VEGETABLE CROPS HOTLINE

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

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In This Issue

Plectosporium Blight of Pumpkin

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

Recently, I have observed several pumpkin vines and fruit with Plectosporium blight. When I receive phone calls about Plectosporium blight, the caller often has trouble describing the disease. Indeed, the disease is difficult to describe. Therefore, I will include several photos with this article.

Lesions of Plectosporium blight are most often observed on the stems of affected plants. The lesions are small and irregularly shaped. The lesions often coalesce to form a scabby area (Figure 1). When the handle of the pumpkin is affected, the marketability of the pumpkin is affected. In severe cases, the pumpkin itself may have lesions of Plectosporium blight. Lesions on the leaves are often on the midrib and major veins and may be diamond shaped as on the stem. When lesions occur on the leaf surface, the lesions are small and speck like. Plectosporium blight lesions on fruit may be confused with bacterial spot or edema (Figure 2). Edema is a non-infectious disorder caused by too much moisture, bacterial spot is caused by a bacterium and Plectosporium blight is caused by a fungus.

Figure 1. Lesions of Plectosporium blight on a pumpkin handle.

Figure 2. A comparison between symptoms of edema (left), bacterial spot (middle) and Plectosporium blight (right) on pumpkin.

Cucumbers and melon are generally considered to be resistant to Plectosporium blight. I have never observed the disease on watermelon in Indiana.

The biology and epidemiology of Plectosporium blight is not well understood. It is thought that the fungus survives in the soil and/or in crop debris for 3 years. Cool, wet weather is thought to favor disease development; however, the disease has become established in Florida during warm weather. Conidia are easily splashed from lesions with rain or irrigation water. *P. cucumerina* may be associated with a range of hosts which may influence the survival of the pathogen between cucurbit crops.

Crop rotation should be practiced for at least 3 years to lessen the amount of inoculum in the soil. However, *P. cucumerina* may affect a range of hosts as noted above. Any cultural technique that aids ventilation and drying of leaf surfaces, such as orienting rows with the prevailing wind or manipulating plant spacing should help to lessen disease severity. Crops should be scouted for symptoms and, when appropriate, fungicides should be applied.

Plectosporium blight is said to be readily controlled by fungicides. However, anecdotal accounts report management failures with fungicides. Such failures, if confirmed, may be due to fungicide application problems, fungicide resistance or simply a lack of knowledge regarding the biology of *P. cucumerina.* This pumpkin fungicide schedule lists the systemic fungicides Cabrio®, Flint Extra® , Merivon® and Quadris®/Satori®.

Host resistance to Plectosporium blight does not exist in Cucurbita spp. However, some varieties and plant introductions vary in susceptibility.

Pumpkin and Watermelon Herbicide Injury Symptoms – In Photos

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

Throughout the growing season, vegetable crop farmers often report suspected herbicide drift injury. Each type of herbicide results in specific types of injury. Knowing what to look for can help us narrow which herbicide or herbicide mode of action could be responsible.

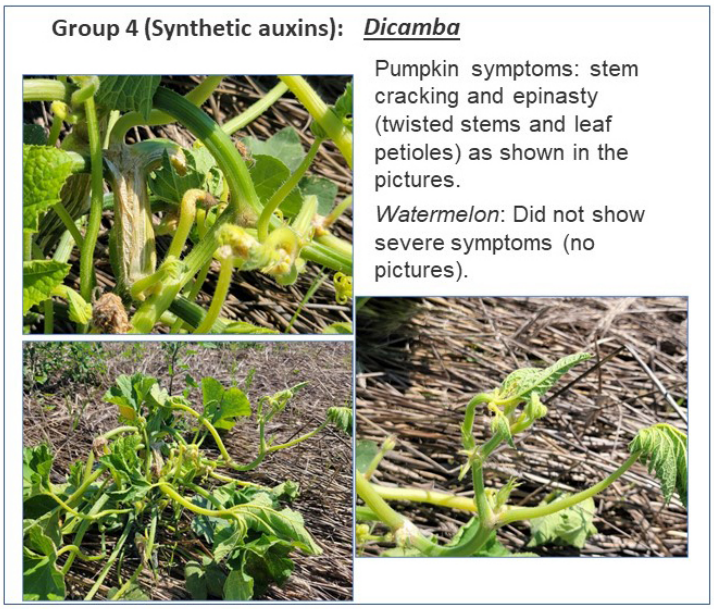
To document how watermelon and pumpkin respond to various herbicides, we sprayed a reduced rate (1/10th of the recommended rate) of 9 herbicides (Table 1).

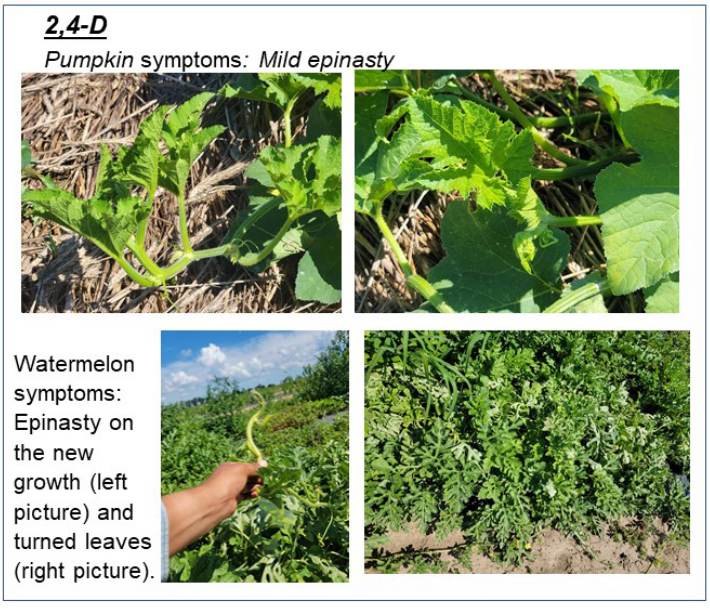
Herbicide common name	Active ingredient	Group	Reduced rate
XtendiMax	dicamba	4	2.2 fl. oz/acre
2,4-D Amine	2,4-D	4	2.4 fl. oz/acre
Sencor	metribuzin	5	0.6 oz/acre
Aatrazine 4L	atrazine	5	3.2 fl. oz/acre
Roundup	glyphosate	9	2.2 fl. oz/acre
Liberty	glufosinate	10	3.2 fl. oz/acre
Aim	carfentrazone	14	0.2 fl. oz/acre
Command	clomazone	27	3.2 fl. oz/acre
Argos	mesotrione	27	0.6 fl. oz/acre

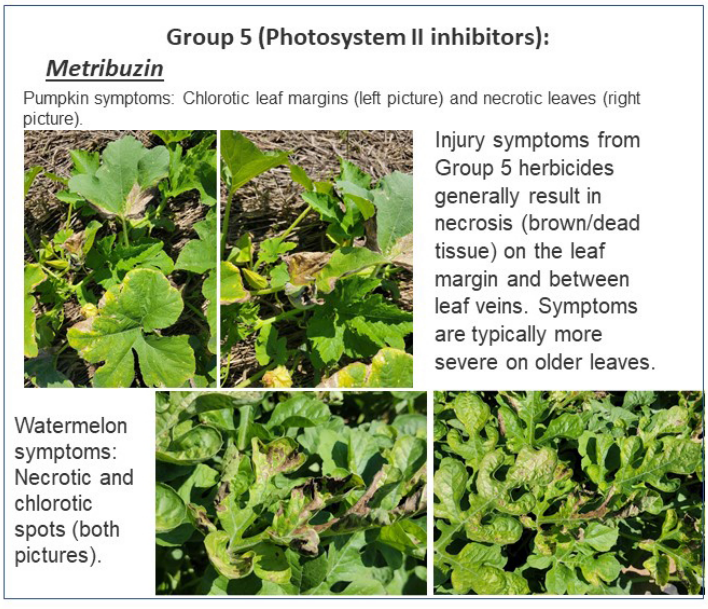
Table 1. Herbicide active ingredient, group number, and rate.

Observations:

- Symptoms were similar for watermelon and pumpkin with a couple exceptions:
  - Pumpkin appears to be more sensitive to dicamba than 2,4-D. The opposite appears to be true for watermelon, which was more sensitive to 2,4-D than dicamba.
  - Clomazone resulted in very mild bleaching injury on watermelon leaves only. In contrast, mesotrione, another group 27 herbicide, caused severe bleaching injury on the watermelon growing points.



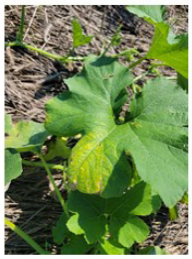




Group 5 (Photosystem II inhibitors):

- ***Atrazine***

Pumpkin symptoms: Necrosis (left picture) and chlorosis (right picture) on the leaves.

Injury symptoms from Group 5 herbicides generally result in necrosis (brown/dead tissue) on the leaf margin and between leaf veins. Symptoms are typically more severe on older leaves.

Watermelon symptoms: Interveinal chlorosis and necrotic spots on the leaves and necrotic leaf margins.

Group 9 (EPSP synthase inhibitor):

Glyphosate

Pumpkin *Watermelon*

Symptoms: Chlorosis (yellowing) of shoot tips followed by necrosis and overall plant stunting.

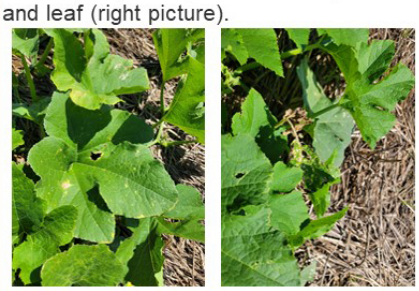
Group 10 (Glutamine synthase inhibitor):
Glufosinate

Pumpkin symptoms: White spots on the leaves (left picture) and chlorosis on leaves and necrotic leaf margins (right picture).

Watermelon symptoms: Necrotic leaves.

Group 14 (PPO inhibitor):
Carfentrazone

Pumpkin symptoms: White spots on the leaves (left picture) and necrotic petiole and leaf (right picture).



Watermelon symptoms: Bronzing on the leaves.

Group 27 (HPPD inhibitors):

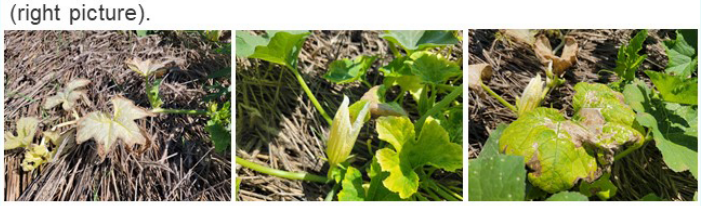
Clomazone

Pumpkin symptoms: No visible injury on the pumpkin. See bleaching injury on the common lambsquarters plant.

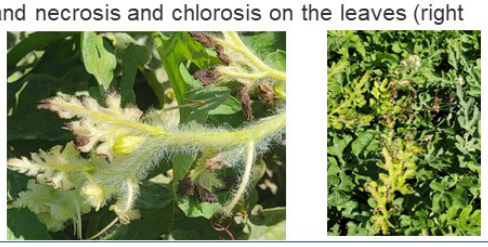
Watermelon symptoms: Bleaching on the leaf margins.

- ***Mesotrione***

Pumpkin symptoms: Bleaching on the leaves of new growth (left picture) and flowers (middle picture) and necrosis on the leaves (right picture).



Watermelon symptoms: Bleaching on the new growth (left picture) and necrosis and chlorosis on the leaves (right picture).

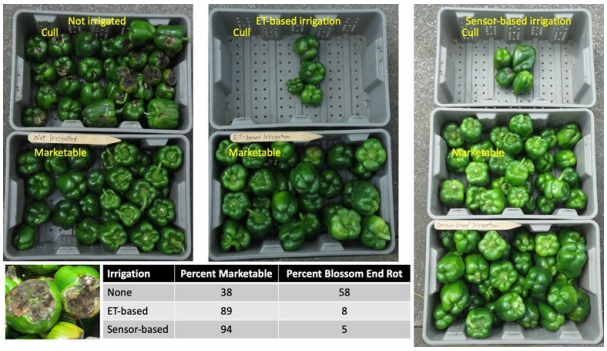


Irrigation Demonstration Update July Aug. 24, 2022, Pinney Purdue Ag Center.

(Liz Maynard, emaynard@purdue.edu, (219) 548-3674)

At Pinney Purdue (PPAC) bell peppers were harvested for the first time on August 15. Plants appear a little larger in the irrigated plots than in the unirrigated plots, but it is not obvious in photographs (Figure 1). Similar to what was observed at SWPAC, blossom end rot (BER) was much more common in the unirrigated treatment than in the two irrigated treatments (Figure 2). More than half of the fruit from the unirrigated plot had BER, and only 5% to 8% of fruit in the irrigated treatments had BER.

Figure 1. Pepper plots in irrigation demonstration plots at Pinney Purdue Ag Center at the time of of first harvest on 8/15/2022. Treatments were 1) no irrigation, 2) irrigation based on evapotranspiration estimates for tomatoes, and 3) irrigation based on soil moisture sensors installed in tomato section of bed.



Irrigation	Percent Marketable	Percent Blossom End Rot
None	38	58
ET-based	89	8
Sensor-based	94	5

Figure 2. Cull and marketable fruit harvested from unirrigated pepper plants, or from plants irrigated based on evapotranspiration (ET) estimates or soil moisture sensor measurements. First harvest on 8/15/2022 of 'Tarpon' pepper transplanted on June 6, 2022. Unreplicated demonstration at Pinney Purdue Ag Center, Wanatah, IN. 21, 15, and 20 plants harvested in unirrigated, ET-based, and sensor-based treatments, respectively.

The first fruit to set on the plants, located at the first fork of the stem, rarely had blossom end rot. Some of the later-set fruit with BER in the unirrigated plot had not yet reached marketable size. In the irrigated plots, most of the immature later-set fruit did not have BER, and so they were left on the plant to reach marketable size.

We did not monitor soil moisture in the peppers, but soil moisture measured in the tomato section of the same bed suggests patterns we would expect under the peppers. In the second week of July, when the first pepper fruit was setting, the soil moisture in the unirrigated bed decreased from about 0.25 m3/m3 to just below 0.20 m3/m3. In the irrigated treatments, moisture remained above 0.26 m3/m3. As described above, few fruit set around this time developed BER. Over the next week and a half, from July 13 to 24, soil moisture in the unirrigated plot remained below 0.20 m3/m3, and in the irrigated plots soil moisture was maintained above 0.27 m3/m3. During this period pepper plants continued to flower and set fruit at higher nodes. After a rain on the 24th, the unirrigated plot dried down to below 0.20 m3/m3 after several days. Given that lack of soil moisture can promote BER, it seems likely that fruit set during these dry periods are the ones showing BER. Rain in early August wet the soil profile in all the treatments. If the plots are maintained for a few more weeks it will be interesting to see how much BER shows up in later harvests.

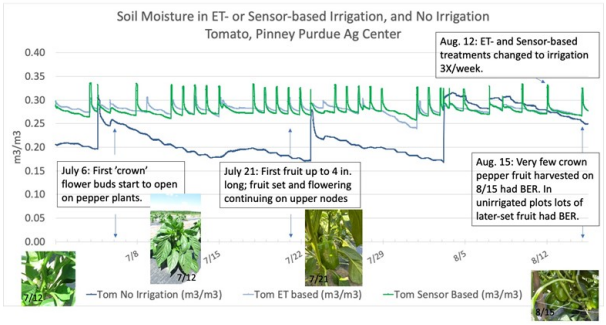


Figure 3. Observations on pepper development and soil moisture measured by electronic sensors at 12 inch depth in tomato plots irrigated based on evapotranspiration (Et-based), soil moisture sensors, or not irrigated. Pinney Purdue Ag Center, July 1–Aug. 15, 2022.

Funding for project *Improve Drip Irrigation Management for Vegetables and Melon Production in Indiana* was made possible by the Indiana State Department of Agriculture through grant A337-22-SCBG-21-003. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the ISDA.

Understanding Wetting Patterns in Drip Irrigation

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A major difference between drip irrigation and other irrigation methods is that drip irrigation applies water to only a portion of the soil. This works great for vegetables grown on the plastic mulch, since no irrigation water is applied between the row middles; water applied to row middles encourages weed growth. So, does the soil under the plastic evenly wet? In some cases, as we will examine below, the soil does not become evenly wet.

Water moves downward by gravity and horizontally by capillary

action when dripped onto the soil. Fine-textured soil has a greater ability to hold and retain water than coarse-textured soil. Thus, water is more likely to move horizontally in clay soils than in sandy soils. Water discharge rate of drip tapes also affects the wetting pattern. In general, water is more likely to move horizontally with high flow-rate (high discharge) drip tapes than low flow-rate (low discharge) drip tapes (Figure 1 and 2).

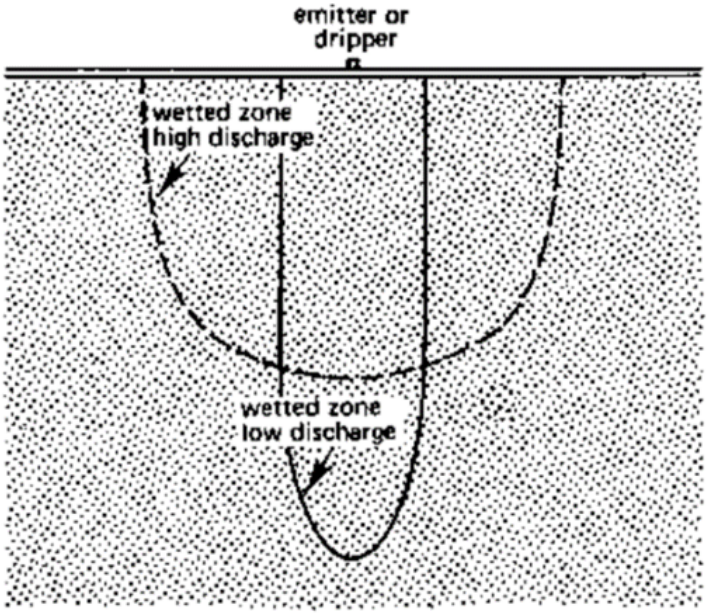

Figure 1. Wetting patterns for sandy soils with high and low flow-rate drip tapes.

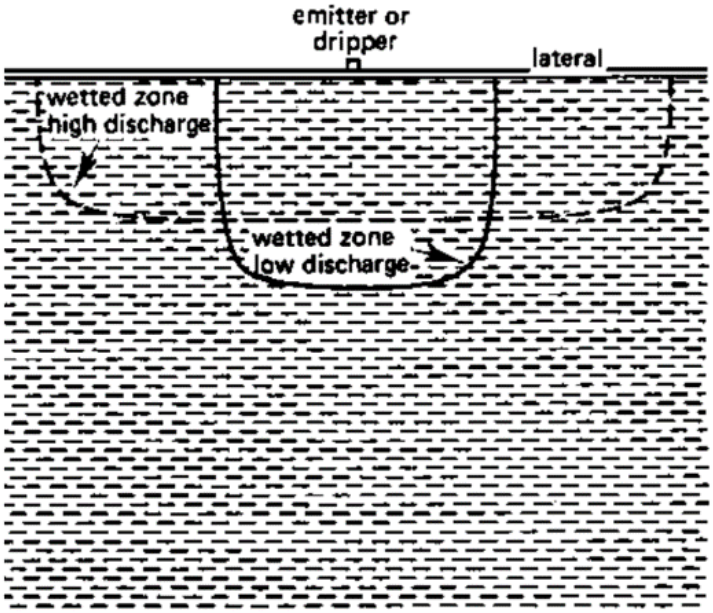

Figure 2. Wetting patterns for clay soils with high and low flow-rate drip tapes. (Figure 1 and 2 were adapted from https://www.fao.org/3/s8684e/s8684e07.htm#TopOfPage)

Thanks to the help of irrigation educator Lyndon Kelley, we used blue dye to demonstrate the wetting patterns of different drip tapes in a sandy soil at Pinney Purdue Vegetable Field Day. A 12'' emitter spacing drip tape watered the soil for an hour. Assume the blue dye-covered area was where water from the irrigation event reached (Figure 3). We found the most expansive water covering area from one emitter was about 9'' horizontally, and there was at least 3'' spacing between wetting zones of two adjacent emitters that water did not reach. The soil was relatively wet when we conducted the demonstration. The wetting pattern would likely be wider horizontally if the soil was drier, but the gap between the two wetting zones would not likely be filled, regardless of irrigation time, given the soil moisture conditions at the time of the demonstration.

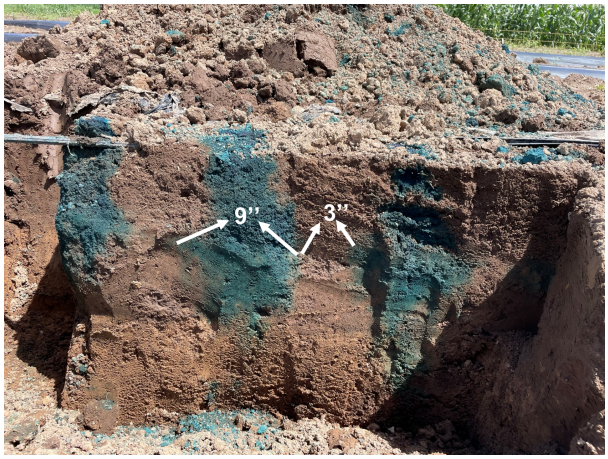

Figure 3. Irrigation dye-demonstration at Pinney Purdue Vegetable Field Day. The drip tape in the demonstration was 12'' emitter spacing and 0.4 gpm/100 ft flow rate at 8 PSI ran for an hour at 10 PSI.

Why is it important to understand the wetting pattern? After all, one may argue, roots can follow the water pattern. As long as enough water is applied, plants should be okay even if the soil is not evenly wetted. This statement is true if only water is considered. However, water application could affect other factors. For example, suppose dry fertilizers or other soil amendments were incorporated into the beds. It is likely only fertilizers that land where the soils are wetted can be used by the plant. In other words, a large amount of nutrients may never be used if part of the soil on the bed stays dry. In another example, if one applies pesticides through drip tapes to control soilborne diseases, the wetting pattern would indicate where the pesticide is applied. Pesticides applied through drip tape will not be effective if the wetting pattern does not contact the entire root system.

We will continue discussing considerations in drip irrigation in a series of future newsletter articles.

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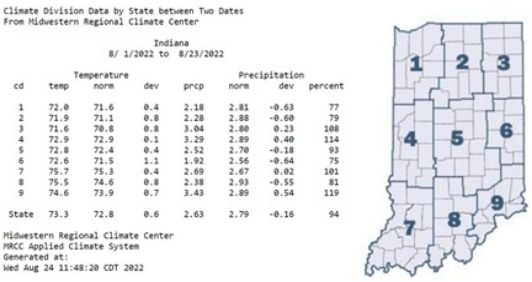
Cooler Temperatures and Below Normal Rainfall; Warmer Weather Returning August 24, 2022

(Austin Pearson, pearsona@purdue.edu, (765) 675-1177)

For the second week in a row, the much-appreciated cooler temperatures remained from August 17-23. The preliminary state average temperature was 71.2°F, which was 1.2°F below the

1991-2020 normal. The largest temperature departures were observed in central and southern Indiana, where departures were up to 2.1°F below normal. After a warm, wet beginning to August, month-to-date temperatures (Figure 1) remained slightly above normal through August 23 (0.6°F above normal). Daytime high temperatures in south-central and southern Indiana were cooler than normal (Figure 2, Left) while overnight lows were 1-3F warmer than normal (Figure 2, Right). From April 1-August 24, Modified Growing Degree Days continued to run 102 percent of normal for the state. Central and southern Indiana has the highest Modified Growing Degree Day departures (Figure 3).



Climate Division Data by State between Two Dates
From Midwestern Regional Climate Center

Indiana
8/ 1/2022 to 8/23/2022

cd	Temperature temp	norm	dev	Precipitation prcp	norm	dev	percent
1	72.0	71.6	0.4	2.18	2.81	-0.63	77
2	71.9	71.1	0.8	2.28	2.88	-0.60	79
3	71.6	70.8	0.8	3.04	2.80	0.23	108
4	72.9	72.9	0.1	3.29	2.89	0.40	114
5	72.8	72.4	0.4	2.52	2.70	-0.18	93
6	72.6	71.5	1.1	1.92	2.56	-0.64	75
7	75.7	75.3	0.4	2.69	2.67	0.02	101
8	75.5	74.6	0.8	2.38	2.93	-0.55	81
9	74.6	73.9	0.7	3.43	2.89	0.54	119
State	73.3	72.8	0.6	2.63	2.79	-0.16	94

Midwestern Regional Climate Center
MRCC Applied Climate System
Generated at:
Wed Aug 24 11:48:20 CDT 2022

Figure 1. August 1-23, 2022 climate division and state average temperatures, normal temperatures, temperature deviations, average precipitation, normal precipitation, precipitation deviations, and percent of normal precipitation compared to the 1991-2020 climatological averages.

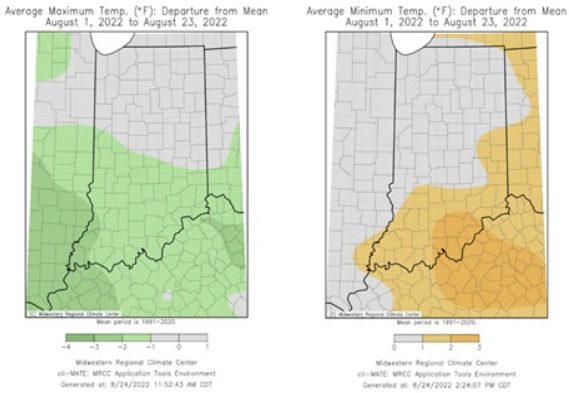


Figure 2. Left – Average maximum temperature in degrees Fahrenheit for August 1-23, 2022, represented as the departure from the 1991-2020 normal temperature during that period. Right – Average minimum temperature in degrees Fahrenheit for August 1-23, 2022, represented as the departure from the 1991-2020 normal temperature during that period.

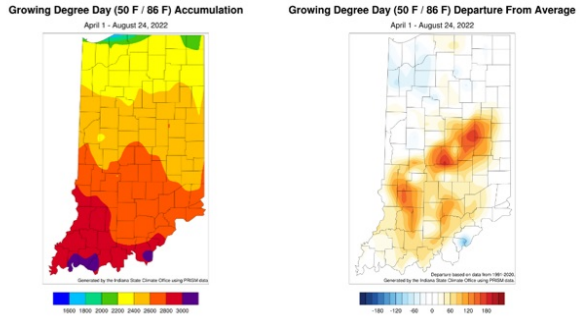


Figure 3. Left – Modified Growing Degree Day accumulations April 1-August 24, 2022. Right – Modified Growing Degree Day accumulations from April 1-August 24, 2022 represented as the departure from the 1991-2020 climatological average.

Dry conditions settled in for August 17-23 as the state average precipitation was 0.48 inches (0.27 inches below normal or 64 percent of normal). Central and southern Indiana were the driest regions, averaging less than 60 percent of normal rainfall for the week. Clay County, Indiana, recorded the highest precipitation with 1.94 inches falling on August 21. Several stations actually missed out on adequate precipitation during this period (Figure 4, Left) and received less than 50 percent of normal rainfall (Figure 4, Right). State preliminary precipitation has averaged 2.79 inches for August 1-23, which is 94 percent of normal. As of August 23, river and stream gauges in the northwestern and central part of the state had 7-day average streamflows that were ranked below the 25th percentile (Figure 5). The August 23rd US Drought Monitor brought expansion of the Abnormally Dry (D0) category through the northern part of the state, but Moderate Drought has not yet returned (Figure 6).

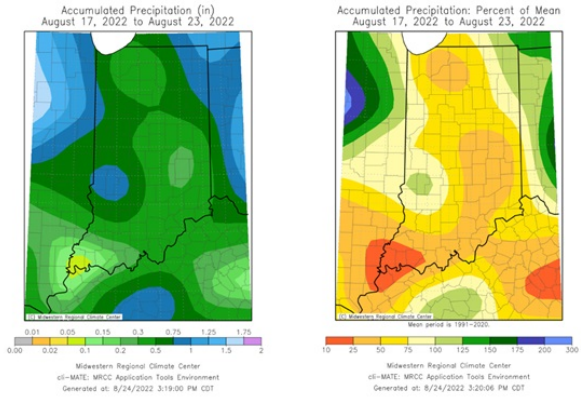


Figure 4. Left – Accumulated precipitation from August 17-23. Right – Accumulated precipitation from August 17-23, represented as the percent of the 1991-2020 normal precipitation that fell during this period.

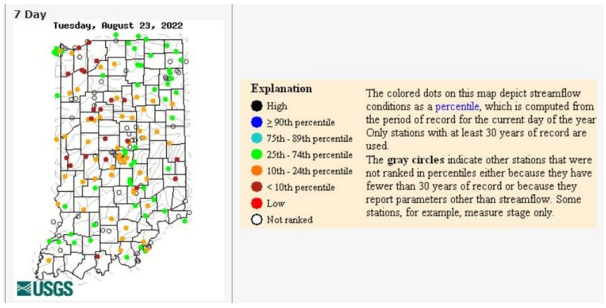


Figure 5. Seven-day average stream flows across Indiana as of Tuesday, August 23, 2022 using date from the USGS Water Watch.

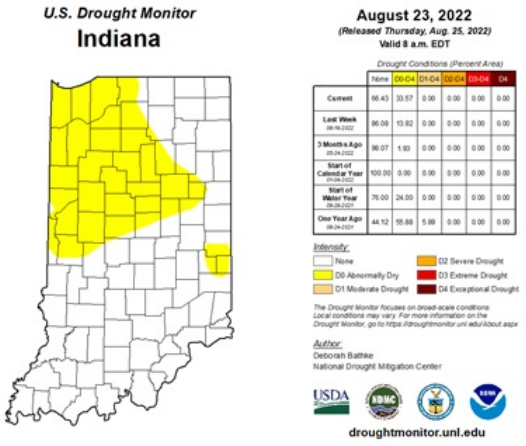


Figure 6. Indiana US Drought Monitor from August 23, 2022.

The Climate Prediction Center outlooks have been accurate for August so far. The 6–10-day outlook for August 30th– September 3rd has higher confidence in above-normal temperatures

statewide. Precipitation is expected to be below normal in the northern, normal in the middle, and above normal in the extreme southern parts of the state (Figure 7). The 8–14-day outlook (September 1-7) has elevated confidence in near-normal temperatures through much of the state with areas of higher confidence in above-normal temperatures in extreme northern Indiana. Precipitation is expected to be below normal throughout most of the state with near-normal precipitation in southern Indiana (Figure 8).

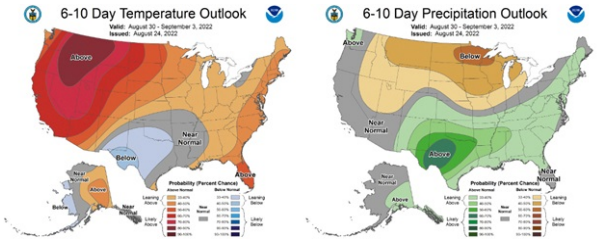


Figure 7. The Climate Prediction Center's 6-10-day temperature (left) and precipitation (right) outlooks for August 31-September 3, 2022.

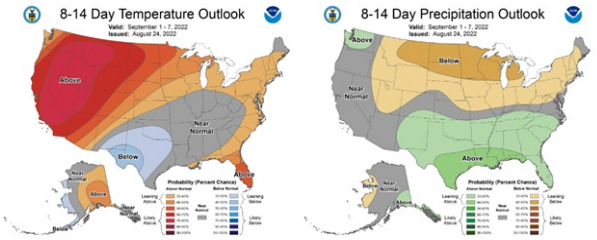


Figure 8. The Climate Prediction Center's 8-14-day temperature (left) and precipitation (right) outlooks for September 1-September 7, 2022.

Strawberry Chat Plasticulture Production

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

The Aug. topic of Strawberry Chat is about plasticulture strawberry production. Our special guests were Brad Bergefurd, former Horticulture Specialist at The Ohio State University, Calvin Beasley from Beasley Orchard in Danville, IN, and Danny Vanmeter from Vanmeter Family Farm in Clarkston, KY. We discussed many important topics in plasticulture strawberry production, including site selection, beds, plastic mulch, fertility management, crop rotation, winter protection, cultivar selection, and more. You can access the podcast at https://anchor.fm/strawberrychat/episodes/Plasticulture-Production-I-Episode-6–Aug-10-2022-e1mebh4

We will discuss substrate strawberry production with elevated systems on Sept. 7, 12:00pm-1:00 pm EST. If you are interested in participating the discussion live, please register at https://purdue-edu.zoom.us/meeting/register/tJctcu2qqjsrGNeKWvXqrKRQuqyI3p5ZHqcI

Midwest Mechanical Weed Control Field Day on Sep. 14 in Benton Harbor, MI

Midwest Mechanical Weed Control Field Day will held Wednesday, September 14, 2022 at MSU Southwest Michigan Research and Extension Center in Benton Harbor, MI.

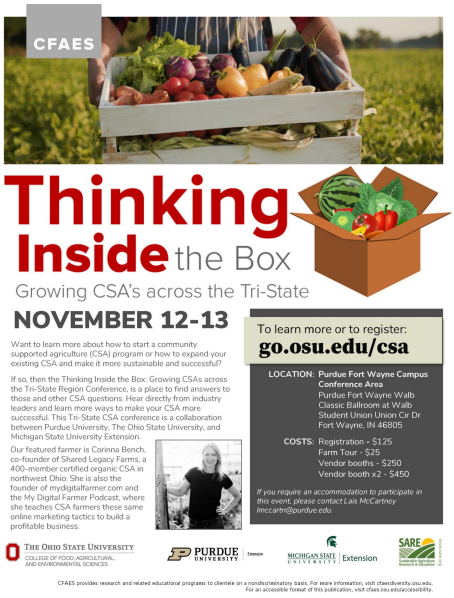
Registration and more information about the field day can be found at https://thelandconnection.org/event/2022-mmwcfd/

If you have questions about the field day, please contact Sam Oschwald Tilton (Sam.oschwaldtilton@wisc.edu), phone (608) 219-7775

Tri-state (Indiana, Ohio, Michigan) Community Supported Agriculture (CSA) Conference in Nov. in Ft. Wayne

The Indiana, Ohio, and Michigan Tri-state Community Supported Agriculture (CSA) conference is Saturday and Sunday, November 12th and 13th, in Ft, Wayne, IN. The conference starts with a Hawkins Family Farm tour on Saturday morning. Experts with Central State University, The Ohio State University College of Food, Agricultural, and Environmental Sciences (CFAES), in collaboration with Purdue University and Michigan State University, will host the conference. We will have great farmer speakers, vendors, and resources for farmers and ag professionals to learn more about CSAs. The flyer has more information on our featured farmer.

More information about the conference and to register, please access https://web.cvent.com/event/e40d5530-3155-4716-b76a-f12bc9da4b2d/summary



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