

Pest & Crop newsletter

Purdue Cooperative Extension Service and USDA-NIFA Extension IPM Grant

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Supercells Brought More Than Death And Destruction To Indiana

(Christian Krupke) & (John Obermeyer)

Our hearts go out to those, including a Purdue employee, that lost loved ones and friends, during the recent severe storms. Many also lost homes, buildings, animals, and trees.

The storms' origins in the Southwestern U.S. literally vacuumed up black cutworm moths and "spit them out" during its passage through the Midwest. Refer to the "Black Cutworm Adult Pheromone Trap Report," below, featuring moth captures that are a mix of zeroes and eye-popping numbers. It is not unusual at this time of year to have a few high catches mixed in with mostly zeroes, one of the reasons we want many cooperators all over the state is to overcome this variability.

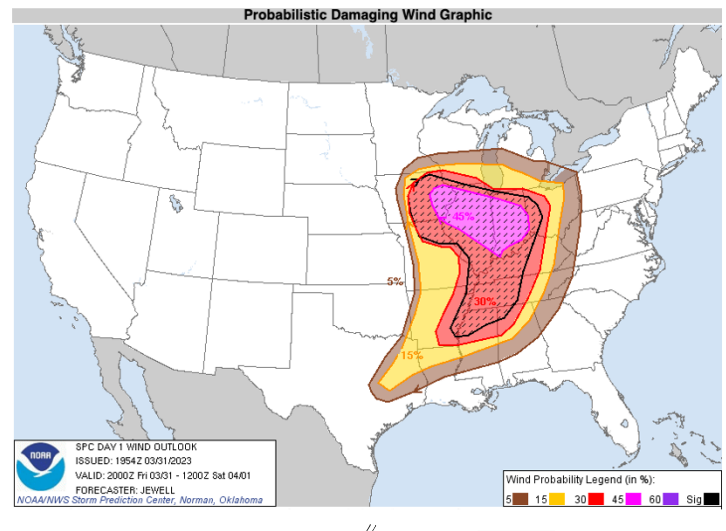
The weather fluctuations that are typical at this time of year are responsible for these ups and downs.

Often, we will receive freezing temperatures following these early spring flushes. Since the black cutworm isn't particularly cold hardy, e.g., spending the winter in Southwestern States and Mexico, many likely perish during these cold spells. But they will keep filtering in over the coming weeks, and there are certain to be sufficient moths to lay eggs in the many winter-annual weeds (particularly broad-leaf weeds) and cover crops. We use these trap counts only as a timing mechanism or presence/absence gauge, to help determine when to start looking for them. A large number of moths DOES NOT equate to a disaster in the making and vice versa for small numbers of moths.

In the near future, we will publish color-coded maps with their anticipated development to help you to time your scouting trips. As a reminder, the cutworm threat will be greatest when there is a "green

bridge" for them - shifting from weeds and cover crops to seedling corn as it emerges. We recognize that this is often unavoidable, but still worth mentioning. BCW larvae cannot go long without feeding, so a period with no host plant material can mean death.

The following NOAA high-wind outlook, issued on March 31, 2023, graphically shows the origins in Texas and fanning out through the Midwest:



2023 Black Cutworm Pheromone Trap Report

(John Obermeyer)

County	Cooperator	BCW Trapped					
		Wk 1 4/1/23	Wk 2 4/6/23 - 4/12/23	Wk 3 4/13/23	Wk 4 4/20/23	Wk 5 4/27/23	Wk 6 5/4/23 - 5/10/23
Adams	Roe/Mercer	3					
Allen	Landmark/Decatur	0					
Allen	Anderson/Indigoag/Churubus co						
Allen	Gynn/Southwind Farms/Ft. Wayne	1					
Allen	Kneubuhler/G&K Concepts/Harlan						
Bartholome w	Bush/Top Crop Alliance/Columbus						
Benton	Nally/Dairyland	1					
Clay	Seeds/Remington						
Clay	Mace/Ceres Solutions/Brazil	4					
Clay	Fritz/Ceres Solutions/Clay City	5					
Clinton	Emanuel/Frankfort	19*					
Daviess	Brackney/Daviess Co. CES/Montgomery						
Dubois	Eck/Dubois Co. CES/Jasper	14					
Elkhart	Kauffman/Crop Tech/Millersburg	5					
Fayette	Schelle/Falmouth Farm Supply/Falmouth						

County	Cooperator	BCW Trapped					
		Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6
		4/1/23	4/6/23-4/12/23	4/13/23	4/20/23	4/27/23	5/4/23-5/10/23
		4/5/23	4/12/23	4/19/23	4/26/23	5/3/23	5/10/23
Fountain	Mroczkiewicz/Syngenta/Attica	39*					
Hamilton	Campbell/Beck's Hybrids	54*					
Hendricks	Nicholson/Nicholson Consulting/Danville						
Hendricks	Tucker/Bayer/Brownsburg						
Howard	Shanks/Clinton Co. CES/Kokomo	0					
Jasper	Overstreet/Jasper Co. CES/Rensselaer	11*					
Jasper	Ritter/Dairyland	0					
Jay	Seeds/McCoysburg	0					
Jay	Boyer/Davis PAC/Powers	2					
Jay	Shrack/Ran-Del Co.	37*					
Jennings	Alliance/Parker City						
Jennings	Bauerle/SEPAC/Butlerville	42*					
Knox	Clinkenbeard/Ceres Solutions/Edwardsport	0					
Knox	Edwards/Ceres Solutions/Fritchton	1					
Kosciusko	Jenkins/Ceres Solutions/Mentone	13					
Lake	Kleine/Rose Acre Farms/Cedar Lake	151*					
Lake	Moyer/Dekalb Hybrids/Shelby	5					
Lake	Moyer/Dekalb Hybrids/Schneider	0					
LaPorte	Rocke/Agri-Mgmt. Solutions/Wanatah	26*					
Miami	Early/Pioneer Hybrids/Macy	0					
Montgomery	Delp/Nicholson Consulting/Waynetown	13					
Newton	Moyer/Dekalb Hybrids/Lake Village	2					
Perry	Lorenz/Lorenz Farms/Rome	10					
Perry	Lorenz/Lorenz Farms/Rome	20					
Porter	Boyer/PPAC/Wanatah	16*					
Porter	Freyenberger/Dairyland Seeds/Kouts						
Posey	Schmitz/Posey Co. CES/Blairsville	0					
Pulaski	Leman/Ceres Solutions/Francesville						
Putnam	Nicholson/Nicholson Consulting/Greencastle	15*					
Randolph	Boyer/DPAC/Farmland	5					
Rush	Schelle/Falmouth Farm Supply/Carthage						
Scott	Tom Springstun/Scott Co. CES/Scottsburg	0					
Shelby	Fisher/Shelby County Coop/Shelbyville						
St. Joseph	Carbiener/Breman	0					
St. Joseph	Deutscher/Helena/New Carlisle						
Sullivan	McCullough/Ceres Solutions/Farmersburg	2					
Sullivan	McCullough/Ceres Solutions/Dugger						
Tippecanoe	Bower/Ceres Solutions/Lafayette	33*					
Tippecanoe	Nagel/Ceres Solutions/W. Lafayette	17*					
Tippecanoe	Obermeyer/Purdue Entomology/ACRE	19*					
Tippecanoe	Westerfeld/Bayer Research Farm/W. Lafayette	15*					
Tipton	Campbell/Beck's Hybrids	2					
Vanderberg	Schmitz/Purdue CCSI/Armstrong	0					
Vigo	Lynch/Ceres Solutions/Clinton	2					
Whitley	Emley/NEPAC/Schrader	74*					
Whitley	Emley/NEPAC/Kyler	32*					

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

Alfalfa Weevil Damage Reported In Southern Indiana

(John Obermeyer)

Pest managers, in southern Indiana, should now be scouting their alfalfa for leaf feeding from weevil larva. Higher risk fields are those that have been in alfalfa for over three years. Most vulnerable areas of the field are southern facing slopes that heat up first in the season. This pest is often overlooked during the busy spring season. More on this pest,

damage, and management guidelines can be found by clicking [HERE](#).



Alfalfa weevil damage.

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										
Jennings/SEPAC Ag Center	21										
Knox/SWPAC Ag Center	37										
LaPorte/Pinney Ag Center	60										
Lawrence/Feldun Ag Center	159										
Randolph/Davis Ag Center	57										
Tippecanoe/Meigs	36										
Whitley/NEPAC Ag Center	0										

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 = 6/1/23-6/7/23; Wk 11 = 6/8/23-6/14/23

Reduce The Chances Of Listeriosis And Botulism By Using Best Management Practices When Making Silage

(Keith Johnson)

With Dr. Grant Burcham's permission, the paper he authored and was part of the proceedings shared with attendees of the recently held "Heart of America Grazing Conference" follows. Dr. Burcham is a diagnostician at the Heeke Animal Disease Diagnostic Laboratory that is found at the Southern Indiana Purdue Agricultural Center. Dr. Burcham has identified listeriosis and botulism as causes of death in multiple necropsies performed. I thought it was prudent to share this information at the beginning of the growing season. As forages are harvested and ensiled, follow guidelines so fermentation can achieve a pH of at least 4.5. Forage too mature, packaged at too high or too low a moisture content, loosely packed, put in a structure or wrapped bale that doesn't exclude air, and with soil contamination can create an unforgiving issue. Please read on!



Livestock Disorders Associated with Preserved Forages: Listeriosis and Botulism

Grant N. Burcham, DVM, PhD, Dipl ACVP

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Preservation of forages via fermentation results in high-quality feed that can be stored and fed to livestock many months after cutting and processing the forage. Ensiled forages typically retain more nutrient content than dry hay, giving producers a high-quality feed option throughout non-growing months. Fermented forages come in three main types: silage, haylage, and baleage. Silage has a higher moisture content than haylage or baleage. Haylage is typically chopped like silage and can be stored in a silo or bag. Baleage is baled and then sealed in an airtight wrap.

The preservation of forages occurs over three steps. First, bacteria and plant cells will process sugars in the presence of any remaining oxygen. This first step is known as the “aerobic phase” and lasts about a day. Next, fermentation occurs. Bacterial species that can process sugars without oxygen (anaerobic bacteria) will do so, and produce acid as a byproduct of metabolism. Acid decreases the pH, preserving the forage and preventing breakdown of nutrients. Low pH also prevents growth of undesirable bacteria and molds. At this point, the material reaches an equilibrium state, known as the “stable phase,” and can be maintained under anaerobic conditions for months. If/when aerobic conditions are reintroduced, molds and other bacteria can grow and cause spoilage. Once opened, ensiled forages should be used as quickly as possible to minimize chances of spoilage. If problems occur during this process, bacteria that are harmful to livestock can grow and pose a threat to animal health. This presentation will cover two more common bacterial causes of disease associated with feeding preserved forages: listeriosis and botulism.

Listeriosis

Listeriosis is a condition caused by the bacteria *Listeria monocytogenes*. *Listeria* is a psychrophilic, gram positive species of bacteria that is found throughout the environment. *Listeria* thrives in silage or other preserved forages that do not reach the appropriate pH level during the fermentation phase; pH <4.5 inhibits growth of this potentially harmful bacteria. The disease resulting from *Listeria* infection, listeriosis, usually manifests as one of three different syndromes: encephalitis, abortion, or sepsis. Encephalitis, or inflammation of the brain, manifests as asymmetric facial paralysis, ataxia, and/or circling to one side. Circling

is such a prominent feature of disease that this manifestation of listeriosis has been called “circling disease” by producers. Dullness, anorexia, and head pressing can also be observed. A second manifestation of listeriosis in adult livestock is abortion or stillbirths. Fetal loss due to listeriosis usually occurs in the last trimester for cattle, and fetuses are usually autolyzed. Retention of the placenta is common, and cows may experience fever or anorexia in association with abortion. Interestingly, outbreaks of encephalitis and abortion do not usually occur in the same herd; producers only see one syndrome at a time. The reason for this phenomenon is not completely understood, although, it may be due to the route of entry of the bacteria, as encephalitis occurs secondary to abrasions in the oral mucosa, while abortion likely results from maternal sepsis. Various strains of the bacteria likely play a role in the different types of infection as well.

Another manifestation of listeriosis that can be overlooked by producers and veterinarians alike is sepsis in young ruminants. This syndrome occurs in animals that are just a few days of age to those that are a few months of age. Neonatal infections likely stem from *in utero* infections; those infections in older animals could presumably come from the environment or feed material. Clinical signs of neonatal infection are usually vague, including listlessness and inappetence. Cattle producers and veterinarians sometimes refer to cases with this type of presentation as “weak calf syndrome.” In the spring of 2022, the Heeke Animal Disease Diagnostic Laboratory (ADDL) saw multiple cases of septicemic listeriosis in cattle. Affected calves ranged from 4 days of age to 48 days of age. In all cases, the history included calves “not thriving” or doing poorly. Affected producers were feeding fermented forage materials, including one farm feeding orchardgrass baleage. In one case, cows were started on corn silage the last week of February and the cows started calving the first week of March. By mid-March, 2-week-old calves were “not thriving” and had increased mortality. *Listeria* was cultured from major organs of dead calves, and pathologic changes associated with bacterial sepsis were present. Adult animals never exhibited clinical signs. Diagnosis of listeriosis in animals requires a post-mortem examination and culture of affected organs. Testing suspect forages is not considered helpful. Treatment of affected animals involves antibiotic therapy, usually with penicillin; however, treatment is not often successful. There is no available vaccine for listeriosis.

Botulism

Botulism is a disease caused by toxins produced by the bacteria *Clostridium botulinum*. This bacteria is considered an anaerobe, meaning that the bacteria favor low to no oxygen environments—the exact environment created during the fermentation process. To counter growth of *C. botulinum*, producers need to ensure that the pH of the product is <4.5, at which botulism bacteria cannot grow. Different livestock species have varying levels of susceptibility to botulism intoxication. Horses have a low threshold for botulism intoxication and are the species usually covered in discussions about botulism. Cattle have an intermediate to low susceptibility to botulism; however, ruminants are usually those species fed ensiled forages, meaning that, overall, there may be more opportunities for botulism intoxication in cattle as compared to horses.

Because cattle have a higher threshold for botulism intoxication, clinical signs may be prolonged and, seemingly, mild. Cattle may even spontaneously recover from intoxication, which also creates difficulty in diagnosing the condition. While horses may exhibit weakness leading to complete paralysis in a matter of 2-3 days, cattle may be affected for several days to weeks. Typical clinical signs include muscle tremors, symmetrical weakness, motor paralysis, and recumbency. Cattle with botulism may seem ataxic (wobbly) or weak, but otherwise normal.

Affected animals typically progress to sternal recumbency. Histories from botulism cases submitted to the Heeke ADDL over the last few years have included producers that say calves “just won’t get up.” Affected calves are aware of their surroundings and will eat and drink, but, remain down until they recover or the disease progresses. If the disease progresses, animals will become laterally recumbent and, eventually, die due to paralysis of muscles used for breathing.

Botulism diagnostics include testing gastrointestinal contents of affected animals or feed materials using a test known as the mouse bioassay. In this test, the material to be sampled is purified and injected into mice that have been vaccinated against botulism and those that have not. This test has poor sensitivity, meaning that a negative test may not be helpful, especially in the face of compatible clinical signs. Diagnostic testing based on detection of the botulinum toxin within a sample is forthcoming and will be the next generation of botulism testing. Treatment for botulism is expensive and involves administration of anti-toxin. Prevention via vaccination is available for horses, but not other livestock species.

Management Recommendations

Both of the diseases discussed here are caused by infection with bacteria that are widespread throughout the environment, in soil and vegetation. Thus, the causative agents are commonly present to some degree in large amounts of forage, especially ensiled forage. There are two specific recommendations for decreasing the risk of these diseases to livestock:

1. *Ensure that ensiled forage hits the target pH of <4.5 to inhibit growth of harmful bacteria. Testing ensiled forage for pH levels can be accomplished at private laboratories.*
2. *Heavy soil contamination of forage for any reason can be a risk factor for both of these diseases. Having forages tested for ash content can give producers an idea about how much soil contamination is present in a particular product and, therefore, associated risk level.*

Feeding ensiled forages has both benefits and risks. Minimizing risks associated with bacterial infections involves proper fermentation technique, testing the finished product for pH level and ash content, and expeditious use of ensiled forage once exposed to air.

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Tactics To Consider For Tar Spot Management In Indiana For 2023

(Darcy Telenko)

In Indiana, tar spot has been an annual concern since 2018 when growers experienced 20-60 bu/A loss. In 2021 favorable weather conditions led to another severe epidemic where reports of 50% yield loss occurred. This last year, we had a slight break from tar spot due to dry conditions in June/July that delayed the disease in areas where it was a main concern. I took this as a welcomed reprieve from the previous years, but that doesn’t mean we should let down our guard. Even though we had less tar spot in Indiana in 2022, it has continued to spread and has now been confirmed in 86 of 92 Indiana counties, 18 states, and Ontario Canada. As to say tar spot is a disease has become the number one topic in corn during our winter meetings.

Therefore, I am going to share some tactics to consider for 2023 on what we have learned and how to plan for this disease this season and beyond.

My first question to you is have you found tar spot on your farm over the last few years? And how severe tar spot was the infection? Did you find a few lesions (Fig 1A), a moderate number (Fig 1B) or was it severely blighted and covered with tar spot (stromata)(Fig 1C)?

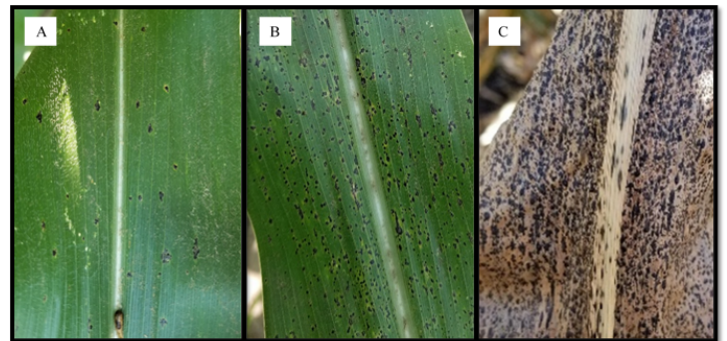


Fig. 1. Tar spot lesions (stromata) on corn leaves A. a few stromata (1% severity), B. moderate tar spot (7-10%), C. severe tar spot (>30%) causing leaf blighting. (Photo credit: Darcy Telenko)

In 2022, in our research trials in we saw limited tar spot impact. I can find the small black spots (stroma of the fungus), but it barely got above 1% severity. If tar spot has not yet been severe on your farm you won’t get a return on investment (ROI) to manage it, but be aware, on the lookout, and prepared to make in-season decisions should the environment become favorable.

If you farm saw severe tar spot in the past, I suggest a few things for next year.

Farmers And Crop Specialists Survey – April 2023

(Darcy Telenko)

Farmers and crop specialists: please help us with a tar spot and fungicides survey:

<https://crops.extension.iastate.edu/blog/daren-s-mueller/tar-spot-and-fungicide-survey>

Tar spot cost U.S. farmers \$770 million in lost yield in 2022. This doesn’t

include economic cost of fungicide management!



Tar spot

The Current State Of Hemp

(Marguerite Bolt, mbolt@purdue.edu)

The hemp industry is familiar with boom-and-bust cycles, with a surge in production acres in 2019 followed by a decline in the following years. According to Hemp Benchmarks, planted acres decreased by 42% from 2021 to 2022 in the United States. The report also showed a shift in the industry with an increase in fiber production acres from 2021 to 2022 (Hemp Benchmarks, 2022).

According to the NASS report, Indiana hemp producers planted 255 acres in 2021 (Cornell University, 2022). Indiana hemp producers planted 646 acres in 2022 (OISC, personal communication). Most of the planted acres in 2022 were for grain and fiber hemp. There are 710 acres of hemp expected to be planted this season in Indiana. Over half of the planned acres are for grain and fiber hemp.

The difficulty farmers face when growing this crop is not going unnoticed. Senator Braun (R-IN) and Senator Tester (D-MT) introduced a bipartisan hemp bill to provide exemptions for certain requirements specific to the hemp industry. The bill aims to reduce challenges faced by farmers that grow grain and fiber hemp. In this bill, grain and fiber hemp would be defined as “industrial hemp”, separate from hemp grown for cannabinoids. Another change—visual inspections for grain and fiber hemp rather than chemical testing for THC. Industrial Hemp Act of 2023 (S.980) can be viewed [here](#).

References

How much hemp has been planted in 2022? Hemp Benchmarks. (2022, September 7). Retrieved April 6, 2023, from <https://www.hempbenchmarks.com/hemp-market-insider/how-much-hemp-has-been-planted-in-2022/>

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A Cool, Wet Start To Spring

(Beth Hall)

Meteorological spring started March 1st. Astronomical spring started March 20th. Baseball fans might consider the first day of spring to be Opening Day (March 29th this year). Regardless of when one defines the

start of spring, so far it has been mostly on the cooler and wetter side. I have yet to meet anyone over the past few weeks who has expressed a general love for this weather with most asking when things are going to warm up. February and early March were noticeably warmer than average (Figure 1). This encouraged bulbs to coming up, trees to swell with buds, and increasingly more birds are singing their spring songs. But it has recently been gloomy and wet. Figure 2 shows how much cooler temperatures have been since March 8th of this year.

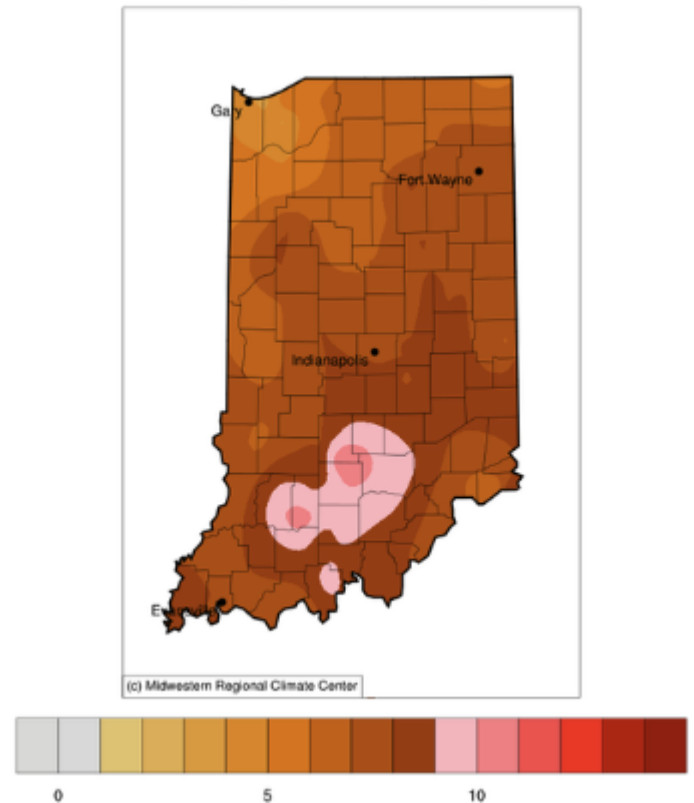


Figure 1. Average temperature departure (degrees F) from the 1991-2020 climate normal period for February 1 through March 7, 2023.

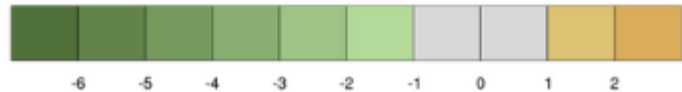
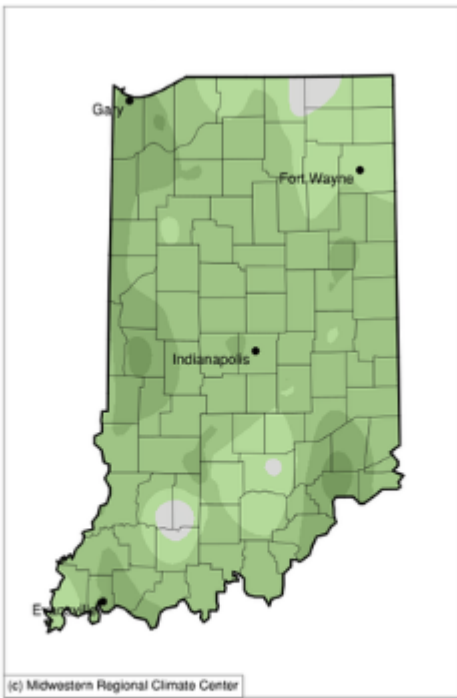


Figure 2. Average temperature departure (degrees F) from the 1991-2020 climate normal period for March 8-27, 2023.

When can those patio cushions come out more permanently? When can neighborhood walks happen without worrying about a coat? Climate outlooks for the next 8-14 days (April 4-10) are favoring above-normal precipitation and temperatures. Keep those umbrellas nearby and flooding potential is likely to persist. The monthly (April) and seasonal (April-May-June) climate outlooks are indicating similar probabilities for warmer and wetter conditions.

The phases of the El Nino - Southern Oscillation (ENSO; e.g., La Nina) can be relatively useful indicators for Midwest winters. For example, a typical La Nina winter in Indiana is characterized by milder (i.e., warmer) and wetter conditions. Overall, that was the case this past winter. However, whatever phase the ENSO is in during the spring seems to do little more than confuse the climate models. Therefore, keep in mind that climate outlooks this time of year could be riddled with greater than usual uncertainty. It would certainly be nice if this upcoming planting season could be dry enough to provide enough field work days!

Stormy End To March, Elevated Chances For Above-Normal Temperatures Through Mid-April April 5, 2023

(Austin Pearson)

Indiana experienced near-normal temperatures for March as the state averaged 40.9 F, despite the record warmth at the beginning of the month (Figure 1). Weather stations in central, southern, and eastern Indiana experienced record-breaking high temperatures during the first week of March (Figure 2). Cold weather returned during the third week with several daily low maximum and minimum temperature records broken or tied (Figure 3). Southern Indiana saw dormancy break for many woody perennials, which become susceptible to any cold snaps we encounter moving forward.

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

Indiana
3/ 1/2023 to 3/31/2023

cd	Temperature			prcp	Precipitation		
	temp	norm	dev		norm	dev	percent
1	37.7	38.6	-0.9	4.12	2.92	1.20	141
2	37.5	37.9	-0.4	4.27	2.78	1.48	153
3	37.6	37.3	0.2	3.96	2.71	1.25	146
4	40.5	40.6	-0.1	5.53	3.36	2.17	165
5	40.3	40.1	0.2	5.93	3.28	2.65	181
6	39.9	39.1	0.9	5.72	3.08	2.64	186
7	45.2	44.8	0.4	7.86	4.23	3.63	186
8	45.0	44.2	0.8	7.18	4.17	3.01	172
9	43.4	43.1	0.3	6.40	3.95	2.45	162
State	40.9	40.7	0.1	5.73	3.40	2.32	168

Midwestern Regional Climate Center
MRCC Applied Climate System
Generated at:
Wed Apr 5 09:17:04 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 March 2023.

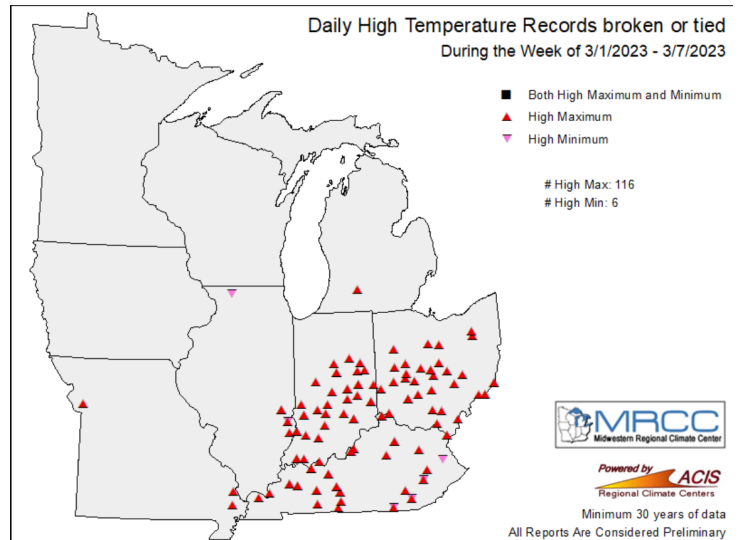


Figure 2: Midwest daily high temperature records broken or tied during the week of March 1-7, 2023.

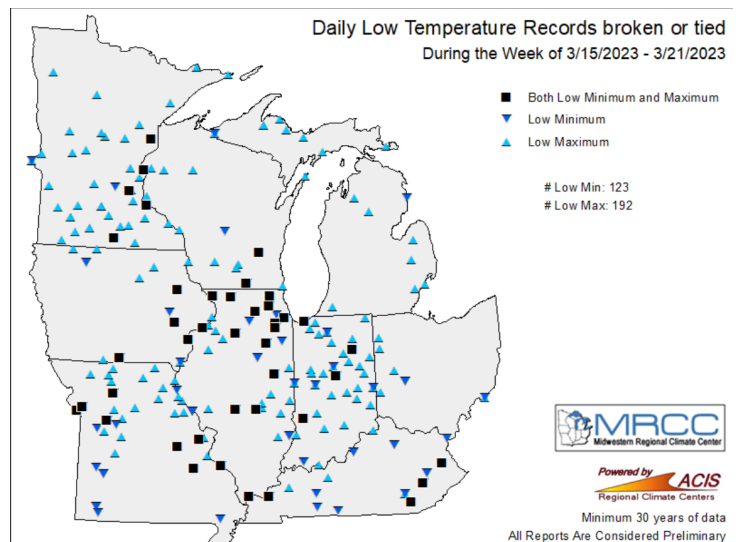


Figure 3: Midwest daily low temperature records broken or tied during the week of March 15-23, 2023.

The big story for the month was flooding rains and severe weather. The state averaged 168 percent of normal precipitation for the month, with locally higher percentages in central and southern Indiana (Figure 4). Dearborn County measured 9.38 inches of precipitation in March and had a single day maximum of 2.85 inches on March 24. River flood warnings hung around for a large portion of the month as storm water runoff overwhelmed streams and rivers. Localized flooding was also reported in spots.

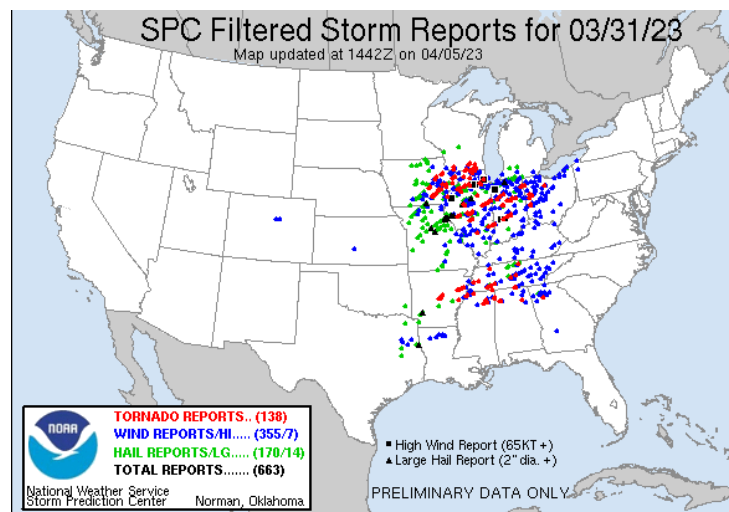


Figure 4: US Storm reports for the March 31, 2023 severe weather outbreak.

On March 31st a cold front associated with a strong low-pressure system caused a severe weather outbreak across the Midwest. As of April 5, there were 22 confirmed tornadoes in Indiana ([NWS Indianapolis](#) & [NWS Northern Indiana](#) have websites dedicated to the event). EF-3 tornadoes occurred in Grant, Sullivan, Johnson, Owen and Monroe Counties in Indiana with significant damage. Tragically, five people died in the storms along with 11 others sustaining injuries. The Indiana State Climate Office would like to express condolences to the families and communities impacted by these events.

Turning attention to the Climate Prediction Center outlooks, mid-April has higher chances of above normal temperatures and below normal precipitation (Figure 5). This could be the pattern shift that is needed to help us dry out enough to begin field work across the state.

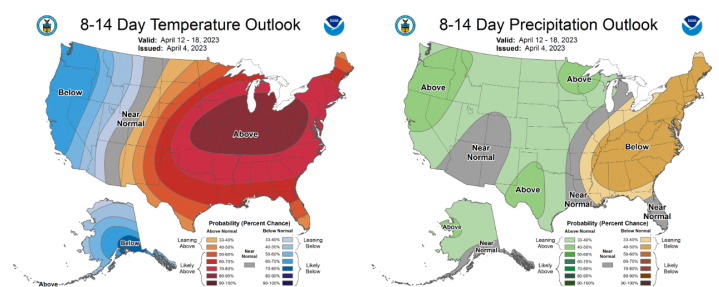


Figure 5: Climate Prediction Center's 8-14 Day temperature and precipitation outlooks showing high chances for above normal temperatures and elevated chances for below normal precipitation mid-April.

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