PURDUE UNIVERSITY | Extension - Entomology

Pest&Crop newsletter

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In This Issue

Timing Black Cutworm Scouting

(Christian Krupke) & (John Obermeyer)

Once again, we urge you to view the "Black Cutworm Pheromone Trap Report." For the fifth consecutive week, our volunteer trappers have been busy counting captured moths, e.g., *lots* of intensive captures. On April 1, after severe storms arrived in the state, the trappers were detecting "moth-ageddon." There was panic at first, then fear. But, as we have seen in the past, these captures are more like an alert to start scouting, than they are an indication of certain pressure and damage.

However, what is certain is that conditions recently have been favorable for these "fair-weather pests"; they are not very freeze-tolerant as larvae. Due to a lack of widespread hard freezes since then, we initiated heat unit (50°F base) accumulations ("biofix") to determine their rate of development, see accompanying state contour map below.

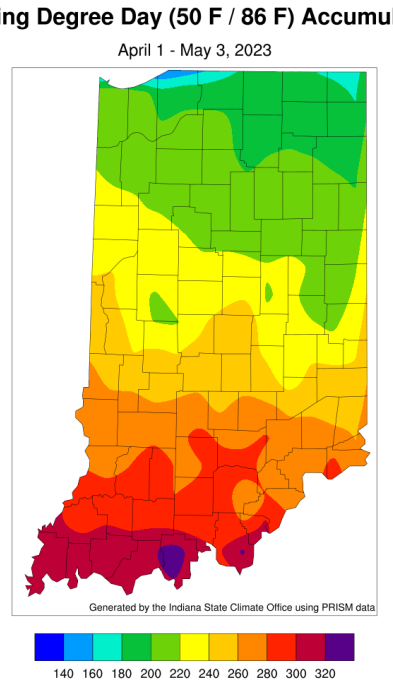
Back in the mid-1970's, researchers* from the University of Illinois published the approximate heat unit accumulations for each life state of the black cutworm, see pictures below. Although these data are almost 50 years old, there is no reason to think that the amount of heat units required for larvae to develop has changed since then. Take a look at the chart below, and compare with the map at bottom – at this time of year, the part of the state where you are planning scouting matters a great deal.

Cumulative Degree Days	Black Cutworm Stage	Activity
0 (biofix)	Intensive moth capture	Egg laying
90	Hatch	
91-311	1st – 3rd instar larvae	Leaf feeding
312-364	4th instar	Cutting initiates
365-430	5th instar	Cutting
431-640	6th instar	Cutting
641-989	Pupa to moth	Pupation in soil

*modified from Luckmann et al., Journal of Economic Entomology, June 1976

From the previous moth captures, the heat unit (50°F) accumulations since biofix, and the above development table, you can now better time your scouting trips for high-risk emerging corn (i.e. when black cutworms are likely to be large, and corn is small, and there is nothing else for them to eat!)

Remember this: lots of black cutworm moths does not an outbreak make! Without a litany of ecological/biological/meterological reasons why, let's just say that it takes a "perfect storm" of variables for black cutworm to survive and damage to our crops. Stay tuned!



As of May 3rd, cutting from black cutworm is possible in extreme southern Indiana.

The following graphics may help in recognizing black cutworm and their damage:

Black cutworm eggs and newly hatched (1st Instar) larvae.

Size comparisons of 2nd to 6th instar black cutworm larvae.

Early instar leaf feeding, the small larva may be in the folds of the leaf or in the soil.

Newly cut seedling and larva revealed by carefully digging around the plant. Note the new growth of this delayed, but not dead, seedling.

2023 Black Cutworm Pheromone Trap Report

(John Obermeyer)

		BCW Trapped					
		Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6
County	**Cooperator**	**4/1/23 - 4/5/23**	**4/6/23-4/12/23**	**4/13/23 - 4/19/23**	**4/20/23 - 4/26/23**	**4/27/23 - 5/3/23**	**5/4/23-5/10/23**
Adams	Roe/Mercer Landmark/Decatur	3	9*	5	22*	14	
Allen	Anderson/Indigoag/Churubusco	0	1	0	8		
Allen	Gynn/Southwind Farms/Ft. Wayne	1	2	3	3	3	
Allen	Kneubuhler/G&K Concepts/Harlan	61*	50*	26*	43*	15	
Bartholomew	Bush/Top Crop Alliance/Columbus	0	0	4	8	27*	
Benton	Nally/Dairyland Seeds/Remington	1	11	21*	31*	22*	
Clay	Mace/Ceres Solutions/Brazil	4	1	0	1		
Clay	Fritz/Ceres Solutions/Clay City	5	0	3	11*	9	
Clinton	Emanuel/Frankfort	19*	11	12	6	40*	
Daviess	Brackney/Daviess Co. CES/Montgomery	1	0	0	5	14*	
Dubois	Eck/Dubois Co. CES/Jasper	14	21*	12	6	13	
Elkhart	Kauffman/Crop Tech/Millersburg	5	30*	8	8	4	
Fountain	Mroczkiewicz/Syngenta/Attica	39*	21*	47*	38*	32*	

County	Cooperator	BCW Trapped 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
Hamilton	Campbell/Beck's Hybrids	54*	37*	22*	13	21*	
Hendricks	Nicholson/Nicholson Consulting/Danville		5	10	24*	92*	
Hendricks	Tucker/Bayer/Brownsburg			21*			
Howard	Shanks/Clinton Co. CES/Kokomo	0	2	5	3	5	
Jasper	Overstreet/Jasper Co. CES/Rensselaer	65*	3	4	0	0	
Jasper	Ritter/Dairyland Seeds/McCoysburg	0	9	10	11		
Jay	Boyer/Davis PAC/Powers	2	2	10	8	18*	
Jay	Shrack/Ran-Del Co-Alliance/Parker City	37*	21*	37*	27*	31*	
Jennings	Bauerle/SEPAC/Butlerville	42*	8	5	2	19	
Knox	Clinkenbeard/Ceres Solutions/Edwardsport	0	5	8	37*	7	
Knox	Edwards/Ceres Solutions/Fritchton	1	4	3	6	5	
Kosciusko	Jenkins/Ceres Solutions/Mentone	13	24*	24*	8	12	
Lake	Kleine/Rose Acre Farms/Cedar Lake	151*	94*	52*	16	20*	
Lake	Moyer/Dekalb Hybrids/Shelby	5	16	19*	6	8	
Lake	Moyer/Dekalb Hybrids/Schneider	0	1	9	7	10	
LaPorte	Rocke/Agri-Mgmt. Solutions/Wanatah	26*	27*	27*	6	16	
Miami	Early/Pioneer Hybrids/Macy	0	7	1	1		
Montgomery	Delp/Nicholson Consulting/Waynetown	13		19*	36*	30*	
Newton	Moyer/Dekalb Hybrids/Lake Village	2	4	6	2	1	
Perry	Lorenz/Lorenz Farms/Rome 1	0	6	1	0	0	
Perry	Lorenz/Lorenz Farms/Rome 2	0	0	0	0	0	
Porter	Boyer/PPAC/Wanatah	16*	39*	27*	17	6	
Porter	Freyenberger/Dairyland Seeds/Kouts			0	1		
Posey	Schmitz/Purdue CCSI/ Blairsville	0	4	10	5	12	
Posey	Schmitz/Posey Co. CES/Cynthiana	0	1	0	0	0	
Pulaski	Leman/Ceres Solutions/Francesville		44*	28*	42*	17	
Putnam	Nicholson/Nicholson Consulting/Greencastle	15*	5	19*	18*	20*	
Randolph	Boyer/DPAC/Farmland	5	9	18*	16	11	
Rush	Schelle/Falmouth Farm Supply/Carthage		0	5	2	4	
Scott	Tom Springstun/Scott Co. CES/Scottsburg	0	1	5	5	5	
Shelby	Fisher/Shelby County Coop/Shelbyville		0	3		8	
St. Joseph	Carbiener/Breman	0	25*	42*			
Sullivan	McCullough/Ceres Solutions/Farmersburg	2	3	7	1	5	
Sullivan	McCullough/Ceres Solutions/Dugger		0	5	3	10	
Tippecanoe	Bower/Ceres Solutions/Lafayette	33*	53*	28*	26*	20	
Tippecanoe	Nagel/Ceres Solutions/W. Lafayette	17*	36*	42*	29*	35*	
Tippecanoe	Obermeyer/Purdue Entomology/ACRE	19*	31	55*	26*	14	
Tippecanoe	Westerfeld/Bayer Research Farm/W. Lafayette	15*	6	20*	9	7	
Tipton	Campbell/Beck's Hybrids	2	1	9	14	3	
Vigo	Lynch/Ceres Solutions/Clinton	2	1	0	2	9	
Whitley	Emley/NEPAC/Schrader	74*	76*	58*	11	17*	
Whitley	Emley/NEPAC/Kyler	32*	15	5	13	6	

* = Intensive Capture…this occurs when 9 or more moths are caught over a 2-night period

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						
Jennings/SEPAC Ag Center	21	20	39	8	12						
Knox/SWPAC Ag Center	37	242	46	26	16						
LaPorte/Pinney Ag Center	60	296	216	54	56						
Lawrence/Feldun Ag Center	159	99	197	70	41						
Randolph/Davis Ag Center	57	0	0	2	5						
Tippecanoe/Meigs	36	56	51	8	6						
Whitley/NEPAC Ag Center	0	259	179	13	39						

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

Grazing Schools Provide An Opportunity For Hands-on And Visual Learning

(Keith Johnson)

Grazing Schools Provide an Opportunity for Hands-on and Visual Learning

Attendees engage during a 2021 Indiana Grazing School. (*Photo Credit: Keith Johnson*)

WEST LAFAYETTE, Ind. – From the Indiana Forage Council and Purdue Extension, the Indiana Grazing School program returns this June. Livestock producers will have the opportunity to gain hands-on training in implementing improved grazing systems.

The program is also hosted by the U.S. Department of Agriculture Natural Resources Conservation Service and the North Central Sustainable Agriculture Research and Education program.

Topics to be covered include soil fertility, water delivery, fencing, grazing system options, animal health and plant identification. The program will offer two training sessions. The registration fee is $75 and covers the cost of management information and a meal and refreshments on the program's second day. Additional attendees from the same operation can attend for a reduced $50 fee. Dates and locations for the Indiana Grazing School sessions are as follows:

- June 9-10, Southern Indiana Purdue Agricultural Center, 11371 East Purdue Farm Road, Dubois, IN 47527
- June 16-17, Randolph County Extension Office, 1885 S. U.S. Highway 27, Winchester, IN 47394

The programs will run from 1-6 p.m. on Friday and 8 a.m. to 5 p.m. on Saturday. Attendees will hear from featured speakers and hosts Keith Johnson, Purdue Extension forage specialist; Jason Tower, Southern

Indiana Purdue Agricultural Center superintendent; Bethany Funnell, DVM, Purdue clinical associate professor of veterinary reproductive medicine and surgery; and Grant Burcham, DVM, veterinary diagnostician.

"The Indiana Grazing Schools are an opportunity to network with instructors and other producers," Johnson said. "Much of the training will be held in the pasture, which lends itself to a great environment for learning skills and gaining ideas for better use of a pasture as a feed resource for livestock."

Tower said, "The grazing schools bring together a great team of presenters to share very applicable information that producers can take back to their operations and implement immediately."

Trainings will consist of field tours and pasture walks. There also will be small-group discussions with featured experts and other school participants.

"We're extremely excited to host this event and make this educational opportunity accessible to all invited," said Amy Alka, Randolph County Purdue Extension educator, agricultural and natural resources.

Further event details and the registration form can be found on the Indiana Forage Council website. The registration deadline is June 2. For questions, contact Tower at towerj@purdue.edu or 812-678-4427.

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Early-Planted Corn & Cold Weather

(Bob Nielsen)

- Early planted corn always involves the risk of cold weather in the weeks after planting.
- Imbibitional chilling injury occurs within a day or two of planting.
- Chilling injury after germination can cause delayed or failed emergence.
- Slow plant development increases risk of injury by diseases or insects.

he talk among some of the regulars down at the Chat 'n Chew Cafe is that some of their neighbors who were feeling so smug a week ago about having planted so much corn are now feeling less certain of the wisdom of their actions in light of the recent cold temperatures and, in some cases, frost. Should they be concerned about the health of their newly planted and, in a few cases, newly emerged crops? Well, we'll know for certain come harvest time. But in the mean time, we can talk about possibilities.

Newly Planted Corn

One of the risks that newly planted corn faces is that of **imbibitional chilling injury** caused by exposure of the kernels to cold soil temperatures during the initial 24 to 36 hours after seeding, when the kernels imbibe water and begin the germination process. In response to the imbibition of water, kernels naturally swell or expand. If the cell tissues of the kernel are too cold, they become less elastic and may rupture during the swelling process. Symptoms of imbibitional chilling injury include swollen kernels that fail to germinate or arrested growth of the radicle root and/or coleoptile following the start of germination.

Alternatively, chilling injury that occurs during the emergence process can cause stunting or death of the seminal root system, deformed elongation of the mesocotyl (the so-called "corkscrew" symptom) and either delayed emergence or complete failure of emergence (i.e., leafing out underground). The net result of either type of chilling injury to corn is a combination of stunted plant development and outright loss of stand.

It is not clear how low soil temperatures need to be for imbibitional chilling or subsequent chilling injury to occur. Some sources simply infer temperatures less than 50F (10C). Others suggest the threshold soil temperature is 41F (5C). Daily minimum soil temperatures at the 4-inch depth (typical depth for National Weather Service measurements) have certainly dropped into the mid- to high-40's (F) in recent days, with some growers reporting temperatures as low as 40F at seed depth.

Newly Emerged Corn

Damage from **exposure of above-ground plant tissue to frost** can range from minor leaf injury to complete death of all exposed leaf tissue. That's the bad news. The good news is that the all-important growing point region of a young corn plant remains below the soil surface, safe from exposure to frost, until the V4 to V6 stages of development. That means that the above-ground plant tissue you see in fields younger than about V4 is composed primarily of leaves and rolled up leaf tissue in the whorl, but does not include stalk tissue or the growing point. As long as temperatures are not lethally cold, "simple" frost injury usually does not literally kill such young corn plants. Damaged plants will begin to show recovery from the whorl within 5 to 7 days, depending on temperatures following the frost event.

Disclaimer: Repeated frost events that re-inflict damage to recovering corn plants can cause permanent stunting or death.

When folks worry about the effects of cold weather on corn, they often fail to distinguish between simple frost events and lethal cold temperatures. Frost can occur at temperatures easily up to the high 30's F, but **lethal cold temperatures** for corn are generally thought to be 28F (-2C) or colder. Such cold temperatures may "penetrate" the upper inch of soil near the growing point region of corn seedlings, especially if soils are excessively dry and free from surface residue.

In situations where temperatures have simply been sub-optimal (i.e., less than 50F), but without frost, the direct effect on the corn crop is simply slow development. Once planted, it requires 115-120 GDD (Fahrenheit) for the crop to emerge. Once emerged, it requires about 80-85 GDD to progress from one leaf stage to another up to about leaf stage V10 (10 visible leaf collars). After V10, leaf stage progresses at about 50-55 GDD per stage. The main risk associated with slow plant development is that many protective seed treatments (fungicide, insecticide) dissipate after about 2 to 3 weeks, leaving slow-developing young plants vulnerable to soil-borne diseases and insects, and thus increasing the risk for additional stunted plants or stand loss.

To put that into perspective for the 2023 planting season to date, total accumulation of soil-temperature based GDD (F) between 16-Apr-2023 and 2-May-2023 ranges from about 50 GDD in the northern parts of the state to about 70 GDD in the southern parts of the state. That explains why the May 2nd USDA-NASS report estimated only 1% of Indiana's corn crop was emerged even though 20% of the state's corn crop was estimated to have been planted.

Bottom Line

Only time will tell whether the cold temperatures of recent weeks will cause permanent damage or death of early-planted corn around the state. Some early-planted fields will likely require some replanting because of poor stands. Come October, we will know for certain whether this year's early planting risk takers will have "won the game" or not.

Related Reading

Nielsen, RL (Bob). 2001. Symptoms of Low Temperature Injury to Corn and Soybean. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/articles.01/Frost_Corn_Soy-0418_Gallery.html [URL accessed May 2023].

Nielsen, RL (Bob). 2019. Determining Corn Leaf Stages. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/VStageMethods.html [URL accessed May 2023].

Nielsen, RL (Bob). 2019. Growing Points of Interest. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/GrowingPoints.html [URL accessed May 2023].

Nielsen, RL (Bob). 2019. Visual Indicators of Germination in Corn. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/GerminationEvents.html [URL accessed May 2023].

Nielsen, RL (Bob). 2020. Assessing Frost / Cold Temperature Injury to Young Corn. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/FrostedCorn.html [URL accessed May 2023].

Nielsen, RL (Bob). 2020. Cold Soils & Risk of Imbibitional Chilling Injury in Corn. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/ImbibitionalChilling.html [URL accessed May 2023].

Nielsen, RL (Bob). 2020. Heat Unit Concepts Related to Corn Development. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/HeatUnits.html [URL accessed May 2023].

Nielsen, RL (Bob). 2020. Requirements for Uniform Germination & Emergence of Corn. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/GermEmergReq.html [URL accessed May 2023].

Nielsen, RL (Bob). 2020. The Emergence Process in Corn. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/Emergence.html [URL accessed May 2023].

Nielsen, RL (Bob). 2022. Emergence Problems in Corn. Corny News Network, Purdue Univ. online at http://www.kingcorn.org/news/timeless/EmergenceFailure.html.html [URL accessed May 2023].

Warmer Temperatures On The Way

(Austin Pearson)

It is May, the sun is shining, of course the wind is blowing, and the weather forecast is calling for warmer temperatures. Things are looking up from here. Despite the warm start and cool end to April, the preliminary statewide average temperature ran 1.2°F above normal (Figure 1). The largest temperature departures occurred in northern Indiana (near 2.0°F above normal). Rockville, located in Parke County, recorded the lowest minimum temperature in the state for the month (21°F) on April 24. The station's highest temperature, 85°F, occurred just four days earlier. If I can do my math right, that's a 64°F temperature drop in four days… brrr. Modified growing degree days (MGDDs) got off to a quick start, but tapered off toward the end of the month. As of May 2, the state accumulated 140-350 MGDDs (Figure 2) and are running within 40 units of normal. Similar to last week, soil temperatures hovered in the mid-40s to mid-50s (Figure 3).

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

Indiana
4/ 1/2023 to 4/30/2023

	Temperature			Precipitation			
cd	temp	norm	dev	prcp	norm	dev	percent
1	50.7	49.5	1.2	2.21	3.60	-1.40	61
2	50.7	48.9	1.8	2.43	3.59	-1.16	68
3	50.4	48.5	2.0	2.49	3.47	-0.99	72
4	52.5	51.5	1.0	2.43	3.88	-1.45	63
5	51.9	50.9	1.1	2.83	3.91	-1.08	72
6	51.3	49.9	1.4	3.02	3.78	-0.76	80
7	55.8	54.9	0.9	3.47	4.45	-0.98	78
8	55.3	54.2	1.0	3.49	4.42	-0.92	79
9	53.9	53.1	0.8	3.53	4.21	-0.68	84
State	52.6	51.4	1.2	2.86	3.94	-1.07	73

Midwestern Regional Climate Center
MRCC Applied Climate System
Generated at:
Wed May 3 13:06:05 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 April 1-30, 2023.

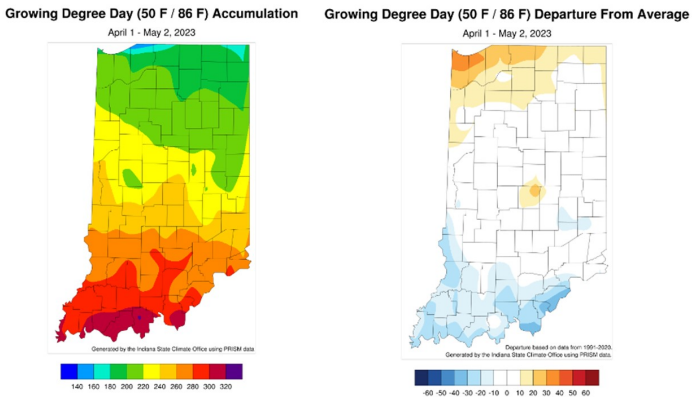

Figure 2: Total Accumulated Indiana Modified Growing Degree Days (MGDDs) April 1-May 2, 2023 (left) and Total Accumulated MGDDs represented as the departure from the 1991-2020 climatological normal (right).

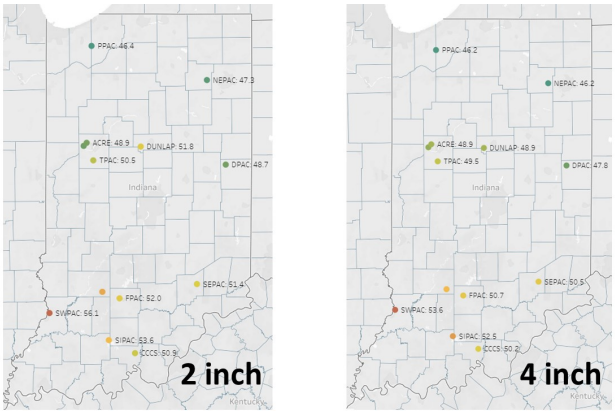

Figure 3: Two-inch (left) and four-inch (right) soil temperatures for stations located at Purdue Mesonet sites in Indiana on May 3, 2023. Data can be obtained from the Purdue Mesonet Data Hub.

Preliminary April precipitation averaged 73 percent of normal statewide, but larger departures occurred in the north (Figure 1). Over the last 30 days (April 4-May 3), precipitation ranged 25-75 percent of normal (Figure 4). Cold temperatures aloft allowed showers with mixed precipitation to fall during the last two weekends of the month. Locations even saw minor accumulations of sleet and hail. Rensselaer WWTP (Jasper County) measured 1.42 inches of precipitation over the last 30 days, which was 2.58 inches below the 1991-2020 climatological normal. Driest locations were in western Indiana, which reintroduces drought concerns moving into the next couple of weeks. However, the rain forecast does indicate rain over the next week.

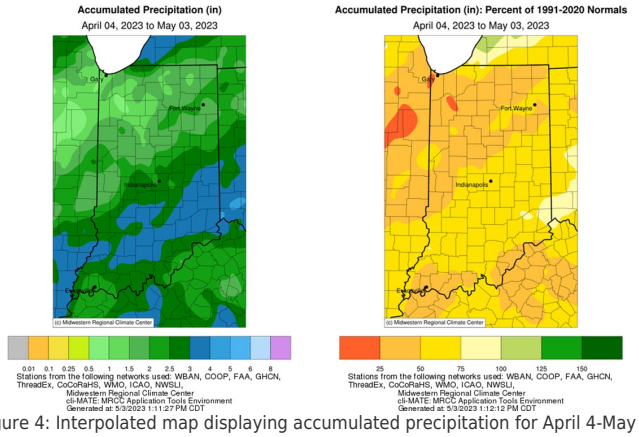

Figure 4: Interpolated map displaying accumulated precipitation for April 4-May 3, 2023 (left). Interpolated map displaying accumulated precipitation as a percent of the 1991-2020 climatological normal (right).

Rain forecast totals over the next seven days range between 0.10-2.00 inches statewide (Figure 5). Lightest totals appear fall in the northeast and heaviest totals are expected to be in southwestern Indiana. The Climate Prediction Center's 6–10-day (Figure 6) and 8–14-day (Figure 7) temperature and precipitation outlooks indicate higher chances for above-normal temperatures and near-normal precipitation. The warmer temperatures will certainly be welcomed by all.

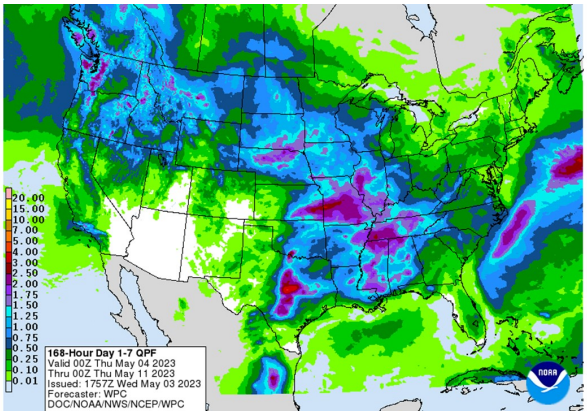

Figure 5: NWS Weather Prediction Center 7-day quantitative precipitation forecasts for the continental United States, valid May 4-May 11, 2023.

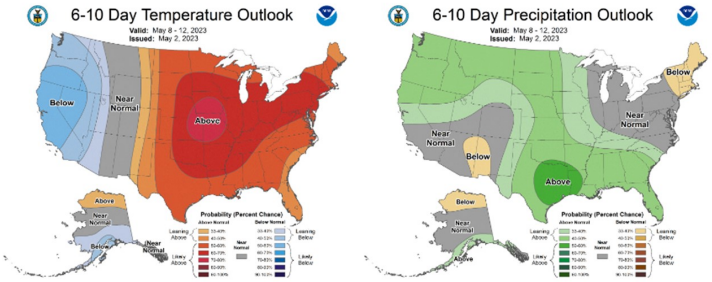

Figure 6: The CPC's 6–10-day temperature and precipitation outlooks, valid for May 8-12, 2023.

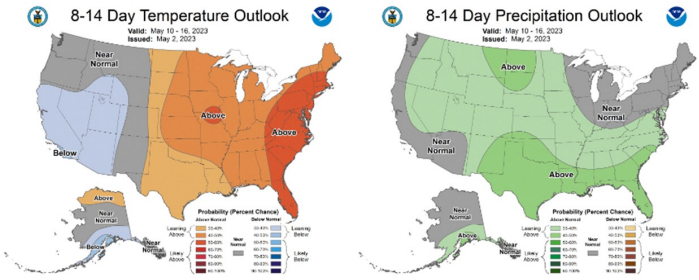

Figure 7: The CPC's 8-14-day temperature and precipitation outlooks, valid for May 10-16, 2023.

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