

Pest & Crop Newsletter

Purdue Cooperative Extension Service
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In This Issue

- [Yield Response to Plant Populations in Corn](#)
- [Pest&Crop 2023 Survey](#)
- [October Favored To Be Wetter Than Normal](#)

Yield Response to Plant Populations in Corn

(Bob Nielsen) & (Jim Camberato)

The cost of seed corn represents 17% of farmers' variable cost of production, second only to the cost of nitrogen (N) fertilizer. Every thousand seeds planted per acre that does not increase grain yield represents \$3 to \$4 per acre of lost profit for the farmer. Grain yield response of commercial dent corn to plant density (number of plants per acre or "population") is typically not linear. More commonly the response takes the form of a quadratic or quadratic plateau function. As population increases, the magnitude of the yield response decreases until ultimately yield response ceases or even decreases due to the stress imposed on the plants. The "balancing act" of determining the "optimum" plant population is not just about maximizing grain yield, but also about avoiding unnecessary seed expenses as yield response to population decreases. Dr Jim Camberato and I began conducting field scale research trials in 2008 to evaluate corn responses to plant population. Over 16 years, we accumulated nearly 100 datasets from different geographic regions and growing conditions throughout the state. Questions addressed in this presentation include 1) whether hybrids respond differently to plant population, 2) whether high plant populations require higher N fertilizer rates, and 3) whether site-specific yield responses to plant population warrant variable rate seeding.

Related resources:

* Nielsen, Camberato, and Lee. 2019. Yield Response of Corn to Plant Population in Indiana. <https://www.agry.purdue.edu/ext/corn/news/timeless/CornPopulations.pdf>

* Nielsen, Quinn, and Camberato. 2022. Optimum Plant Populations for Corn. <https://www.agry.purdue.edu/ext/corn/news/timeless/PlantPopulations.html>

Pest&Crop 2023 Survey

(John Obermeyer)

Dear Pest&Crop Readers:

Hope you have enjoyed the Pest&Crop newsletter this year. The following is a link to a simple, short online survey. Please consider doing

this right now, as we need your evaluation of this newsletter. Too, we need to show our funding agencies whether or not this information from Purdue specialists throughout the season is meaningful to you and the industry. Thanks in advance for your support!

https://purdue.ca1.qualtrics.com/jfe/form/SV_0jJXXqJGHu0qW

October Favored To Be Wetter Than Normal

(Beth Hall)

To say the last few months have been dry is a bit of an understatement. Since August 1st, only a sliver of Newton and Benton counties (northwest Indiana) and the tiniest speck of Warrick County (southwest Indiana) have had above-normal precipitation. Most of western Indiana has been near (but below) normal, while the rest of the state has seen less than 75% of normal amounts (Figure 1). Normal amounts are approximately the 30-year average from 1991-2020. Since September 1st, the story gets even drier (Figure 2). It is rather shocking to see most of the state has received less than 25% of the normal amount of precipitation typical during that period. This has led to most of Indiana now being classified in Moderate Drought (D1) according to the U.S. Drought Monitor (Figure 3). How long is this expected to go on? The 7-day forecast has most all of Indiana dry (except for northeast Indiana that might get a very small amount). Fortunately, this dry pattern then move out of the area within the next 6-10 day, with near normal to above normal precipitation patterns following. In fact, the national Climate Prediction Center is slightly favoring above-normal precipitation for October. This is not very strong confidence, but certainly better than the dry pattern seen lately! Unfortunately, the various climate outlook models that offer these probabilities were all over the place for the 3-month period of October-November-December, providing no precipitation guidance over this longer period. This is likely due to it being a transition season (from summer to winter) but also with a strong El Niño pattern moving in. El Niños and La Niñas tend to have weaker climate correlations in the Midwest than other parts of the U.S. and the fall season tends to be the most difficult season for those global oceanic patterns to predict any strong guidance. Climate scientists are still waiting a bit longer to get a better understanding of how strong this winter's El Niño will be before predicting what this upcoming winter may be like.

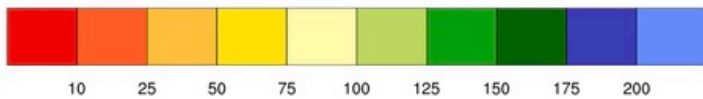
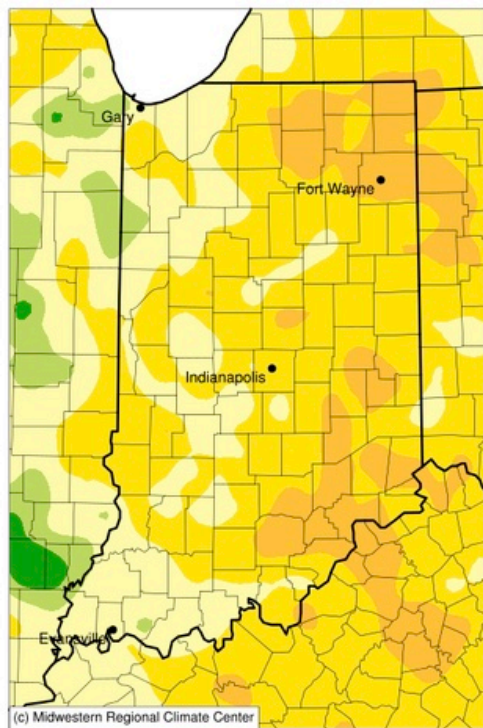


Figure 1. Precipitation represented as percent of normal based upon the 1991-2020 period for August 1 through September 28.

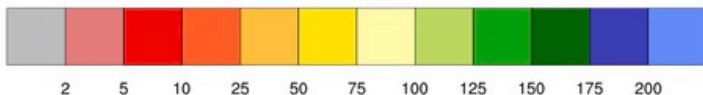
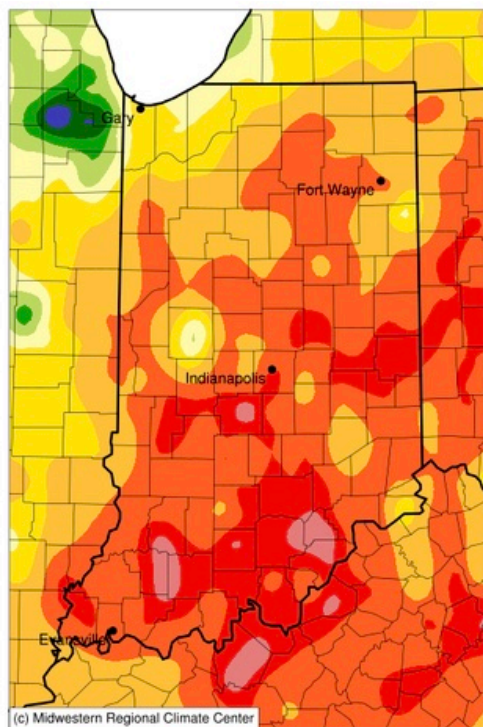
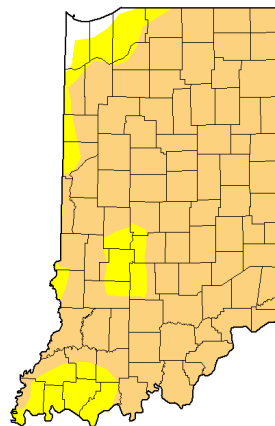


Figure 2. Precipitation represented as percent of normal based upon the 1991-2020 period for September 1 through September 28.

U.S. Drought Monitor Indiana

September 26, 2023
(Released Thursday, Sep. 28, 2023)
Valid 8 a.m. EDT



	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	1.38	98.62	85.30	0.00	0.00	0.00
Last Week 09-19-2023	6.82	93.18	32.80	0.00	0.00	0.00
3 Months Ago 06-27-2023	1.78	98.24	79.50	33.62	0.00	0.00
Start of Calendar Year 01-01-2023	6.84	93.16	58.37	1.34	0.00	0.00
Start of Water Year 09-01-2022	80.92	19.08	0.00	0.00	0.00	0.00
One Year Ago 09-27-2022	80.92	19.08	0.00	0.00	0.00	0.00

Intensity:
None D0 Abnormally Dry D1 Moderate Drought D2 Severe Drought D3 Extreme Drought D4 Exceptional Drought

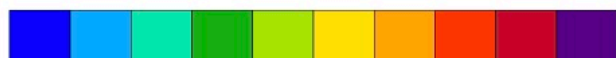
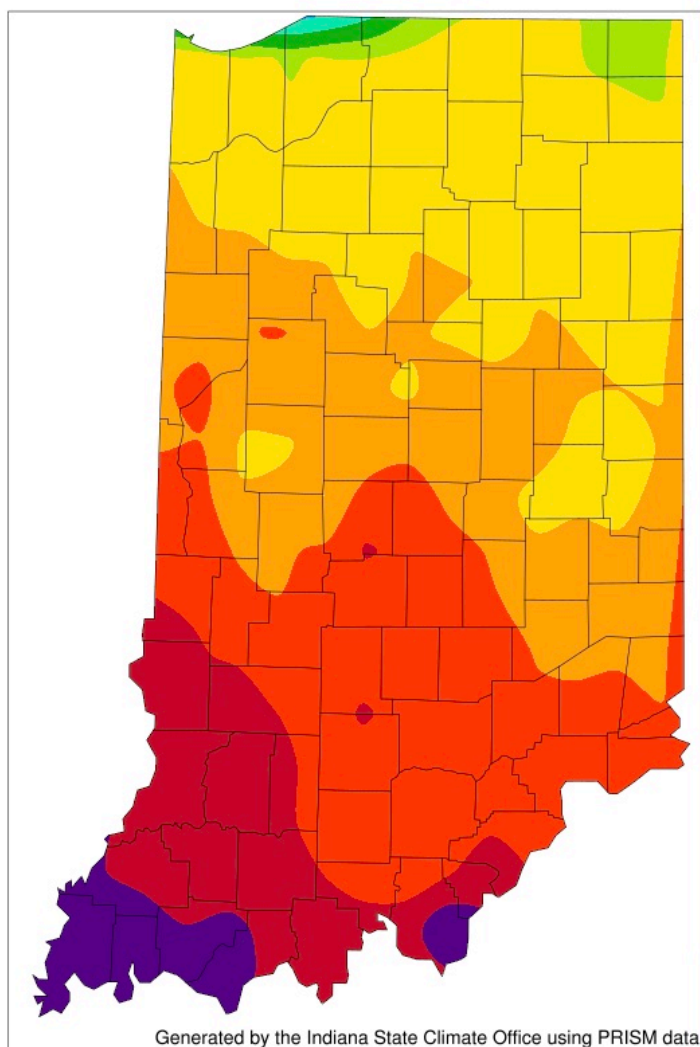
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/about.aspx>

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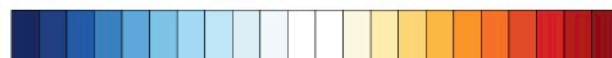
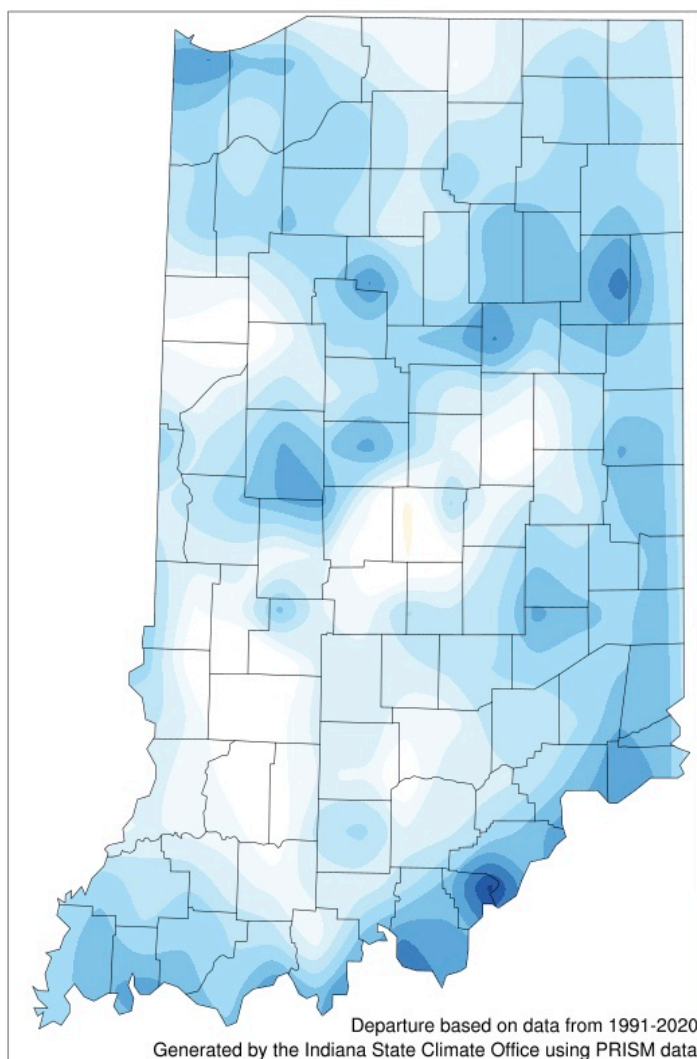
Figure 3. U.S. Drought Monitor conditions for data collected through Tuesday, September 26, 2023.

While the dry pattern will start shifting away from the region, there are strong probabilities that above-normal temperatures will move in over the next 2 weeks. This should not mean triple-digit heat waves, but may make us wonder what happened to the start of autumn. Do not worry. Those fall colors are already developing. We may have to keep enjoying them without a coat on for a while, though! Accumulated modified growing degree-day temperatures since April 15th now range from around 2600 units (northern Indiana) to over 3400 units (southern Indiana) (Figure 4). Most of Indiana has accumulated less modified growing degree days compared to the 1991-2020 period by up to 175 units (Figure 5).



1800 2000 2200 2400 2600 2800 3000 3200 3400

Figure 4. Modified growing degree day (50°F / 86°F) accumulation from April 15-September 27, 2023.



-300 -240 -180 -120 -60 0 60 120 180 240 300

Figure 5. Modified growing degree day (50°F / 86°F) accumulation from April 15-September 27, 2023, represented as the departure from the 1991-2020 climatological average.

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