PURDUE UNIVERSITY | Extension - Entomology

Pest&Crop newsletter

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In This Issue

Black Cutworm Damage Reported In Soybean And Sweet Corn

(John Obermeyer)

No surprise, as reported in last week's Pest&Crop, the "landing spots" for the many black cutworm moths into the state are now being realized. Another encouragement to scout high-risk corn and soybean fields as they emerge.

Black cutworm larvae, some near pupation, were reported cutting soybean seedlings in Southwest Indiana. The river bottom fields, lush with weeds earlier this spring, had lost 4 to 8,000 plants/acre from the damage. Because of soybeans ability to compensate for lost plants, and the size of the cutworm larvae, no treatment will be necessary in these fields. Fortunately, the damage was scattered throughout, rather than concentrated in areas of the fields. If replanting, or filling-in, is being considered, the following publication may be of help, click HERE.

In West Central Indiana, black cutworm damage was being reported in one-leaf sweet corn planted into cover crop residues. Most plants had some leaf feeding, and cutting was just beginning. The producer was going to apply a rescue treatment to protect this high-value crop. Pest management at work!

Happy scouting!

Range of soybean damage by black cutworm. (*Photo Credit: Dan Emmert*)

Black cutworm leaf feeding, the cutting will soon begin. (*Photo Credit: Steve Meyers*)

Armyworm Pheromone Trap Report – 2023

(John Obermeyer)

County/Cooperator	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11
Dubois/SIPAC Ag Center	0	80	56	14	25	48	3				
Jennings/SEPAC Ag Center	21	20	39	8	12	11	1				
Knox/SWPAC Ag Center	37	242	46	26	16	6	5				
LaPorte/Pinney Ag Center	60	296	216	54	56	401	140				

County/Cooperator	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11
Lawrence/Feldun Ag Center	159	99	197	70	41	119	48				
Randolph/Davis Ag Center	57	0	0	2	5	414	280				
Tippecanoe/Meigs	36	56	51	8	6	39	31				
Whitley/NEPAC Ag Center	0	259	179	13	39	323	142				

Wk 1 = 4/1/23-4/5/23; Wk 2 = 4/6/23-4/12/23; Wk 3 = 4/13/23-4/19/23; Wk 4 = 4/20/23-4/26/23; Wk 5 = 4/27/23-5/3/23; Wk 6 = 5/4/23-5/10/23; Wk 7 = 5/11/23-5/17/23; Wk 8 = 5/18/23 – 5/24/23; Wk 9 = 5/25/23-5/31/23; Wk 10 = 6/`/23-6/7/23; Wk 11 = 6/8/23-6/14/23

The Corn Mesocotyl And Assessing Its Abnormal Growth

(Dan Quinn)

As a young agronomist, one of the first things I learned was that when assessing corn emergence and stand establishment following planting, is that it is always important to have a shovel with you. Why? Because often the reasons for poor emergence or stand establishment lie beneath the soil surface. The young corn root system is essential for early-season growth and stand establishment and is comprised of various important plant components which include the radicle (first emerging root from the tip end of the kernel), the seminal roots, the nodal roots, and the **mesocotyl.**

The mesocotyl is identified as a white, stem-like plant organ that develops during seed germination and connects the corn seed to the base of the coleoptile (protective sheath which encloses the young corn leaves as they push through the soil surface). One of the main roles of this plant organ is to elongate and push the coleoptile through the soil surface. Mesocotyl growth helps to facilitate deeper planting depths and will cease growth following exposure to solar radiation and light, which is due to hormonal changes (the length of the mesocotyl can also help you determine how deep a corn seed was planted). In addition, this organ also facilitates the movement of energy and nutrients from the seed endosperm to the developing seedling. It is important to remember, that up until the young corn plant is around the V3 growth stage, a majority of the plant's nutrients and energy is coming from the seed. Therefore, maintaining a healthy mesocotyl is absolutely crucial during the period of corn emergence and stand establishment.

Failed crop emergence, uneven emergence, and stunted plants can often be a direct result of poor mesocotyl growth and health. For example, severe mesocotyl damage to young corn seedlings (before nutritional dependance is shifted to the nodal root system) can cause complete plant death due to the loss of energy and nutrient transfer to the young seedling from the kernel. Common symptoms of mesocotyl issues are presented in Figures 1 and 3. Figure 1 shows a common abnormal mesocotyl symptom known as 'corkscrewing', which occurred following early May corn planting in 2023. A 'corkscrewed' mesocotyl is typically caused by soil crusting (restricted crop emergence), chilling injury, herbicide injury (e.g., cell growth inhibitors such as acetochlor), kernel position (embryo face down) in the furrow, or large fluctuations in soil temperatures. The corkscrewed symptoms shown in Figure 1 are likely a result of cold soil temperatures and wide fluctuations in soil temperatures following planting. As shown in Figure 3, 4" bare soil temperatures ranged from 42° F to near 80° F in the first week following planting. The 'corkscrew' appearance of the mesocotyl following cold soil temperatures is caused by damage to the outer surface layers of the mesocotyl and since these damaged outer surface layers become less elastic, the elongation of the mesocotyl becomes uneven, and the 'corkscrewing' occurs. Another important note is that the corn also received a pre-emergence application of acetochlor immediately following planting, which may have exacerbated the observed symptoms.

Figure 1. Corkscrew mesocotyl growth symptoms observed in corn seedlings planted on May 3, 2023 in West Lafayette, IN. (*Photo Credit: Rachel Stevens, ACRE farm manager*)

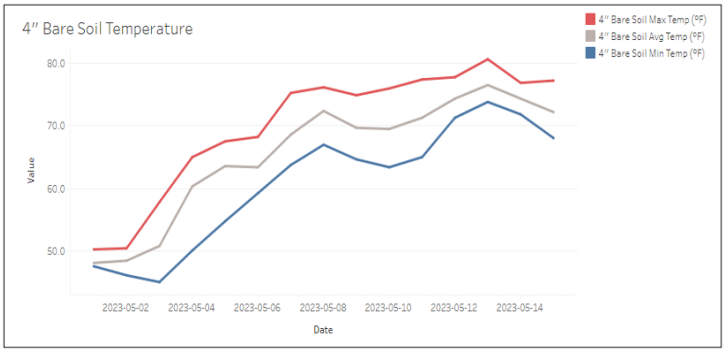

Figure 2. Maximum (red line), average (gray line), and minimum (blue line) 4" bare soil temperatures from May 2, 2023 to May 14, 2023 at the Purdue University Agronomy Center for Research and Education (ACRE) in West Lafayette, IN. Data acquired from: https://ag.purdue.edu/indiana-state-climate/purdue-mesonet/purdue-mesonet-data-hub/

In addition, to chilling and/or herbicide injury, severe mesocotyl damage can also occur from excessively high starter fertilizer rates (especially those with higher salt contents). Figure 3 shows corn during the 2022 growing season that was damaged by an application of nitrogen fertilizer through the planter at too high of a rate. This damage caused severe plant stunting and failed crop emergence throughout the field.

Figure 3. Severe corn mesocotyl damage caused by excessive nitrogen starter fertilizer rates at planting during the 2022 growing season.

Overall, it is always important to pay attention to root and mesocotyl health in young corn seedlings, especially before stand establishment and the plant transition to the nodal root system is finished. Therefore, if poor emergence and/or stunted plants are observed, remember to get out your shovel and look belowground, this may just give you an answer to your problem.

Additional Resources:

Nielsen, R.L. 2022. Emergence problems in corn. Corny News Network. Purdue Univ. Ext. https://www.agry.purdue.edu/ext/corn/news/timeless/EmergenceFailure.html

Niu, L., R. Hao, X. Wu, and W. Wang. 2020. Maize mesocotyl: Role in response to stress and deep-sowing tolerance. Plant Breeding. 139:466-473.

Hay Harvest Is Here

(Keith Johnson) & *(Ron Lemenager)*

To make excellent quality hay, the forage needs to be cut at the right growth stage and packaged into a bale at the right moisture content without incidence of rain damage. As forages mature, protein and digestibility concentrations decline. If the forage is harvested too late, dry matter intake by the consuming animal will be less because of high fiber concentration.

What are “Best Management Practices” associated with haymaking?

- Take advantage of every hour that the sun shines. While mid-afternoon is the time of day that there is a slight improvement in forage quality because of elevated sugar content, if the weather forecast for drying hay to safe baling moisture is questionable, consider mowing in the morning to have more drying time.
- Mow the forage with a properly set mower-conditioner so the stems are crimped every three to four inches. This will increase rate of moisture loss.
- Lay the forage in a wide swath and not a narrow windrow. This, too, will increase drying rate.
- Consider tedding the crop if there is concern about not getting to a safe baling moisture before inclement weather occurs. Tedding should occur when the moisture is greater than 50 percent to reduce yield and quality loss from the aggressive action of tedding when the forage is too dry.
- Raking the forage into a windrow should occur when the moisture is around 40 percent. If raked at a lower moisture level, there will be loss of leaves which will result in yield and quality loss. Set the tines on the rake high enough that soil does not contaminate the forage.
- Bale small rectangular bales at 20 percent moisture, large round bales at 18 percent moisture, and large rectangular bales at 17 percent moisture. Hay baled at too high a moisture content will heat, mold, and spontaneous combustion is possible.
- Store high quality hay under cover (Examples: properly ventilated building, hay tarp properly secured) to reduce deterioration from weathering. Storing hay on a six-inch layer of very coarse rock placed on geotextile cloth will reduce (not eliminate) deterioration at the bottom of the bales.

The links below are videos about the process of making dry hay and timing of the hay harvest.

The Process of Making Dry Hay – YouTube

Timing of the Hay Harvest – YouTube

Many of you have put much effort into producing the forage thus far. Use best management practices to get the forage cut, dried and into storage. Be safe!

A successful hay harvest requires using proper harvest procedures of mowing, tedding, raking, and baling. (*Photo Credit: Keith Johnson*)

Is Your Hay Too Hot?

(Keith Johnson)

It is that time of year when much cool-season grass and legume hay is

being made in Indiana. Remember to package hay at the correct moisture content to avoid excessive heating of bales when in storage. Target moisture to begin baling hay without an effective preservative is 20 percent, 18 percent and 17 percent for small rectangular bales, large round bales, and large rectangular bales, respectively. Excessive heating can result in mold formation by microorganisms, the binding of amino acids to soluble sugars that results in reduced available protein, reduced forage quality, and the possibility of storage structure fires.

Moldy hay caused by microorganisms because hay was made at too high a moisture content. (*Photo Credit: Brooke Stefancik, Former Purdue ANR Educator-Sullivan County*)

It is quite normal for a temperature rise to occur after hay is packaged, but anything greater than 125 degrees F should be monitored. My observation has been that hay producers are watchful of the possibility of "hot" hay for several days after it is put into storage. After this time, the hay may be assumed to be okay and not monitored again. *With hay storage structure fires, it may take three to four weeks before spontaneous combustion occurs. It is important to note temperature for an extended period of time and not just for a few days*.

Hay in the foreground was removed from the hoop building because it was smoldering.
(*Photo Credit: Keith Johnson*)

Temperature probes are available through many agricultural vendors. An online search will provide many resources to consider. The probe should be strong so it can penetrate through tightly packed bales to a length of around six feet preferred. Options for making a probe that permits thermometer insertion on a string can also be found with an online search.

The following table provides temperature values and action steps that should be considered when hay is put into storage.

Critical temperature and action steps for hay in storage.

125°F Or Lower	**Action Steps**
125°F	**No action needed.**
150°F	**Entering the danger zone.** Check temperature twice daily. If possible, disassemble stacked hay to allow more air to move around and cool heated bales.
160°F	**Reaching the danger zone.** Check temperature every couple of hours. If possible, disassemble stacked hay to allow more air to move around and cool heated bales.
175°F	**Hot spots or fire pockets are likely.** Continue to check temperature frequently. If possible, stop all air movement around hay. Alert fire service of possible hay fire incident.
190°F	**Fire is likely.** Remove hot hay with fire service assistance. The fire service should be prepared for the hay to burst into flames as it contacts fresh air.
200°F or higher	**Fire is imminent.** Remove hot hay with fire service assistance. The fire service should be prepared for the hay to burst into flames as it contacts fresh air.

Source: Extinguishing Fires in Silos and Hay Mows (Natural Resource, Agriculture, and Engineering Service publication NRAES-18).

Much effort goes into the production of high quality hay. Don't let the effort "go up in smoke"!

Foliar Diseases Of Wheat And Fusarium

Head Blight (Scab) Management

(Darcy Telenko)

Wheat is starting to head out across the central and northern Indiana, with flowering not too far behind. Our plots in southern Indiana hit early anthesis (flowering) last week. Rainy, wet conditions can favor many fungal diseases in wheat. Our southern neighbors have started reporting multiple diseases in wheat. These include – strip and leaf rust. We did find Septoria leaf spot in the lower canopy in our southwest plots.

There are a number of resources are available to help distinguish wheat leaf diseases, they include the Purdue Wheat Field Guide (https://www.edustore.purdue.edu/item.asp?Item_Number=ID-448) and "*Identifying Rust Diseases of Wheat and Barley.*" https://www.ars.usda.gov/ARSUserFiles/50620500/Cerealrusts/Rust_Diseases_National.pdf

Samples can always be submitted to the Purdue Plant Pest Diagnostic Lab for disease identification and confirmation. https://ag.purdue.edu/btny/ppdl/Pages/default.aspx

During flowering (anthesis) **warm, wet weather** with high relative humidity will favor the development of Fusarium head blight (scab). Fusarium head blight (FHB) is caused by the fungus *Fusarium graminearium*. It infects wheat during flowering, beginning at Feekes 10.5.1. Symptoms of FHB will appear as bleached spiklets on the head later in the season. Infection can lead to small or shriveled grain kernels referred to as "tombstones." In addition to shriveled grain, this fungus can produce mycotoxins such as deoxynivalenol (DON), which can accumulated in the infected grain.

Figure 1. Wheat beginning to flower and Fusarium head blight infection. (*Photo Credits: Darcy Telenko*)

A number of resources are available to help you make disease management decisions in wheat.

1) **The Fusarium Risk Assessment Tool** is available at the following website. http://www.wheatscab.psu.edu/. This tool estimates the risk of a Fusarium head blight epidemic (> than 10% field severity) using weather conditions (temperature, rainfall, and relative humidity) measured 15 days prior to flowering. See below for the current risk map – all of Indiana is colored yellow (low risk for scab development), even if we select a very susceptible cultivar the risk still remains low for most of the state except the southern edge. You can see the risk increase in neighboring states where orange and red = medium to high risk of head blight due to favorable environmental conditions.

Keep in mind that actual disease risk depends heavily on the growth stage of wheat in your area. We are approaching a critical time here in Indiana and the good news it the risk still remains low; the estimate is most relevant just prior to flowering (Feekes 10.5.1) or the early stages of grain development. Fusarium head blight risk is highest when there are three or more days with extended periods of high relative humidity and moderate temperatures (65 to 80°F) during the early stages of kernel development.

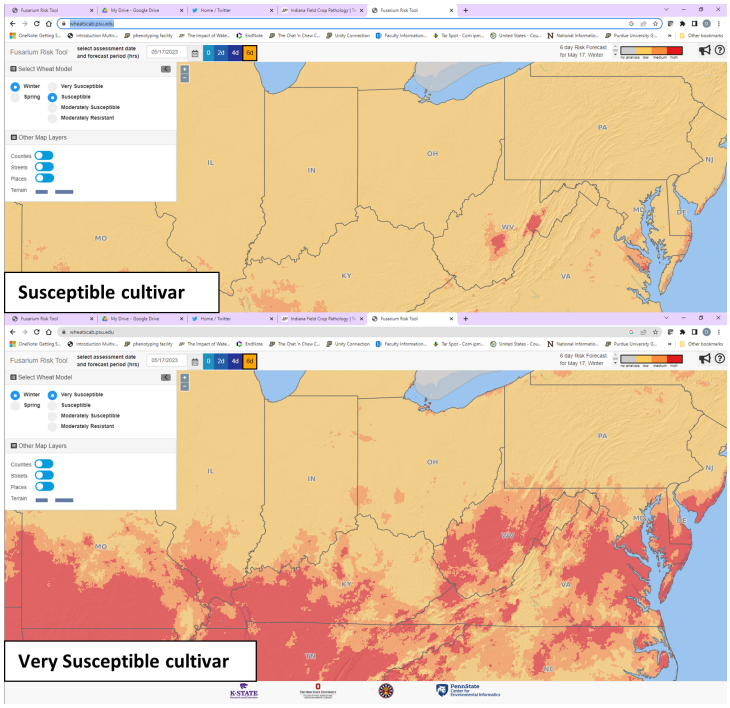

Figure 2. Fusarium Risk Assessment Tool Indiana map generated on 17 May 2023. Red = high risk, Orange= medium risk, Yellow = low risk for Fusarium head blight on wheat just prior to flowering or the early stages of grain development. (*Image Credit: https://www.wheatscab.psu.edu*)

2) **Fungicide Application:** A fungicide application might be considered if a Fusarium head blight (FHB) susceptible variety is planted, or if you are worried about scab on your farm. These applications should be made at Feekes 10.5.1, or early flowering to suppress FHB. Fungicides recommended for FHB and DON include Prosaro, Caramba, Proline, Miravis Ace, and Sphaerex. The use of products containing strobilurin fungicides may result in higher levels of DON accumulation in grain when damaged by FHB. These are not labelled for FHB management.

Fungicide Efficacy Tables are updated yearly and available from the Crop Protection Network publications https://cropprotectionnetwork.org/publications/fungicide-efficacy-for-control-of-wheat-diseases

These tables can help you identify products to use based on your targeted disease. As a reminder follow the label on harvest restriction as some products may have 30 to 45 days required between last fungicide application and harvest. Once the full head has emerged flowering will likely occur in 3-5 days, depending on weather and variety. It is time to keep an eye on your fields. Those most at-risk would-be fields that were planted to a Fusarium head blight susceptible variety or those with limited rotation that follow a previous crop of wheat or corn.

Recent Localized Rainfall; Warm Temperatures And Below-normal Precipitation Forecasted

(Austin Pearson)

Cool mornings and warm afternoons have made conditions pleasant across the state. Through the first 17 days of May, temperatures ran 1.5°F above normal (Figure 1). Indiana Climate Divisions 1 and 7 had the largest departures, which were 2.1°F and 2.0°F above normal, respectively. Since April 1, growing degree days (GDD) have accumulated between 260 and 600 units statewide (Figure 2, left). Accumulations were above normal through the northern extent of the state and slightly below normal in the southern extent (Figure 2, right). However, since April 15, GDD accumulations have run between 10 and 60 units below normal statewide. This is attributed to the cooler conditions that occurred in the last half of April and beginning of May.

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

Indiana
5/ 1/2023 to 5/17/2023

	Temperature			Precipitation			
cd	temp	norm	dev	prcp	norm	dev	percent
1	60.2	58.2	2.1	2.16	1.99	0.16	108
2	59.3	57.6	1.7	2.09	1.90	0.19	110
3	58.3	57.2	1.1	1.92	1.78	0.14	108
4	61.6	59.7	1.9	2.06	2.26	-0.20	91
5	60.2	59.1	1.1	1.78	2.31	-0.53	77
6	58.9	58.2	0.7	1.95	2.19	-0.24	89
7	64.1	62.1	2.0	2.50	2.83	-0.34	88
8	63.1	61.4	1.7	2.32	2.82	-0.50	82
9	61.0	60.6	0.4	2.02	2.68	-0.65	76
State	60.9	59.4	1.5	2.09	2.32	-0.23	90

Midwestern Regional Climate Center
MRCC Applied Climate System
Generated at:
Thu May 18 06:11:13 CDT 2023

Figure 1: Indiana climate division and state temperature, normal temperature, temperature departure from normal, precipitation, normal precipitation, precipitation departure from normal, and percent of mean precipitation for May 1-17, 2023.

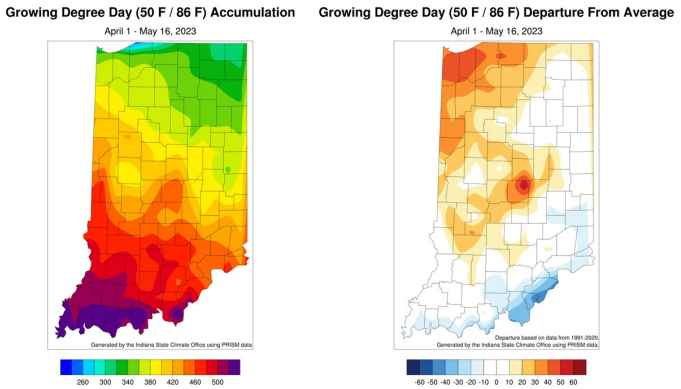

Figure 2: Total Accumulated Indiana Modified Growing Degree Days (MGDDs) April 1-May 16, 2023 (left) and Total Accumulated MGDDs represented as the departure from the 1991-2020 climatological normal (right).

Statewide, precipitation ran 0.23 inches below normal through the first 17 days of May (Figure 1). Climate Divisions 1, 2, and 3, all located in northern Indiana, were the only areas with slightly above-normal precipitation. The rest of the state averaged 76 to 91 percent of normal precipitation. Most of the recent rains were a result of convective storms. Northern Indiana had two locations where rain exceeded four inches since April 18 (Figure 3). The Fort Wayne International Airport measured 5.05 inches and North Judson, located in Starke County, measured 8.05 inches total. On May 12-13, a line of storms developed along a frontal boundary and trained over northern Indiana. As a result, North Judson totaled 4.37 inches, triggering flood concerns in the area. The May 16 US Drought Monitor brought some improvement to the abnormally dry conditions in northwestern Indiana (Figure 4). Lingering drought concerns remained in Vermillion and Warren counties, as those locations continued to miss precipitation. Overall, conditions have favored continued agricultural activity. The May 14 Indiana Crop Weather Report indicated that 56 percent of corn and 52 percent of soybeans have been planted, which both are above the 5-year average. Emergence for both crops is also above the 5-year average as a result of the warmer temperatures.

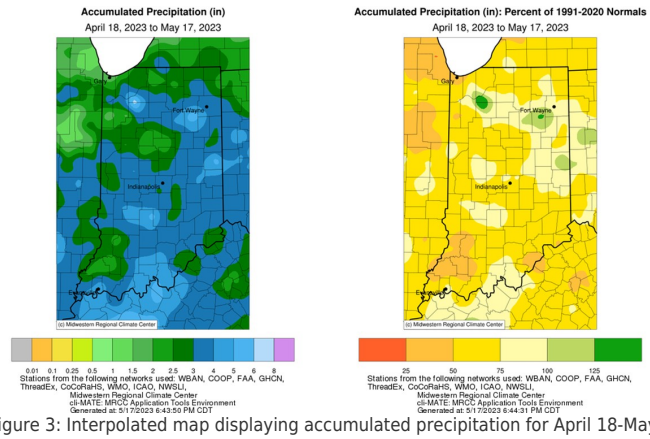

Figure 3: Interpolated map displaying accumulated precipitation for April 18-May 17, 2023 (left). Interpolated map displaying accumulated precipitation as a percent of the 1991-2020 climatological normal (right).

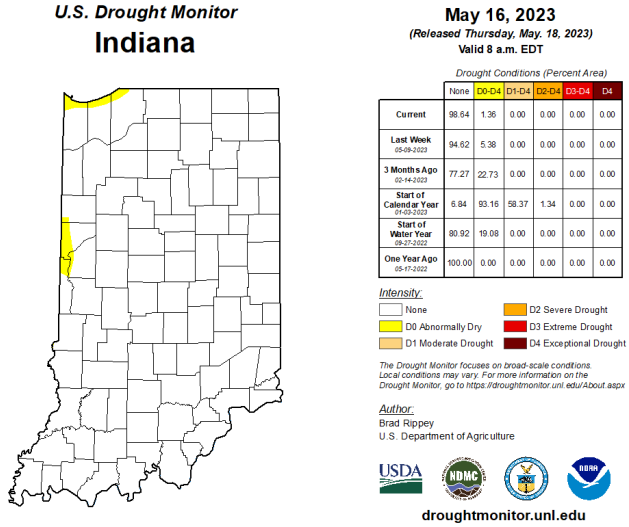

Figure 4: May 16, 2023, US Drought Monitor. The US Drought Monitor is released every Thursday morning by 8:30 AM

The seven-day forecast precipitation blankets the state with less than 0.5 inches of rain, which should allow time to continue field work (Figure 5). That's the good news. This also means that areas with below-normal precipitation will continue seeing subpar precipitation, which enhances drought concerns. Both the Climate Prediction Center's 6–10-day (Figure 6) and 8-14-day (Figure 7) outlooks show elevated chances for above-normal temperatures and below-normal precipitation. Temperatures are forecasted to be in the upper 70s and low 80s, which should amplify drying conditions. Stay tuned to the US Drought Monitor over the next month, as conditions may worsen.

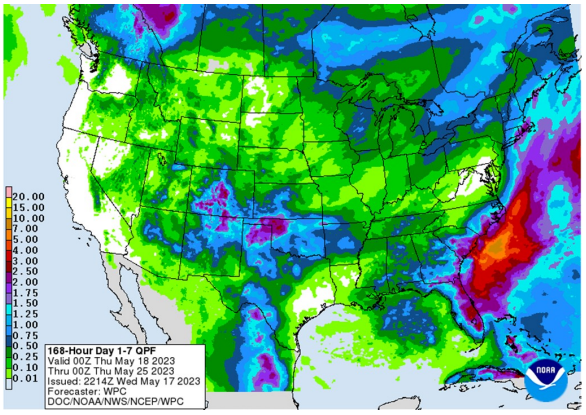

Figure 5: NWS Weather Prediction Center 7-day quantitative precipitation forecast for the continental United States, valid May 18-May 25, 2023.

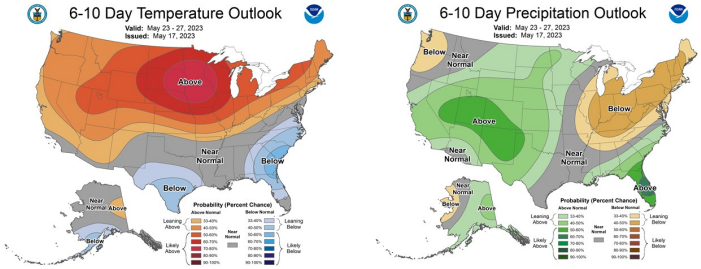

Figure 6: The CPC's 6–10-day temperature and precipitation outlooks, valid for May 23-27, 2023.

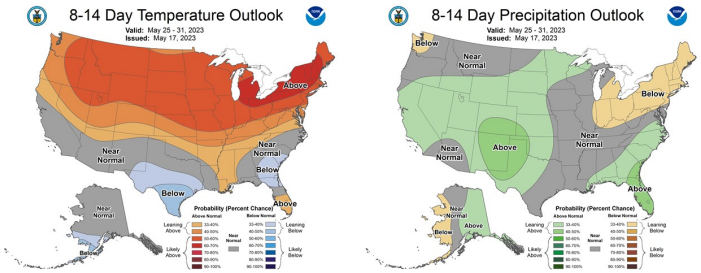

Figure 7: The CPC's 8–14-day temperature and precipitation outlooks, valid for May 25-31, 2023.

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Editor: Tammy Luck | Department of Entomology, Purdue University, 901 W. State St., West Lafayette, IN 47907