers face this time of year are fruit defects caused by high temperatures. Heat stress on tomatoes can lead to reduced yield and abnormal fruit development. The common physiological disorders on fruit development under heat stress include yellow shoulder, internal white tissue, and blotchy ripening.

In a recent presentation by Gordon Johnson from the University of Delaware at the 2020 annual meeting of the American Society for Horticultural Science, he elaborated on the cause of internal white tissue in tomatoes, compared varieties, and provided suggestions to reduce the problem. Information in this article is summarized from this presentation and the tomato variety trial report by Gordon Johnson.

Tomato white tissue (Figure 1) develops when vascular tissue of the fruit is disturbed or damaged by heat so that the tissue turns white and the fruit has a bland taste. The fruit looks normal on the outside but may have severe internal defects. The variety trial compared 28 varieties from 5 companies in the summer of 2019. Commercial varieties that had the highest incidence of white tissue across five harvests were Camaro, Mountain Merit and Mountain Fresh. In addition to these varieties, Red Snapper had high white tissue incidence in the first harvest, and Grand Marshall and Myrtle had high incidence of white tissue in the late harvests. We noticed that some of the popular varieties in our area such as Primo Red, BHN 589, Red Deuce and Red Bounty ranked relatively low in the incidence of white tissue. In terms of marketable yield, the top commercial varieties were Grand Marshall, Red Snapper, Red Mountain and Red Bounty. [Here](#) is the full report about this variety trial.

Clearly, variety selection plays an important role in minimizing the white tissue problem. Gordon also suggested in his presentation that maintaining potassium levels in the plant is the key to reduce white tissue incidence. In the black plastic mulch system, soil temperatures might be so high that plant root function is reduced and potassium uptake is inadequate. By reducing soil temperature, white plastic mulch may help to reduce the problem for later planted tomatoes. In addition, applying additional potassium through the drip system or foliar application of potassium may help the problem. Using shade cloth to reduce temperature could also help reduce white tissue incidence.



Figure 1. Internal white tissue of tomato fruit. Photo by Purdue Plant and Pest Diagnostic Laboratory.

Morningglories

(Jeanine Arana, jcordone@purdue.edu, (765) 588-7787) & (Stephen Meyers, slmeyers@purdue.edu, (765) 496-6540)

Genus: *Ipomoea* sp.

Species:

- Ivyleaf: *Ipomoea hederacea*
- Entireleaf: *Ipomoea hederacea integruscula*
- Tall: *Ipomoea purpurea*
- Pitted: *Ipomoea lacunosa*

Morningglories are among the most troublesome weeds in many cropping systems in the Midwest. They are difficult to control due to their fast growth, large seed size, and impenetrable seed coat.

Morningglories get their name because their flowers bloom in the morning and close up later in the day.

Identification: Cotyledons are hairless and butterfly-shaped (notched at the tips forming two lobes that join at the base). Lobes are broad (Figure 1) except for pitted morningglory which has a pointed tip. Mature plants have alternate leaves which are commonly heart-shaped (tall, entireleaf and pitted morningglories) (Figure 2) or 3-lobed, ivy-shaped (ivyleaf morningglory) (Figure 3). Leaves, petioles and stems are densely haired (Figure 1), except for pitted morningglory which is hairless.



Figure 1. Ivyleaf morningglory seedling. Note the dense hairs on the true leaves. Photo by Jeanine Arana.



Figure 2. Heart-shaped leaves of ivyleaf (left) and tall morningglory (right). Photo on left by Jeanine Arana, photo on right by Steve Meyers.



Figure 3. A three lobed leaf of ivyleaf morningglory. Photo by Jeanine Arana.

Growth habit: A summer annual, twining or climbing vine, reaching 10 feet in length. Vining stems form branches that twine around other plants making them difficult to detect and remove (Figure 4).



Figure 4. Ivyleaf morningglory climbs over the canopy of a tomato plant. Photo by Steve Meyers.

Reproduction: Flower petals are purple to pale blue or white and fused into a funnel (Figure 5). Flowers bloom from July to November. Reproduction is by seeds from 4 to 6 mm long (Figure 6) which form in capsules (Figure 7). Unlike many other annuals, they can germinate from much deeper in the soil at a depth of four inches or more (Figure 8).



Figure 5. A pale blue ivyleaf morningglory flower (left) and a deep purple tall morningglory flower (right). Photos by Jeannie Arana and Steve Meyers.

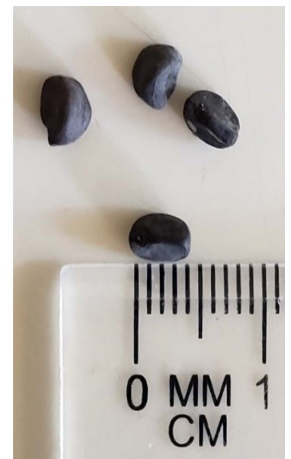


Figure 6. Morningglory seeds are black, relatively large, and wedge-shaped. Seed size 4mm. Left photo by Steve Meyers, right by Jeanine Arana.



Figure 7. Tall morningglory capsules, each containing developing seeds.
Photo by Steve Meyers.



Figure 8. Morningglories are capable of germinating from greater depths than many other weeds. The white hypocotyl of the seedling on the left of this image suggests it germinated from approximately three inches deep.
Photo by Steve Meyers.

Integrated weed management strategies

Cultural and mechanical practices:

- **Scouting:** Routine scouting before planting, during crop growth and after harvest will help identify weeds early in the season, discover patches before they spread, and plan future control strategies.
- **Exclusion:** Manage morningglories in fence rows and field edges (Figure 9) to help reduce future weed pressure. For producers who grow sweetpotatoes (a member of the morningglory family), controlling morningglories can also reduce disease pressure.
- **Plastic mulch:** Plastic mulch provides a physical barrier, preventing germinating morningglory seedlings from reaching the soil surface. Assure planting holes are big enough to fit only your transplant. Excessively large planting holes allow weeds to emerge right next to the crop.
- **Stale Seedbed:** Consider a stale seedbed treatment. In the case of morningglories, this practice may be most effective while preparing fields for fall crops. Prepare the site, allow weeds to germinate, then control small,

emerged weeds with either a broad-spectrum postemergence herbicide or shallow cultivation. This process can be repeated to encourage and control additional flushes of weeds prior to planting.

- **Hand-weeding, hoeing, and cultivation:** Remove seedlings before they reach five inches. After that they are more difficult to control because they can twine onto the crop.



Figure 9. Morningglory grows up a fence along a field edge. Photo by Steve Meyers.

Chemical control:

- An effective herbicide-based weed management program relies on multiple applications to achieve season-long control. Consider combining a pre-plant burndown application with pre-planting and/or early season pre-emergence herbicides, followed by postemergence herbicides and delays preemergence products (layby). Labeled herbicides available vary on a lot of factors including the crop being grown, the cropping system, crop growth stage, soil texture and organic matter, and weather conditions.

Check label restrictions for different crops in the *Midwest Vegetable Production Guide for Commercial Growers 2020* available in the following link:
<https://www.extension.purdue.edu/extmedia/ID/ID-56-W%202020.pdf>. Always read and follow label instruction and remember to rotate modes of action to limit herbicide resistance.

Observations of Insect Communities on Outdoor CBD Hemp

(Elizabeth Long, eylong@purdue.edu, (765) 796-1918)

Since hemp is still a relatively new crop in our state, we're excited to learn more about the insect communities that are associated with this crop! For the last six weeks or so, my lab team, led by Master's student Zach Serber (Figure 1), has been scouting outdoor CBD hemp plants for insects and their signs, including

feeding damage, insect frass, and insect eggs!



Figure 1. Master's student Zach Serber scouting hemp for insects and their signs.

As “bug people” we’re always excited to go out on the hunt for insects, but in this case, we are scouting hemp plants for a specific purpose: to begin developing a seasonal picture of insect activity on outdoor hemp plants, particularly those insects that might be important pests. We know from hemp news in neighboring states that many kinds of insects visit hemp plants, including lively lady beetles, gymnastic grasshoppers, and hummin’ honey bees. However, finding an insect on a plant does not necessarily mean it is a damaging pest. So, here are a few observations of insects we’ve seen visiting and feeding on outdoor hemp plants, beginning June 30th through August 4th, 2020:

(Note: Ideally, we would have monitored hemp in indoor and outdoor settings at the same time, but constraints due to the pandemic this year forced us to focus only on monitoring hemp in outdoor settings).

Hemp visitors: The most conspicuous non-feeding insect we’ve seen on hemp plants this season are Japanese beetles (JBs) (Figure 2). We all know JBs well as fruit and leaf-feeding pests of many other crops, including small fruits, tree fruits, and ornamentals. However, the JBs we observed on outdoor hemp plants this season were around at the end of June for about 2 weeks, with no interest in the plants, besides a place to relax and soak up the sun!



Figure 2. A Japanese beetle (facing head down) in a whorl of hemp leaves.

Hemp leaf feeders: The red-headed flea beetle is perhaps the most interesting insect we’ve seen feeding on outdoor hemp

plants this season; although I may think that only because I wasn’t expecting to see them! These beetles are solid black with a small red spot at the apex of head and of course, they are expert jumpers. They have a chewing feeding strategy and appeared to eat only the top layer of tissue from hemp leaves. Besides the red-headed flea beetles, we’ve also seen whiteflies, aphids, and thrips hanging out and feeding on hemp foliage. This latter group of insects have a piercing-sucking feeding strategy and sip on plant sap for a living. To be sure to see them, you must check the underside of hemp leaves where you will see them sitting, apparently motionless (aphids), crawling around quickly (thrips), or flying off in a cloud of tiny white wings (whiteflies). The flea beetles and whiteflies seemed to be more abundant earlier in our scouting, while aphids appear to be on the rise as the season get later.



Figure 3. Red-headed flea beetle on a hemp plant.

Beneficial (predatory) insects: It’s always great to report that predatory insects are active in a crop, especially when you see pesky insects like aphids and thrips! This season, we’ve seen multi-colored Asian lady beetles (MALB), predatory thrips, damsel bugs, insidious flower bugs, and lacewing larvae (Figure 4) patrolling hemp stems and foliage for insect prey. These predatory insects feed on insect eggs and soft-bodied insects, including aphids, whitefly nymphs, and plant-feeding thrips. While the MALBs are relatively easy to spot, these other predatory insects are small and quite dainty, so you must look carefully and closely to see if they are present. For example, insidious flower bugs are roughly the size of a sesame seed, while lacewing larvae look like 2/3-inch alligators when mature. Regardless of their small size, these predatory insects are voracious and will search out and eat other soft-bodied insects!



Figure 4. A predatory lacewing larva hunting a hemp plant for insect prey.

Last but not least, with the help of our Extension Entomology team, we created a video demonstrating some key tips and strategies for scouting insects in hemp plantings! Check it out on the Purdue Extension Entomology YouTube page: <https://youtu.be/1aO2IbcHmPY>.



We hope the growing season has gone well for you, and as always feel free to reach out with any questions or suggestions for insect-related hotline articles!

Monitoring Potential Evapotranspiration Across Indiana

(Beth Hall, hall556@purdue.edu)

Rain moved across Indiana earlier this week, bringing much-needed precipitation to the northern counties. Unfortunately, the 30-day rainfall totals are still up to two inches below normal (Figure 1). The southern and southwestern counties are well above normal and could likely use a break for the next few days!

Accumulated Precipitation (in): Departure from 1981-2010 Normals
July 13, 2020 to August 11, 2020

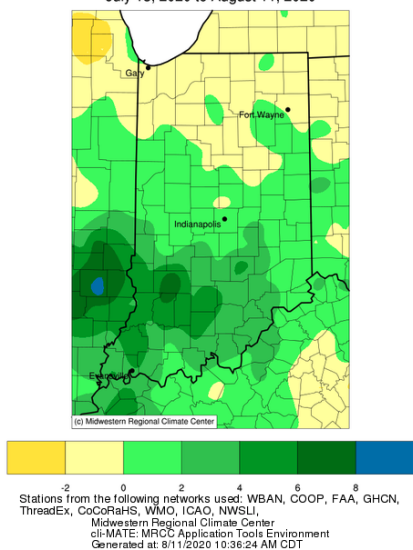


Figure 1. Precipitation departure from the 1981-2010 normals for the period July 13, 2020 to August 11, 2020.

Good news for those tiring of excessive heat conditions! Climatologically, the hottest day of the year (maximum temperature) is July 27th, so things should start to get cooler for the rest of the season. That does not mean cool and less humid every day, but hopefully we can start putting those hot, humid days behind us! In fact, the climate outlooks through August 24th is showing slight confidence for below-normal temperatures

(Figure 2). This same period is also predicted to have below-normal precipitation so perhaps things will get more comfortable without leading to abnormally dry conditions.

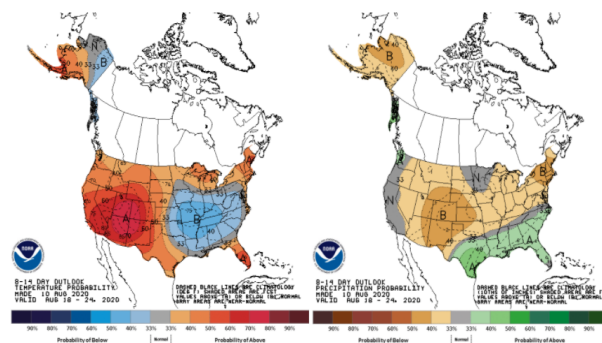


Figure 2. Climate outlook through Aug. 24.

To help better monitor current evapotranspiration and precipitation conditions, the Indiana State Climate Office has launched a new tool (<https://ag.purdue.edu/indiana-state-climate/tools/et-monitoring-tool/>) that presents daily weather conditions in both tabular and graphical format for the nine weather stations across Indiana that comprise the Purdue Mesonet. When users first enter the site, they are presented with a map showing the station locations. Clicking on a map will then lead to a table of daily values. Accumulations for potential evapotranspiration (PET) and the Precipitation-minus-PET Deficit start with the default date, but users can modify the start date by using the slider tool at the top right of the page. Users can also view the data through time series graphs by clicking on the “Go to Graph View” (e.g., Figure 3).

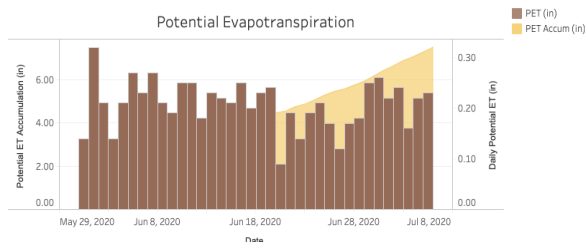


Figure 3. Table view of the Potential Evapotranspiration Monitoring Tool

Question of the Issue (8-13-2020)

(Jeanine Arana, jcordone@purdue.edu, (765) 588-7787)

What happened to these fruit?





Answer to Question from Last Issue (7-30-2020)

(Jeanine Arana, jcordone@purdue.edu, (765) 588-7787) & (Stephen Meyers, slmeyers@purdue.edu, (765) 496-6540)

Watermelon is growing in this bed, but something went wrong. What happened?



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.

Answer: The weed morningglories are taking over watermelons. Morningglories have become one of the most severe weeds observed in the watermelon field in southern Indiana. More information about this weed can be found in the article [Morningglories](#) in this issue of Vegetable Crops Hotline newsletter.

Update of the CFAP program on Aug. 11

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

USDA announces more eligible commodities for Coronavirus Food Assistance Program (CFAP), and the deadline to apply for the program was extended to September 11th.

The following additional commodities are now eligible for CFAP:

- **Specialty Crops** – aloe leaves, bananas, batatas, bok choy, carambola (star fruit), cherimoya, chervil (french parsley), citron, curry leaves, daikon, dates, dill, donqua (winter melon), dragon fruit (red pitaya), endive, escarole, filberts, frisee, horseradish, kohlrabi, kumquats, leeks, mamey sapote, maple sap (for maple syrup), mesculin mix, microgreens, nectarines, parsley, persimmons, plantains, pomegranates, pummelos, pumpkins, rutabagas, shallots, tangelos, turnips/celeriac, turmeric, upland/winter cress, water cress, yautia/malanga, and yuca/cassava.
- **Non-Specialty Crops and Livestock** – liquid eggs, frozen eggs and all sheep. Only lambs and yearlings (sheep less than two years old) were previously eligible.
- **Aquaculture** – catfish, crawfish, largemouth bass and carp sold live as foodfish, hybrid striped bass, red drum, salmon, sturgeon, tilapia, trout, ornamental/tropical fish, and recreational sportfish.
- **Nursery Crops and Flowers** – nursery crops and cut flowers.

Other changes to CFAP include:

- Seven commodities – onions (green), pistachios, peppermint, spearmint, walnuts and watermelons – are now eligible for Coronavirus Aid, Relief, and Economic Stability (CARES) Act funding for sales losses. Originally, these commodities were only eligible for payments on marketing adjustments.
- Correcting payment rates for onions (green), pistachios, peppermint, spearmint, walnuts, and watermelons.

Full news release can be found at

<https://www.ams.usda.gov/press-release/usda-announces-more-eligible-commodities-cfap>

