

# VEGETABLE CROPS HOTLINE

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



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## Downy mildew of Pumpkin: What to Look for

(Dan Egel, [egel@purdue.edu](mailto:egel@purdue.edu), (812) 886-0198)

Downy mildew of cucumbers has been observed in Knox County. This disease has not been observed on pumpkins, but it is possible for downy mildew to spread from cucumbers to pumpkins. Therefore, pumpkin growers should scout for downy mildew and manage for the disease depending on their situation. Pumpkin growers who plan to harvest mid September, should apply fungicides through August. This probably means only 1 or 2 more applications. Since downy mildew does not affect fruit, it is not necessary to apply fungicides until harvest. If growers expect fruit to mature until mid October, then it makes sense to manage for downy mildew through September. More detail on what fungicides to apply can be found in the last issue of the *Vegetable Crops Hotline* or in the *Midwest Vegetable Production guide* [mwvegguide.org](http://mwvegguide.org).

The first symptoms that growers are likely to notice on pumpkin leaves are mustard yellow lesions that often appear in angular spots (Figure 1 and 2). On the underside of the leaf, dark spores may be observed in moist conditions such as when dew is present (Figure 3 and 4).

However, the symptom of the yellow leaf itself does not mean downy mildew is present. There are multiple factors that may cause yellow leaves, please read the other article in this issue [Yellow Leaves on Pumpkin](#).



Figure 1. Downy mildew of pumpkin often causes yellow lesions on the top of leaves that occur in angular spots.



Figure 2. Angular lesions of downy mildew on pumpkin leaves.



Figure 3. Under moist conditions, dark spores may be observed on the underside of pumpkin leaves.





Figure 4. Another photo of the underside of a pumpkin leaf showing the spores along the vein.

## Yellow Leaves on Pumpkin

(Dan Egel, [egel@purdue.edu](mailto:egel@purdue.edu), (812) 886-0198)

In the last several days I have received complaints of pumpkin plants with yellow leaves. Growers want to know if the yellow is a symptom of disease and what can be done about it. Yellow lesions on leaves may be symptoms of disease. There can be many reasons why pumpkin plants have yellow leaves. Usually, the reason for the yellow pumpkin leaves has to do with water stress, weather that has been too hot, nutrient deficiency or other problems. The photos and discussion below will, I hope, illustrate my point.

Let's say you have a pumpkin field where you have pumpkin leaves that are yellow and you are wondering about the cause. You may want to ask yourself, which leaves are yellow and where are they yellow.

In Figure 1, yellow pumpkin leaves may be observed. When one looks a bit closer to find out where the yellow leaves are, one can see that the yellowing runs down the row. In fact, it is the older leaves that are yellow (among plant biologists, we prefer the term chlorosis to yellow. But I will continue to use the word yellow here.) When older leaves are yellow and the younger leaves appear green and healthy, the reason for the yellowing is usually stress related—as indicated above. I am not too worried about this type of yellowed pumpkin leaves.



Figure 1. The yellowing of these pumpkin leaves seems to run down the row.

Look again at figure 1 to try out which part of the leaves are yellow. For the most part, the portion of the leaves that are yellow are the edges (or margins) of the leaves (Figure 2). One doesn't see entire leaves that are yellow. The yellowing doesn't appear in the interior of the leaves. Yellowing on the outside of the leaf normally means that the reason is stress related as discussed above.

Older leaves tend to become yellow with time because nutrients like nitrogen are mobile in the plant and will move to the younger leaves where they are needed. In addition, the edges of leaves may become yellow because the edges of leaves have pores where sap (known as the water of guttation by botanists) is secreted at night. This sap may have a mildly toxic effect on the leaves over time—this is the reason that the edge of older leaves may become yellow.



Figure 2. The edges of this pumpkin leaf are yellow, most likely due to environmental stress.

In Figure 3, the yellowing of the pumpkin leaves is more generally over a larger area in contrast to figure 1 where the yellowing could be seen to run down a row. Most of the yellowing appears in the foreground of the photo in figure 3. If one looks down the hill, the leaves appear green and healthy. Now, let's look at the soil next to the symptomatic pumpkin leaves. The soil appears sandy.



Figure 3. This view is from the top of the hill looking down. The pumpkin plants in the foreground of this photos have yellow leaves. The soil is sandy at the top of the hill.

Next, we will walk down the hill where the pumpkin leaves are green and look back up toward the yellowed pumpkin leaves



(Figure 4). Again, we notice that the area on top of the hill are in a general area—they don't seem to run down a row. That is, it isn't just the older leaves that are yellow. Now, take a look at the soil next to the green pumpkin leaves at the bottom of the hill. The soil is much heavier with more of a clay content than the soil at the top of the hill.



Figure 4. This view is from the bottom of the hill looking up. The pumpkin leaves at the bottom of the hill are generally green and healthy. The soil at the bottom of the hill is relatively heavy.

The lesson here is that the pumpkins at the top of the hill had much less access to water than the bottom of the hill. This is true both because hills tend to be better drained and because sandier soils hold less water. The grower had drip irrigation in place, but was not able to pump much water due to lack of water in a surface pond. Therefore, the yellowing leaves at the top of the hill is due to drought stress.

Both of the fields of pumpkins pictured here produced good crops. The yellow on the pumpkin leaves does not necessarily indicate a disaster or a disease is in the future.

I hope the photos and discussion presented here will help one to figure out what is wrong in one's pumpkin patch. However, if one still has questions about symptoms, it is best to send off a sample to a diagnostic laboratory. Purdue University's Plant and Pest Diagnostic Laboratory is an excellent resource <https://ag.purdue.edu/btny/ppdl/Pages/default.aspx>.

## Corn Earworms are Taking Flight

(Laura Ingwell, [lingwell@purdue.edu](mailto:lingwell@purdue.edu), (765) 494-6167)

After weeks of successive trap catches being empty or in the single digits, we have seen a dramatic increase in the last couple of days in the number of corn earworm moths captured in our pheromone traps throughout the state. At multiple locations catches jumped from near nothing to hundreds of individuals in a single night. This is likely related to a combination of factors including the maturation of the second generation of the pest and the progress of field corn, with most of it passing out of the silking stage. This creates high pressure to any of the remaining sweet corn on the landscape that is at or nearing the silking stage. Now is the time to be diligent with your spray program, monitoring crop progress and making applications (preferably with drop nozzles) at regular intervals to align with product recommendations and crop growth. The weather in most regions is favorable for corn growth resulting in a need for frequent

applications to protect the developing silk. Be sure to check the [CEW trapping website](#) for updates daily. The current action threshold, now that field corn is done silking, is 1 moth in the trap per night. Spray decisions should be made based on the closest trap location. In the table online, if no value is entered the trap was not emptied. A zero will be present in the data table if the trap was checked and there were no moths present. Read the label of any product carefully to determine when to apply the product (% of crop silking) and what the recommended application intervals are; both of these factors are highly dependent on product selection. Remain diligent and you are looking to have a great late-season crop!



Figure 1. Adult CEW recovered in a trap.



Figure 2. CEW larvae in developing ear of corn.

## Spotted lanternfly has been Detected in Indiana

(Elizabeth Long, [eylong@purdue.edu](mailto:eylong@purdue.edu), (765) 796-1918)

We were all hoping it would happen later, but unfortunately, the spotted lanternfly (SLF) (*Lycorma delicatula*) (Figure 1), an invasive planthopper with a piercing-sucking feeding strategy, was officially detected in Vevay, Indiana (Switzerland County) for the first time in July 2021. You can see pictures and read more

about the detection at the [Indiana Department of Natural Resources Website](#). SLF does not attack vegetable crops and does not bite or sting people or pets.



Figure 1. A spotted lanternfly adult with wings folded against body at rest (left) and wings open to show red on hindwings (right). Photos from PA.gov and entomologytoday.org

Spotted lanternfly was first detected in the United States in Pennsylvania in 2014, and based on what we've learned from research and updates on this insect in Pennsylvania, SLF poses the greatest threat to the tree fruit, grape, hardwood nursery, and hops industries. Fortunately for Indiana stakeholders, significant effort has been focused on understanding the ecology of this insect, including which host plants this insect prefers to feed on, their behavior and movement patterns, and of course population management with insecticides. This insect can be managed with insecticides that most commercial fruit producers already use; however, we still have work to do to learn which products are most effective.

At this time, we are planning a SLF webinar update for tree and small fruit producers in the state, so please stay tuned! In the meantime, the best thing you can do as a producer or community member is remain vigilant for this insect in your area. **If you suspect an insect as SLF, please do not attempt to capture or collect the insect.** Instead, please report it immediately by calling 866-NO EXOTIC (866-663-9684) or send an email (with a photo of the insect if possible) to [DEPP@dnr.IN.gov](mailto:DEPP@dnr.IN.gov).

## Insects Visiting CBD Hemp so Far During Summer 2021

(Zachary Serber, [zserber@purdue.edu](mailto:zserber@purdue.edu)) & (Elizabeth Long, [eylong@purdue.edu](mailto:eylong@purdue.edu), (765) 796-1918)

This is our second year scouting CBD hemp to learn more about the insect communities occurring on these plants throughout the season and 'who' the potential pest insects might be! This year we had the opportunity to scout CBD hemp plants grown both in the field and in a high tunnel environment (Figure 1). Since insect communities, both pest and beneficial, can vary between indoor and outdoor production systems, we were excited to see if different kinds of insects occurred on hemp plants grown outdoors versus in high tunnels.



Figure 1. Master's student, Zach Serber, scouting insects in high tunnel hemp. Photo by E. Y. Long

### ***Insects visiting hemp plants***

So far, we have observed many of the same kinds of insects on hemp grown outdoors and in the high tunnel. Some of the most common insect visitors we've observed on hemp this season are the flies, including fruit flies, the showy and often metallic long-legged flies (Figure 2), grass flies, house flies, and crane flies. The larval and adult stages of long-legged flies are beneficial insects that are known to attack soft-bodied arthropod pests, including mites, whiteflies, and aphids! However, we have not observed these predators attacking any insect pests so far. Other insect visitors to hemp included soldier beetles, japanese beetles, snout moths, fireflies, and even june beetles! Although several of these visitors are plant-feeding insects, none were observed feeding on hemp; rather, they appeared to be 'taking a break' on hemp plants.



Figure 2. An adult long-legged fly resting on a hemp leaf. Photo by E. Y. Long

### ***Potential insect pests***

Leafhoppers are one of the most common and abundant insects we've observed on both indoor and outdoor hemp this season. Don't be surprised to see brown, green, or even pale, white-colored leafhoppers perched on the stems and leaves of hemp plants. Leafhoppers leave behind obvious symptoms of feeding damage, called 'hopper burn', on crops like strawberry, apple, beans, and alfalfa. The piercing-sucking feeding strategy these insects have causes leaf margins to curl upwards and inward toward leaf veins, and some leafhoppers even inject toxins into plants while feeding. Given the high number of leafhopper nymphs and adults (including potato leafhopper) we've observed on hemp this season, we suspect the leaf curling symptoms we've



observed on CBD hemp to be the hemp plant's version of 'hopper burn' (Figure 3), and this is the first year we've seen it!



Figure 3. Symptoms of leafhopper feeding on hemp, also known as 'hopper burn.' Photo: E. Y. Long

Other potential pest insects we've observed feeding on CBD hemp this season include cannabis aphid, whiteflies, red-headed and other smaller flea beetles, and caterpillars belonging to the 'leafroller' and 'inchworm' moth families. Inchworm caterpillars may appear to be tiny branches sticking out from hemp leaves (Figure 4), and leafroller caterpillars often glue leaves together to form a protective shelter for themselves. If you see any of these signs, you may have one of these caterpillar visitors on your hemp!



Figure 4. An inchworm caterpillar on a hemp plant. Photo by E. Y. Long

### **Beneficial insects & arthropods**

Predatory insects and arthropods often make our day out in the field! This season, we've seen lady beetle adults and larvae, minute pirate bugs, predatory thrips, praying mantids, crab, jumping, and wolf spiders, and several kinds of parasitoid wasps. These 'good insects' may be found on every part of the plant and have different hunting strategies. For example, spiders may actively hunt for prey or wait to ambush prey once they land on plants. Praying mantids rely on an ambush strategy, blending in with the plant and waiting for prey to arrive or pass by (Figure 5). Meanwhile, lady beetles are active hunters, searching plant surfaces for prey and mowing down large numbers of soft-bodied insects when they find them, including aphids and whitefly eggs and nymphs.



Figure 5. A well-camouflaged praying mantis, waiting for passing prey under a hemp leaf. Photo by E. Y. Long

We will continue our hemp scouting efforts through August and keep you posted on the insects we see! If you have pictures of insects you'd like to share with us from your hemp production systems, we welcome you to share them with us via our [Purdue Fruit & Veg IPM Facebook page!](#)

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## **Dry Conditions Have Returned to Indiana**

(Beth Hall, [hall556@purdue.edu](mailto:hall556@purdue.edu))

Well, it was a nice 4 weeks with no drought or abnormally dry designated areas across the state. Unfortunately, the lack of rain over the past few weeks have led to browning lawns, cracked soils, and other tell-tale signs that drought may be returning. The US Drought Monitor has designated three areas in Indiana as being *Abnormally Dry* (Figure 1). Looking at the national climate outlooks over the next few weeks is suggesting that spotty rain and dry conditions may persist, though there are slight indications that above-normal precipitation may be possible (Figure 2). Unfortunately, that confidence is low. This past week has been extraordinarily warm and muggy with temperatures in the 90s (Fahrenheit) and dew point temperatures in the upper 70s to lower 80s. Dew point temperature tend to stay relatively constant throughout the day and don't vary as much as humidity. It is a truer measure of how much water vapor is in the air and indicates the temperature the air would need to cool down to in order for the air to be saturated and dew to form on surfaces. This is why glasses that have been in air-conditioned environments will fog up quickly when one goes outside in these conditions! When the dew point temperature is that high, there is little if any cooler relief over the nighttime hours. How rare are dew point temperatures this high? Over the past 10 years, dew point temperatures exceeding 75°F on 21 days at the Indianapolis Airport. Last year, there were only 3 days when this happened.



**U.S. Drought Monitor  
Indiana**

**August 10, 2021**  
(Released Thursday, Aug. 12, 2021)  
Valid 8 a.m. EDT

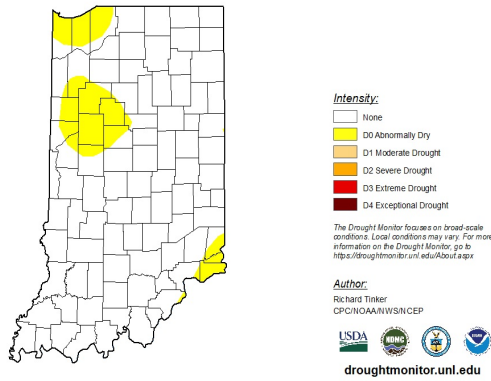


Figure 1. US Drought Monitor for data through August 10, 2021.

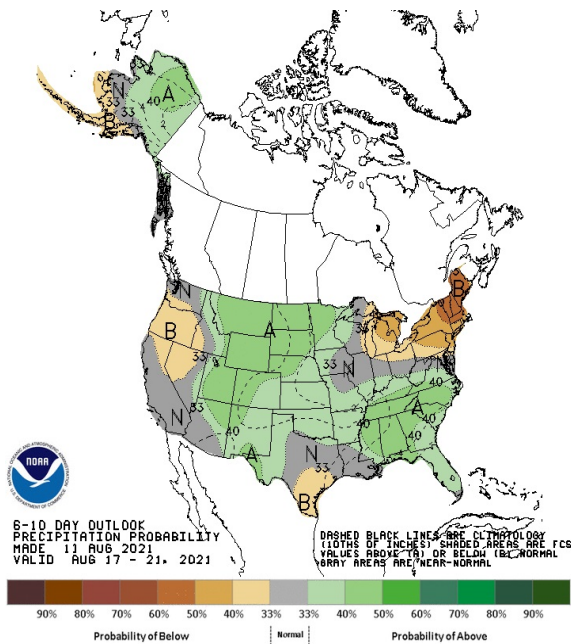


Figure 2. Precipitation outlook for August 17-21 indicating normal conditions likely throughout central Indiana with slight probabilities of above-normal precipitation in southern Indiana and below-normal precipitation in northeastern Indiana.

Modified growing degree days continue to accumulate, though accumulation caps the upper temperature threshold at 85°F. What this means is if the maximum temperature is over 85°, then the maximum temperature is replaced with the number 85 when deriving the daily average. For example, let us assume the minimum temperature was 68°F and the maximum temperature was 92°F, then a traditional growing degree day (base 50°F) would find the average temperature  $((68+92)/2=80)$  and then subtract 50 (i.e.,  $80-50=30$  growing degree-day units). However, some vegetation negatively responds to excessively warm temperatures, so modified growing degree days cap that upper limit at 85°F. In the example, therefore, the average temperature would be  $(68+85)/2=76.5$  and the MGDD would be  $76.5-50 = 26.5$  MGDD units. Accumulated MGDD units range from 1900 in northern Indiana to over 2500 in southern Indiana (Figure 3). This is relatively comparable to recent years (Figure 4).

**Growing Degree Day (50 F / 86 F) Accumulation**

April 1 - August 11, 2021

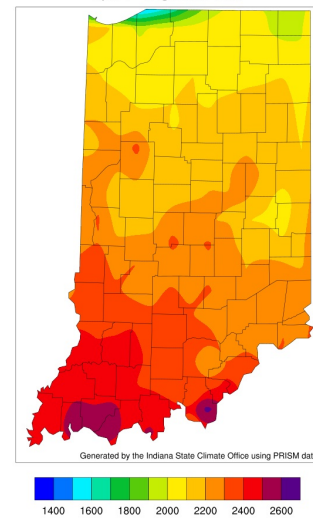


Figure 3. Modified growing degree day accumulations from April 1 to July 28, 2021.

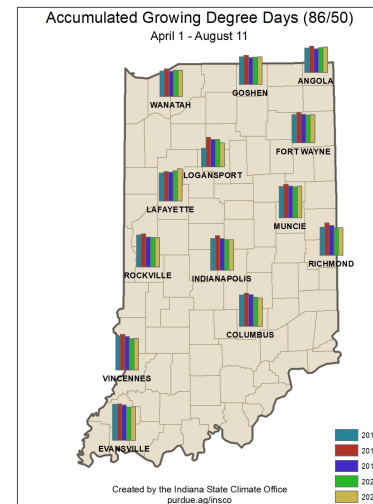


Figure 4. Comparison of 2021 modified growing degree day accumulations from April 1 – August 4 to the past four years.

## Hydroponics Workshop

**Please join us for the 2021 Hydroponics Workshop, hosted by Krishna Nemali!**

**September 22, 2021 (8:30 am to 3:00 pm)**

(A daylong interactive learning session and hands-on activities related to greenhouse and indoor hydroponics)

**Register online at**

[https://purdue.ca1.qualtrics.com/jfe/form/SV\\_cCJPpWrODzqmO7Y](https://purdue.ca1.qualtrics.com/jfe/form/SV_cCJPpWrODzqmO7Y)



Deadline to register: September 19, 2021

*(Registration is required to attend the workshop. Registration fee (\$25) includes lunch and snacks. We may limit the number of participants due to safety requirements. Register early!)*

**For questions contact**

Dr. Krishna Nemali ([knemali@purdue.edu](mailto:knemali@purdue.edu)) or

Lori Jolly-Brown ([ljollybr@purdue.edu](mailto:ljollybr@purdue.edu))

## Hydroponics Workshop

September 22, 2021 (8.30 am to 3.00 pm)  
(A daylong interactive learning sessions and hands-on activities related greenhouse and indoor hydroponics)

**Venue**  
Deans Auditorium, Pfendler Hall of Agriculture, 767-799 W State St, West Lafayette, IN 47907 (starts at 8.30 am) & Greenhouse and Indoor Hydroponics Facilities, Horticulture Building, 625 Agriculture Mall Drive, West Lafayette IN 47907 (starts at 1.00 pm)

**Topics**  
Learn about organic lettuce production in hydroponics, *E. coli* - free lettuce production in greenhouse and indoor hydroponics, food safety principles and certification, and Integrated Pest Management for insect control in hydroponic production



Register online at  
[https://purdue.ca1.qualtrics.com/jfe/form/SV\\_cCIPpWrODzqm07Y](https://purdue.ca1.qualtrics.com/jfe/form/SV_cCIPpWrODzqm07Y)

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For questions contact

Please join us for the Purdue Hydroponics Workshop

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