Issue: 2024:16
July 12, 2024

Pest & Crop Newsletter

Purdue Cooperative Extension Service
and USDA-NIFA Extension IPM Grant

PURDUE UNIVERSITY | Extension - Entomology

This work is supported in part by Extension Implementation Grant 2021-70006-35390 / IND90001518G-1027053 from the USDA National Institute of Food and Agriculture and NCR SARE Award GNC20-311

In This Issue

VIDEO: Lodging Caused By Rootworm Feeding?

(Christian Krupke) & (John Obermeyer)

Corn lodging, during rapid vegetative growth just before pollination, is not a welcome site. No surprise, it generally follows a storm front that includes rain and winds, as you may have noticed characterized the remnants of Hurricane Beryl moving through the Midwest earlier this week. Shallow roots (e.g., compaction), soggy soils coupled with high winds, rootworm feeding, etc, can solely, or contribute to, significant lodging. To properly assess, go to a damaged area, dig up roots with a shovel, clean off the soil, and evaluate. Rootworm feeding scars are noticeable by the brown discoloration anywhere on the root system – there is nothing that looks quite like rootworm feeding. This damage alone is not likely to significantly reduce the root’s anchoring ability. Root pruning, especially whole nodes of roots missing, would likely implicate rootworm as the cause of observed lodging. This video will contrast two root systems with rootworm damage, representing significant and minor feeding.

Another giveaway is the density of rootworm beetles flying about as you enter the field. Rootworms have been emerging for 2 weeks or so, and if you are finding bunches of western corn rootworm beetles in lodged fields, and Bt-RW corn was planted, this is reason for concern and you will want to contact seed company personnel. As a first step and before assuming any resistance issues, plants should be tested for the presence of the appropriate Bt protein.

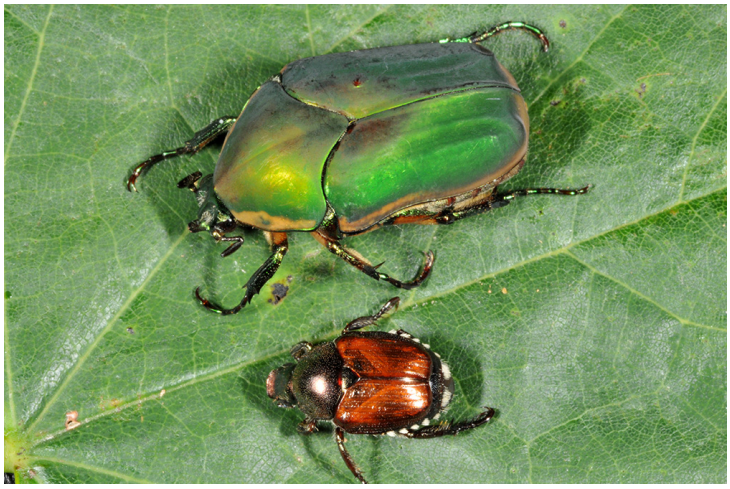
Gigantic Japanese Beetle!?!?

(John Obermeyer)

What are these “huge” Japanese-like beetles seen around homes, golf courses, parks and farmsteads? No, a mutation of the Japanese beetle has not occurred but rather another related scarab, the green June beetle has been actively emerging. These insects are strong fliers and active during the daylight hours,

The large, iridescent, green June beetles feed on many plants, as do the Japanese beetle, but they are especially fond of ripe fruit. Ripening peaches, berries, plums, etc. may be subject to clusters of these pests. The beetles may occasionally feed on sweet corn tassels and silks, but significant damage has not been reported. The green June beetle grub, as with the Japanese beetle grub, feed-on decaying matter and various types of plant roots in the soil. However, the green June beetle larva is much larger and creates tunnels as they move about in the soil. These tunnels can significantly disrupt turf and grass pastures. Bottom-line, be alert to these “pretty” beetles attempting to cut into your fruit harvest. But don’t worry about them as a corn and soybean pest.

Is the lodging just on the end row and what was the cause? (*Photo Credit: John Obermeyer*)



Comparison of the green June beetle and Japanese beetle. (*Photo Credit: John Obermeyer*)

The green June beetle grub is large and will crawl on its back if dug up. (*Photo Credit: John Obermeyer*)

2024 Corn Earworm Trap Report

(Laura Ingwell)

Foliar Disease Update In Indiana Corn And Soybean

(Darcy Telenko)

It is important to continue to scout for diseases in both corn and soybeans. Recent rains following Beryl have created favorable environmental conditions for the development of foliar diseases in both crops. In my scouting rounds and samples submitted to the Purdue Plant Pest Diagnostic Lab (PPDL) this week we continue to find tar spot, gray leaf spot, northern corn leaf blight, and common rust in corn (Figures 1 and 2). No major foliar diseases in soybean found just yet. We continue to add counties with active tar spot in Indiana. The most frequent question I have received is, “Should we make a fungicide application?” My response – What diseases are you finding in your field? What is your hybrid/variety susceptibility and field history? What growth stage? Are you irrigating?

A fungicide application can be effective at reducing disease and protecting yield, but there are a number of factors that need to consider:

1. Field history/previous crop – what diseases have been an issue in previous years?
2. Amount of disease present in the field – what diseases do you find? Where are they in the canopy? Is the disease active in your county or surrounding counties?
3. Hybrid/variety susceptibility to diseases
4. Current weather conditions (use apps such as Tarspotter, Sporecaster, Field Prophet)
5. The value of the crop and cost of fungicide application.

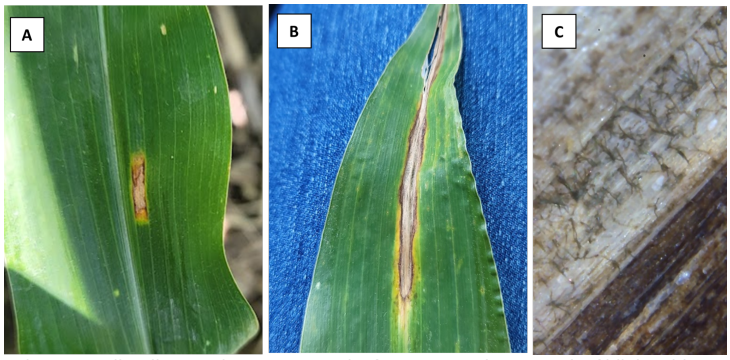


Figure 1. Foliar diseases in corn A. gray leaf spot, B. northern corn leaf blight with C. conidia visible in lesion using my portable hand-held microscope. Both of these were found on lower leaves in corn that was beginning to tassel. (*Photo Credit: Darcy Telenko*)

Tar Spot: Tar spot continues to be on everyone's mind. We continue to add new counties where active tar spot lesions have been found in Indiana (Figure 2). We have confirmed tar spot in 26 counties thus far this year. Tar spot had previously been found in 87 counties (gray color) in Indiana. Many of these tar spot detections have required intensive scouting, but as the disease progresses it will be easier to find as the number of spots increase and it moves up the canopy. We will continue to monitor and update as the season continues.

See recent updates on details for fungicide timing and applications for tar spot:

https://indianafieldcroppathology.com/check-out-this-short-video-about-fungicide-timing-for-tar-spot-of-corn/

https://cropprotectionnetwork.org/publications/fungicide-application-reminders-to-optimize-management-of-tar-spot-and-return-on-investment-in-corn

We continue to research best management practices for tar spot to minimize losses. The good news is that we found a number of fungicides are highly efficacious against tar spot when applied from tassel (VT) to milk (R3). I would recommend picking a product with multiple modes of action. The national Corn Disease Working Group has developed a very useful fungicide efficacy table for corn diseases (see link below). We will continue keeping a close eye on tar spot. Please contact me if you suspect a field has tar spot please or send a sample to the Purdue PPDL for confirmation.

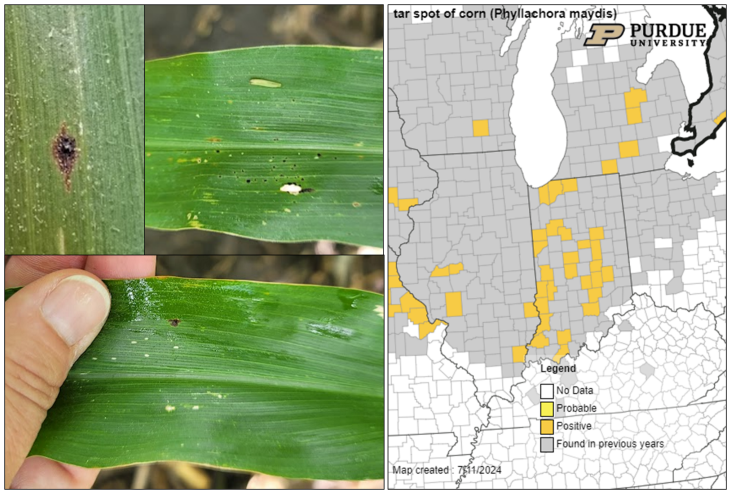


Figure 2. Tar spot lesion on corn in lower canopy, I was finding these on leaves 6 to 8 in our research plots. High resolution of the stroma formed on the leaf. (*Photo Credit: Darcy Telenko*)

Southern Rust has not been officially confirmed in Indiana yet, but there are some suspect reports in Kentucky (Figure 3). I suspect southern rust may be found in southern Indiana where spores settled after moving on weather systems from the south. **We need your help** – if you are out scouting fields please let us know if you find any suspect samples and please send to the Purdue Plant Pest Diagnostic Lab. We need a physical sample in order to confirm southern rust. https://ag.purdue.edu/btny/ppdl/Pages/Submit-A-Sample.aspx.

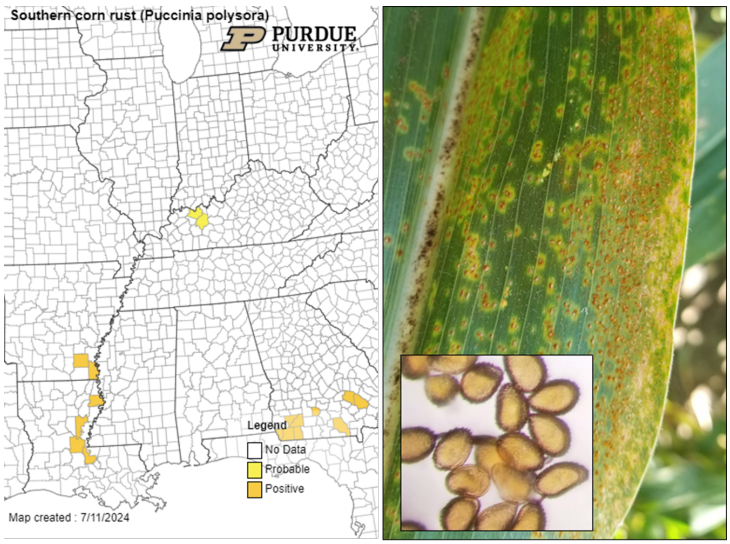


Figure 3. Distribution of southern rust in U.S. on July 11, 2024, orange counties are positive and yellow counties are probable (https://corn.ipmpipe.org/southerncornrust/) and an example of southern rust pustules on a corn leaf and diagnostic spores. (*Photo Credits: Darcy Telenko and John Bonkowski*)

Southern rust pustules generally tend to occur on the upper surface of the leaf, and produce chlorotic symptoms on the underside of the leaf. These pustules rupture the leaf surface and are orange to tan in color. They are circular to oval in shape. We are also seeing some common rust as well and both diseases could be present on a leaf.

There are a few characteristics to use to try to distinguish southern rust from common rust. Common rust will form pustules on both sides of the leaf. In addition, common rust pustules tend to be spread out across the leaf, and less densely clustered. Common rust pustules have a brick red to brown coloration and may be more elongated than southern rust pustules.

Check out the southern rust publication for more images of southern rust and other diseases that might mimic it. This publication also has good information on determining when a fungicide application will be beneficial. The publication is at following link: https://cropprotectionnetwork.org/publications/an-overview-of-southern-rust

Each year the rust spores (urediniospores) travel on air currents from tropical regions to fields in Indiana. Short periods of leaf wetness are required for infection by both rust fungi. Morning dews in Indiana can provide the six hours of moisture required for infection and disease development. Generally, southern rust prefers warmer temperatures — with infection occurring between 77-82°F.

Both gray leaf spot and northern corn leaf blight disease can also be found in corn across the state. It is going to be **extremely important to be out scouting**, especially if you are trying to make a decision on a fungicide application.

Gray leaf spot is active in the lower at multiple sites across the state. The lesions are light tan in color and generally narrow and rectangular, and can be as long as 2 inches. As the lesions age they turn grey in color and are delimited by leaf veins (Fig. 1). This annual disease has

become one of the most important foliar diseases in Indiana. Hybrid susceptibility and weather will have the greatest impact on the severity in a field. Fungicide options that are available for gray leaf spot would be a cost-effective application in fields that have a history of disease and planted to susceptible hybrids in no-till or reduced-till system.

As a reminder the field history, disease activity, hybrid susceptibility, weather conditions, the value of corn and soybean, and cost of fungicide application are factors that should be considered in making a decision to apply a foliar fungicide. Several fungicides are available to help manage these foliar diseases with a recommended application occurring at late vegetative stages through R1 in corn, R1-R3 in soybean for white mold, and R3 in soybean for frogeye leaf spot.

Resources:

- Fungicide efficacy table for corn diseases: https://cropprotectionnetwork.org/publications/fungicide-efficacy-for-control-of-corn-diseases
- Fungicide efficacy table for soybean foliar diseases: https://cropprotectionnetwork.org/publications/fungicide-efficacy-for-control-of-soybean-foliar-diseases
- Purdue Field Crop Pathology website for current updates https://indianafieldcroppathology.com/

As a reminder due to the need to monitor both southern rust and tar spot in Indiana, there will be **no charge for southern rust and tar spot samples submitted to the PPDL for diagnostic confirmation**. This service is made possible through research supported by the Indiana Corn Marketing Council. Please feel free to contact me (dtelenko@purdue.edu) or the PPDL (ppdl-samples@purdue.edu) with any major disease issues you may have this season.

“Flattened” Or “Root Lodged” Corn Caused By Heavy Rain And Wind – Now What?

(Dan Quinn)

Recent storms and heavy rainfall brought on by the remnants of Hurricane Beryl have crossed parts of Indiana this week and brought excessive winds which has resulted in corn being “flattened” from lodging in certain areas of the state. At first sight, corn that has fallen over can be daunting to look at, and cause some serious concern on what may happen next. However, assessing the potential damage and impact on grain yield can be challenging. Therefore, it is important to be patient and wait at least 4 days to allow damaged corn plants to produce visual signs of whether or not they may recover (Nielsen, 2013). Symptoms of recovery can be shown by plants beginning to right themselves upward (“goosenecking”, Figure 1), the re-establishment of roots, and the re-orienting and growth of leaves. The overall severity and recovery potential for corn can depend on the growth stage of the plant, soil moisture at the time of the wind event, root mass structure, hybrid planted, and the severity of the leaning or bending of the plants (Lindsey and Thomison, 2022; Rees et al., 2020).

Figure 1. Corn “goosenecking” as it reorients itself following root lodging. (*Photo Credit: D. Quinn in West Lafayette, IN 2021*)

The majority of corn in Indiana is currently at or approaching pollination. Therefore, the larger the plant, the more vulnerable it is to lodging without stalk breakage (root lodging) or stalk breakage (greensnap) from the combination of heavy rainfall and strong winds. “Root lodging” of corn is the most likely culprit to occur this week and is often observed with the combination of strong winds and high soil moisture levels, which can result in corn roots being pulled out of the soil. Although this symptom can look devastating, yield impacts are often highly dependent on when the damage occurs and what growth stage the plant is in (Lindsey and Thomison, 2022; Figure 1). If the majority of plants are able to re-orient themselves, and if this recovery occurs prior to corn pollination, little impact on pollination success will be observed. Corn plants have been shown to upright themselves fairly quickly (~ 3-4 days) after an initial wind event when in the rapid growth phase. However, if a plant can’t reorient itself properly, some leaves can become shaded and a reduction in photosynthesis can occur. Furthermore, if this damage occurs close to the beginning of pollination, the leaves of neighboring, lodged plants may shade or cover some of the exposed silks, thus causing poor pollination.

Table 1. Corn grain yield reduction and number of barren plants caused by the incidence of root lodging at various growth stages in Ohio. Data acquired from 3-year research trial conducted by Lindsey and Thomison, 2022 (https://ohioline.osu.edu/factsheet/ac-1054).

Growth Stage	Yield Reduction	Barren Plants
	—%—	—%—
V10	5	2
V13	22	6

Table 1. Corn grain yield reduction and number of barren plants caused by the incidence of root lodging at various growth stages in Ohio. Data acquired from 3-year research trial conducted by Lindsey and Thomison, 2022 (https://ohioline.osu.edu/factsheet/ac-1054).

Growth Stage	Yield Reduction	Barren Plants
VT/R1	43	9
R3	33	1

The occurrence of root lodging can also highlight poor early-season root development (side-wall compaction, insect feeding) and be more prevalent in fields with high plant populations (>35K plants/acre). However, if soil moisture is adequate for root growth, leaves can still intercept sunlight, and plants have adequate time to upright themselves to place silking ears in proper position prior to pollination, root lodged corn fields can recover well and yield loss will be minimal. In contrast, for corn that has already reached pollination and early grain fill, yield losses will be more significant as the plant has less flexibility, time, or ability for the stalks have to reorient themselves properly.

In addition to root lodging, the most significant damage that can happen to a corn plant following a storm is if stalks are broken or "green-snapping" occurs. But, before deciding how severe the damage from a snapped stalk may be, it is important to identify where on the stalk the breakage occurred. Plants that snap above the harvestable ear, can still produce an ear, however yield will likely be lower than desired and neighboring plants that are snapped may cause shading and reduce potential ear size. Green-snap below the harvestable ear is much more severe and results in direct loss of yield potential. Research has shown that corn yield can be reduced by 0.5 to 1% per 1% of plants that are broken or green-snapped (Elmore and Ferguson, 1999; Rees et al., 2020).

References

Lindsey, A., and P. Thomison. 2022. Corn yield response to damage from strong storms. Ohio State Univ. Ext. https://ohioline.osu.edu/factsheet/ac-1054

Nafzinger, E. 2016. Storm Damage in Corn. FarmDoc. University of Illinois Extension. https://farmdoc.illinois.edu/field-crop-production/uncategorized/storm-damage-in-corn.html

Nielsen, R.L. 2011. An Example of "Recovery" from Severe Root Lodging. Corny News Network, Purdue Extension. https://www.agry.purdue.edu/ext/corn/news/articles.11/FlatCorn-0728.html

Nielsen, R.L. 2013. Damage to Corn Plants by Strong Winds. Corny News Network, Purdue Extension. https://www.agry.purdue.edu/ext/corn/news/articles.13/WindDamage-0712.html

Rees, J., R. Elmore, and A. Dutcher. 2020. Wind-Damage to Corn. CropWatch. University of Nebraska-Lincoln Extension. https://cropwatch.unl.edu/2020/wind-damage-corn

Thomison, P. 2017. Wind Damage in Corn – "Green Snap" and Root Lodging. C.O.R.N. Newsletter. Agronomic Crops Network. Ohio State University Extension. https://agcrops.osu.edu/newsletter/corn-newsletter/2017-21/wind-damage-corn-%E2%80%9Cgreen-snap%E2%80%9D-and-root-lodging

Potential Impacts Of Heavy Rainfall And Recent Flooding On Corn Growth And Yield

(Dan Quinn)

In the last week, much of Indiana has received the remnants of Hurricane Beryl, with various locations receiving rainfall totals of 3-4+ inches of rain. With this occurrence of heavy rainfall, the risk of potential flooding and saturated soils also increases, especially in poorly-drained soils, low-lying areas of fields, and fields close to creek and river bottoms. So, the question that always gets asked is, what impacts will flooding and saturated soils have on corn growth and yield? And the answer to this question is "well, it depends" (using this answer is an essential part of my training). The overall extent of flooding injury to corn is determined by multiple factors such as 1) what growth stage was the corn plant at when the flooding occurred, 2) how significant was the flooding and where on the plant did the water rise to, 3) how long did the flooding occur 4) what were the air and soil temperatures at the time of the flooding, and 5) how much mud or debris are on the corn plants once the water has drained?

Understanding the growth stage of the corn plant and the level at which the water reached on the corn plant at the time of the flooding or ponding is important. Corn that is younger than V6 (six fully exposed, collared leaves) is more susceptible to flooding than corn that is older than V6 (Nielsen, 2019). The growing point of corn at or below the V6 growth stage is at or below the soil surface. Therefore, corn plants at this stage are more likely to be completely submerged, thus causing significant damage to the corn growing point and plant death rather quickly. Within about 48 hours, the supply of oxygen in a flooded soil is depleted and the growing point can no longer respire and perform critical functions (Lauer, 2008). If temperatures are warm or greater than 77 degrees F, which is consistent with the temperatures recently experienced in Indiana, corn plants that are fully submerged above the growing point may not survive after 1-3 days. Higher soil and air temperatures increases plant growth and warm water contains less oxygen than cool water (Ciampitti et al., 2021). To confirm plant survival, wait at least 3 days after the water is drained from the field and check for new leaf growth and the health of the growing point. The health of the growing point can be assessed by splitting the stalk. Healthy growing points will be white or cream-colored, whereas dead growing points will be dark and soft (Lee et al., 2007). Corn survival increases significantly if water levels do not submerge the growing point of plant and if the growing point was submerged less than 48 hours (Ciampitti et al., 2021).

Corn root growth and function can also be significantly harmed following flooding, especially after soil oxygen has been depleted. The longer an area of a field is flooded, the risk of yield loss and even plant death increases, even if the plants aren't completely submerged and continue to photosynthesize. Without oxygen in the soil, corn plants cannot perform critical functions such as nutrient and water uptake, and root growth inhibition and even death will also occur. Certain areas of the state still has corn that is in the rapid growth phase and has not reached pollination. Therefore, restricted water and nutrient uptake due to poor root function caused by flooding has the potential to impact corn ear size, specifically kernel number. Whereas, another large portion of the state has corn that is currently in pollination. Therefore, root system damage to the corn plants at this growth stage could potentially increase photosynthetic stress during this pollination period and grain fill later in the season due to reduced root function, thus

harming yield.

Flooding can also cause soil and mud to be deposited on corn leaves and within the whorl. This can potentially harm recovering plants and limit overall photosynthesis by hindering the plants ability to capture sunlight and may also damage the waxy surface layer of the leaf. In addition, soil and mud deposited on the leaves, stalks, and within the whorl can encourage the development of fungal and bacterial diseases in the damaged plant tissue (Nielsen, 2019; Ciampitti et al., 2021). Furthermore, if flood water rises above the developing corn ear, ear rots can occur.

Lastly, flooding and ponding can cause significant losses of soil nitrogen from either leaching or denitrification. Fertilizer that is in the form of nitrate is negatively charged and has the ability to move through the soil profile and below the corn root zone following significant rainfall events. This is most likely to occur on coarse-textured, or sandier soil types. In much heavier soils, or low-lying areas of fields where ponding occurs, nitrogen loss most likely occurs due to denitrification. This is caused by the lack of oxygen which causes an anaerobic environment and results in microbes converting plant available nitrate to nitrous oxide or di-nitrogen gas, which can escape from the soil and into the atmosphere (White, 2018). Determining the amount of nitrogen that is lost and if a supplemental application of nitrogen fertilizer should be made is often difficult and can be inaccurate due to the many factors that influence this decision. Specific factors include, nitrogen fertilizer source used, percent nitrate of fertilizer source used, time of fertilizer application, amount of time between fertilizer application and rainfall event, duration of saturated soil conditions, soil temperatures following fertilizer application, and soil texture. Fields that are showing signs of significant nitrogen stress following a flood event prior to pollination will likely benefit the most from a supplemental N application.

References

Ciampitti, I., D. Ruiz Diaz, and S. Duncan. 2021. Effect of Standing Water and Saturated Soils on Corn Growth. Agronomy eUpdates. Kansas State University Extension. https://eupdate.agronomy.ksu.edu/article_new/effect-of-standing-water-and-saturated-soils-on-corn-growth-445-1

Heiniger, R. 2016. Impact of Flooding in Corn. North Carolina State University Extension. https://beaufort.ces.ncsu.edu/wp-content/uploads/2016/06/Excess-Water-and-Flood-Damage-in-Corn.pdf?fwd=no

Lauer, J. 2008. Flood Impacts on Corn Growth and Yield. Agronomy Advice. University of Wisconsin-Madison Extension. http://corn.agronomy.wisc.edu/AA/A056.aspx

Lee, C., J. Herbek, G. Schwab, and L. Murdock. 2007. Evaluating Flood Damage in Corn. AGR-193. University of Kentucky Cooperative Extension Service. http://www2.ca.uky.edu/agcomm/pubs/agr/agr193/agr193.pdf

Nielsen, R.L. 2004. Soggy Soils, N Loss, and Supplemental Nitrogen Fertilizer for Corn. Corny News Network. Purdue Extension. https://www.agry.purdue.edu/ext/corn/news/articles.04/NitrogenLoss-0602.html

Nielsen, R.L. 2014. Flood or Ponding Damage to Corn Late in the Growing Season. Corny News Network. Purdue Extension. https://www.agry.purdue.edu/ext/corn/news/timeless/FloodDamageLateCorn.html

Nielsen, R.L. 2019. Effects of Flooding or Ponding on Corn Prior to Tasseling. Corny News Network. Purdue Extension. https://www.agry.purdue.edu/ext/corn/news/timeless/pondingyoungcorn.html

White, C. 2018. What is the Potential for Nitrogen Losses from Extreme Summer Rainfall. Penn State University Extension. https://extension.psu.edu/what-is-the-potential-for-nitrogen-losses-from-extreme-summer-rainfall

Soybean Recovery After Leaf Defoliation

(Shaun Casteel)

Our soybeans have been off to a great start in terms of development this season with 30% of Indiana flowering as of July 7th (USDA-NASS, 2024). This flowering progress aligns with the 5-year average and it is much faster than 2023 (though it was a delayed flowering season). We also have 9% of Indiana that is podding as of July 7th, which is about 7 to 10 days earlier than the 5-year average and 2023. My goal is to have soybeans green to the eye by the 4th of July (e.g., close the row by the time soybean are flowering out the top), but what happens when storms take those leaves away.

Severe weather continues to impact our soybean fields with localized intensity from heavy rains to strong winds to hail. Nothing is more gut-wrenching than to walk out into a field that had great potential the previous day to see leaves, branches, and even pods on the ground. Soybeans have an amazing ability to adapt and overcome many stressful situations from low plant stands in June to leaf loss in July.

How much can soybeans recover? How much yield loss is expected? The answers to these questions will primarily depend on the growth stage that was impacted and the level of damage.

We simulated leaf loss from strong storms and hail for three seasons at R1 (first bloom) and R3 (first pod) on two varieties (maturity 2.7 vs. 3.7). We removed 0, 25, 50, 75, and 100% of the leaves within each one of the varieties as they reached the target growth stage. We took weekly pictures to document the canopy recovery period (Figures 1, 2, 3, and 4) and of course, yield. We followed up with three more seasons of simulations at R4 (full pod) and R5 (first seed).

Canopy closure is not the same as total leaf area or leaf biomass, but it does give us a good idea of plant recovery. Soybeans that lost leaves at R1 took ~2 weeks to recover from 25% and 50% leaf loss, ~3 weeks to recover from 75% leaf loss, and ~5 weeks to recover from 100% leaf loss (Figure 5). As we pushed the leaf loss back until R3, full canopy recovery of soybean with 100% leaf loss did not occur. Interestingly, soybeans canopy recovery after 25 to 75% leaf losses at R3 was better than expected.

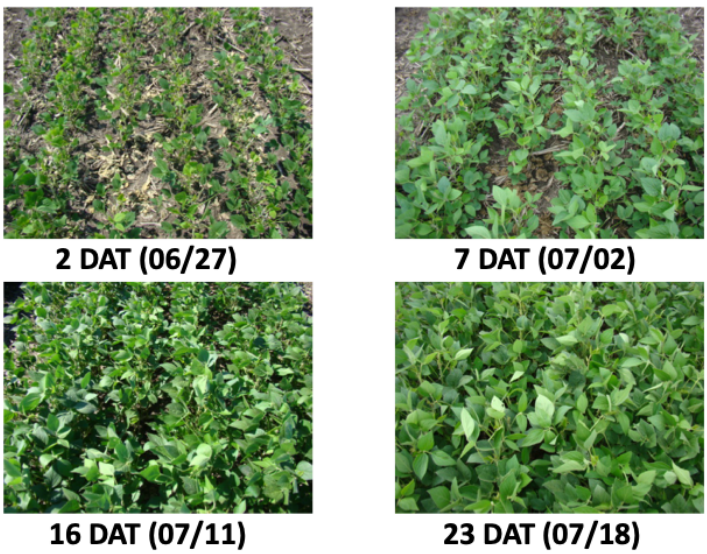


Figure 1. Soybean recovery 2, 7, 16, and 23 days after 50% of leaves were removed at R1 (first bloom) in 2014 West Lafayette.

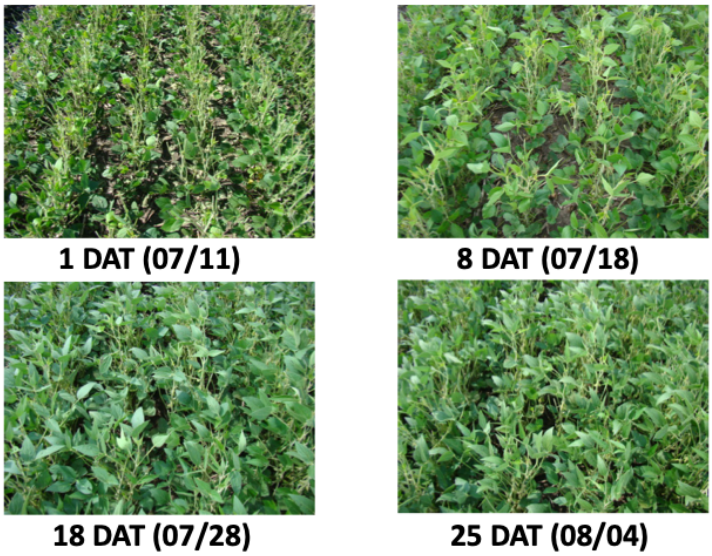


Figure 3. Soybean recovery 1, 8, 18, and 25 days after 50% of leaves were removed at R3 (first pod) in 2014 West Lafayette.

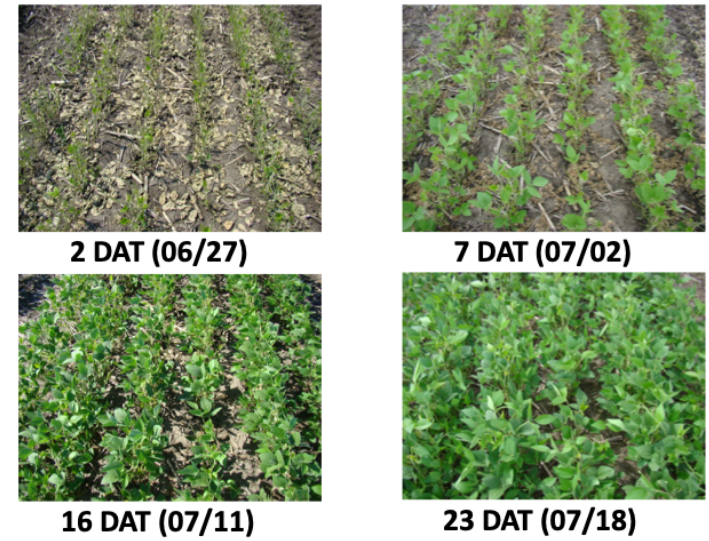


Figure 2. Soybean recovery 2, 7, 16, and 23 days after 100% of leaves were removed at R1 (first bloom) in 2014 West Lafayette.

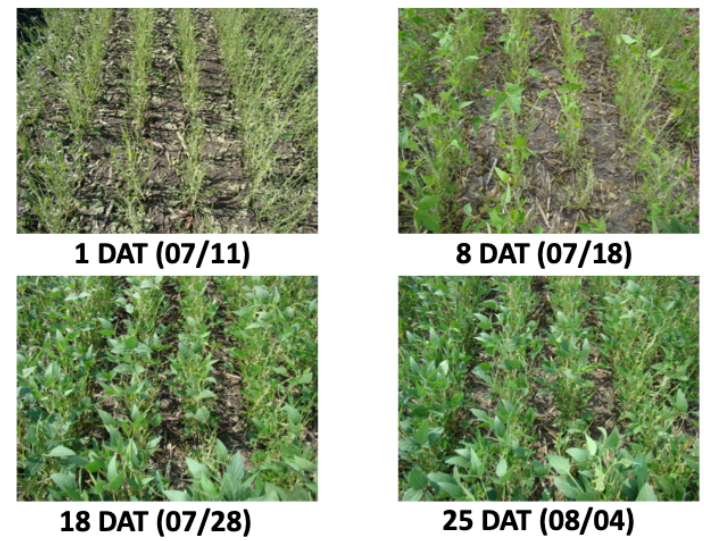


Figure 4. Soybean recovery 1, 8, 18, and 25 days after 100% of leaves were removed at R3 (first pod) in 2014 West Lafayette.

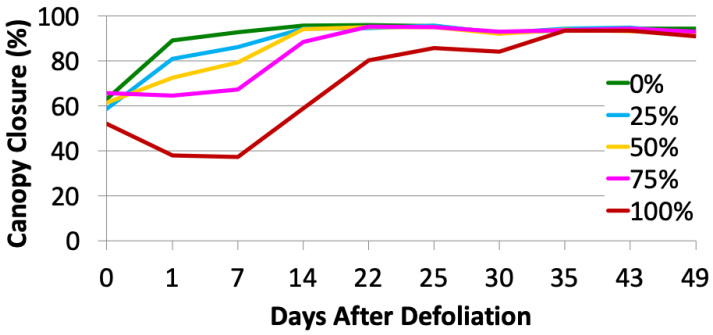


Figure 5. Canopy closure (%) of soybean (2.7 maturity) that was defoliated at R1 (first bloom) in 2012 West Lafayette.

Soybean yield response to leaf defoliation was similar between the varieties even though they were a full maturity unit different (e.g., 2.7

vs. 3.7). The least amount of yield loss occurred when soybean lost leaves at R1 compared to R3, R4, and R5. With one-fourth to half loss of leaves at R1, soybean yield was still ~95% of maximum potential (Figure 6). Greater leaf loss at R1 still yielded 75 to 80% of its potential.

Interestingly, leaf removal at R3, R4, and R5 demonstrated similar yield potential when 25 to 75% of the leaves were removed (Figure 6). Soybeans reached ~80% of yield potential when half of the leaves were removed and ~60% of yield potential when three-fourths of the leaves were removed R3, R4, or R5.

Soybeans normally continue developing new leaves between R5 to R6 (first seed to full seed) at which point plants shift the priorities to developing pods and seeds. As you might imagine, leaf loss later in reproductive stages or greater leaf loss at R4 and R5 will have more impact on development and yield. These plants have more investment into developing pods and seed, and now, less time for leaf recovery, pod retention, and seed fill before the season closes. This is demonstrated with the yield differences when all the leaves were removed at R3 compared to R4 and R5 (Figure 6).

Weather happens and there is nothing we can do about it. The best course of action is to know the growth stage when the damaged occurred and assess leaf loss (e.g., percent or number of leaflets missing) to get an idea of the yield potential. Even with half of the leaves lost between R1 to R5, soybeans can attain 95 to 80% yield potential.

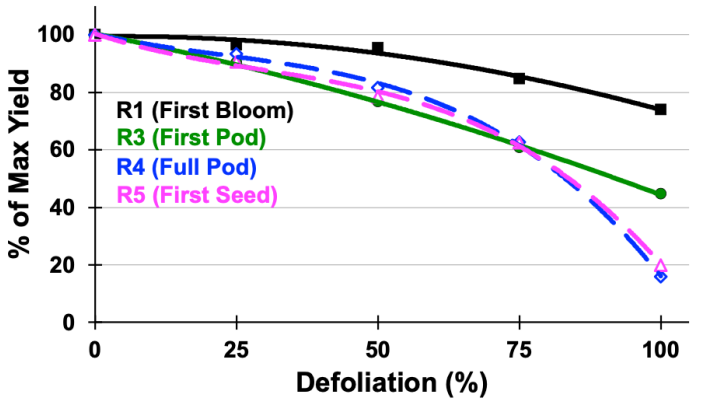


Figure 6. Soybean yield effects after 0, 25, 50, 75, and 100% defoliation at R1 (first bloom, 2012-14), R3 (first pod, 2012-14), R4 (full pod, 2016-18), and R5 (first seed, 2016-18) near West Lafayette.

STAB Your Hay

(Keith Johnson)

Second harvest of hay is likely coming to a close, and with the recent rain a good third harvest should be in the making because adequate moisture is present.

With hay that has been made, you are encouraged to now follow through and **S**ample, **T**est, **A**llocate, and **B**alance or **STAB** your hay. Doing the STAB is an important best management practice to keep your livestock healthy.

Taking time to STAB hay is important to keep livestock in excellent health. (*Photo Credit: Keith Johnson*)

Sample – Hay from each harvest from a field should be sampled with a hay probe. Many Purdue Extension offices have a hay probe to loan to sample hay. The website foragetesting.org has a list of hay probes that can be purchased for sampling hay. Twenty probings comprise a sample. Ten large bales are sampled twice on opposite sides of the curvature of a round bale and each butt end of a rectangular bale. One probing is taken from one butt end of each of twenty small rectangular bales to comprise a sample. Probings should be placed in a clean plastic bag that can be sealed to retain moisture. Mark the plastic bag with the forage type(s), location harvested, and cutting number.

Test – Certified laboratories can be found at foragetesting.org. A basic test will suffice in most cases. A form from the laboratory should accompany the samples and it is likely available at the laboratory website. Minimally, request moisture, crude protein, adjusted crude protein, Neutral Detergent Fiber (predicts dry matter intake), and Acid Detergent Fiber (predicts digestibility). If the forage was harvested as baleage, request pH, too. Mineral analysis should be requested if a total mixed ration is fed to livestock. A test can be done by wet laboratory or Near Infrared Reflectance Spectroscopy (NIRS) methods. The advantage of NIRS analysis is it takes less time to process the sample and the test will cost less.

Allocate – Results received from the laboratory should be reviewed by a trained livestock nutritionist and you. Based on these results, each harvest will be allocated to the class of livestock that the analysis best meets nutritional needs. Growing livestock and females in early lactation will require the best quality hay harvested.

Balance – Utilize the service of the livestock nutritionist, or acquire the knowledge and ability, to balance rations to meet nutritional needs that the hay cannot provide alone. Purdue Extension Educators may know individuals that have the skill to balance rations to keep livestock in excellent health.

You have worked hard to get hay made so far this year. Follow through with the STAB so the forage can be used to best advantage to keep your livestock in proper body condition so performance is not compromised.

P.S. The Indiana Forage Council has organized a Hay Quality Contest this year. For details, go to www.indianaforage.org and find the information in the Upcoming Events tab.

Grazing Schools Can Be A Transformative Experience For Clientele

(Keith Johnson)

I was at a southern Indiana farm last week with an Extension Educator and producer. The producer noted that he was in attendance at last year's grazing school and expressed appreciation for things learned. His learning at the Grazing School resulted in improved forage and grazing management practices today.

Grazing School clientele identify different forage species at the 2023 educational event. (*Photo Credit: Keith Johnson*)

Survey results from the 2023 schools note that Indiana Grazing School participants (number completing survey was 39) learned something they did not know before attending (99%), were extremely likely to recommend this event to a friend or colleague (86%), and will change their grazing techniques to optimize pasture growth (51%).

A news release regarding the 2024 grazing schools that was prepared by Ashvini Malshe with Purdue Agricultural Communications follows. Please share the opportunity of the Grazing Schools, and consider attending, too, if wanting to learn about and enact improved grazing management practices.

WEST LAFAYETTE, Ind. — From the Indiana Forage Council (IFC) and Purdue Extension agriculture and natural resources, the Indiana Grazing Schools will start in August. Livestock producers will gain hands-on training in implementing improved grazing systems.

The program also is hosted by the U.S. Department of Agriculture Natural Resources Conservation Service and the Indiana Association of Soil and Water Conservation Districts.

The event will cover topics including soil fertility, water, fencing and grazing systems, animal health, and plant identification. The program will offer two training sessions. The registration fee is $80 and covers the cost of management information and a meal and refreshments on the program's second day. Additional individuals from the same operation can attend for a reduced $55 fee.

Dates and locations:

- Aug. 2-3, Farm of Steve J. Stoll, 12397 E. County Road 500 N, Loogootee, IN 47553
- Sept. 27-28, Pargil Natural Resources Learning Center, 2335 N. State Road 9, LaGrange, IN 46761

The programs will run from 1-6 p.m. Friday and 8 a.m. to 4:30 p.m. Saturday. Attendees will hear from featured speakers and hosts Keith Johnson, Purdue professor of agronomy and Extension forage specialist; Jason Tower, Southern Indiana Purdue Agricultural Center superintendent; Ron Lemenager, professor of animal sciences and Extension beef specialist; Jackie Boerman, associate professor of animal sciences and Extension dairy specialist; Grant Burcham, DVM, veterinary diagnostician; and many other experts.

"Attending a grazing school can be a transformative experience. Attendees can take education learned and put the practices in place on their farm. The networking among instructors and attendees is also apparent at a grazing school," Johnson said. "This interaction has value as future questions can be directed to instructors and other producers that were part of the event."

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

The registration form is available on the IFC's website. Deadline to register is July 19 and Sept. 13 for the Loogootee and LaGrange schools, respectively.

Direct questions to Johnson at johnsonk@purdue.edu or 765-494-4800. If individuals require auxiliary aids and services due to a disability, call 765-494-4800 prior to the event.

Writer/Media Contact: Ashvini Malshe, 765-496-7480, malshea@purdue.edu

Remnants Of Hurricane Beryl Bring Relief And Challenges To Indiana

(Austin Pearson)

The remnants of Hurricane Beryl brought much-needed rain to the state, although some areas experienced excessive totals. In addition, sporadic power outages were reported as a result of wind gusts exceeding 30 mph. The Community Collaborative Rain, Hail, and Snow (CoCoRaHS) volunteer network once again proved essential, with observations ranging from just under 0.4 inches to over 6 inches. The heaviest rainfall was recorded in northwestern Indiana, where Rensselaer 6.2 SE measured 6.05 inches on the morning of July 10 (Figure 1). Despite Hurricane Beryl being the earliest Category 4 and Category 5 hurricane on record, it was not the earliest tropical system to impact Indiana. In fact, it was the seventh earliest tropical system to reach Indiana, based on data from the National Weather Service Indianapolis Office. The earliest known tropical cyclone remnants to reach Indiana were from Alberto on May 30, 2018.

Beryl's rain came at a crucial time (recent dry conditions and crops entering reproductive phases), as the July 4, US Drought Monitor showed that just over 71 percent of the state was in either abnormally dry (D0) or moderate drought (D1) conditions. Over 17 percent of the state was truly in drought status, classified as at least D1. Southern Indiana experienced some relief in the first week of July, leading to improvements in the July 11 US Drought Monitor (Figure 2). However, drought expansion was noted in the east-central portion of the state, and D0 conditions were introduced in far northwestern Indiana.

Some of you may wonder why there wasn't widespread improvement in the US Drought Monitor this week, despite Beryl's precipitation. The reason is that data collected after Tuesday morning are not considered in the current week's map. Since Beryl was mostly a Tuesday to Wednesday event, most of the precipitation fell after the cutoff to be considered. We'll have to wait until next week's release on July 18 to see the full impact.

Temperatures have been near to slightly below normal across the state since the beginning of July. Despite this, Modified Growing Degree Days (MGDDs) have continued to track above normal since the beginning of the growing season (Figure 3). GDDs have run 100 to 200 units above normal from April 1 to July 8.

Looking ahead, the Climate Prediction Center indicates elevated chances of near- to above-normal temperatures and precipitation through mid-July. From now until July 18, most of Indiana could see up to an inch of rain, with isolated areas receiving higher amounts (Figure 4). Rainfall is expected to follow the typical summer pattern of scattered storms, where some areas might receive rain while nearby areas remain dry. Statewide, there may be an increased chance of rain toward the end of this forecast period.

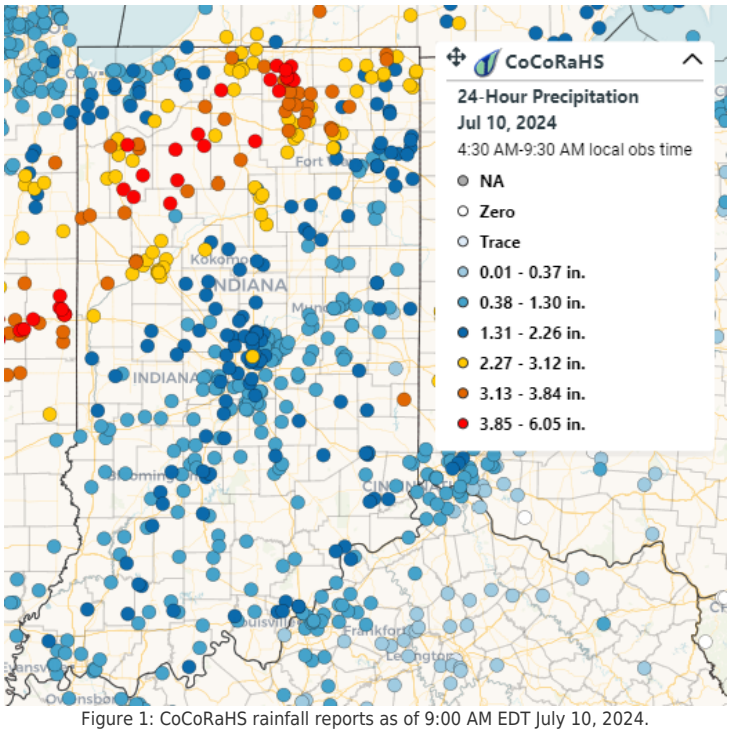


Figure 1: CoCoRaHS rainfall reports as of 9:00 AM EDT July 10, 2024.

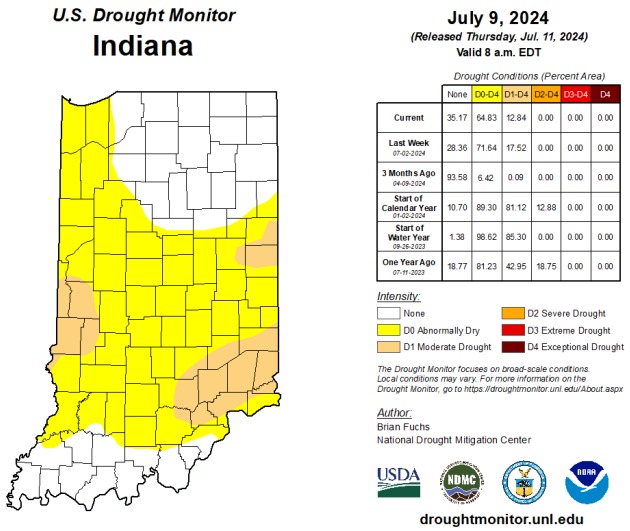


Figure 2: July 11 US Drought Monitor Map.

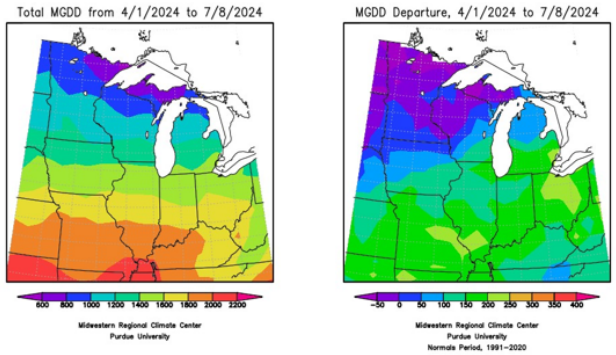


Figure 3: Left – Accumulated Modified Growing Degree Days (MGDDs) (base 50F, ceiling 86F) from April 1 – July 8, 2024. Right – Accumulated MGDDs from April 1 – July 8 represented as the departure from the 1991-2020 climatological average.

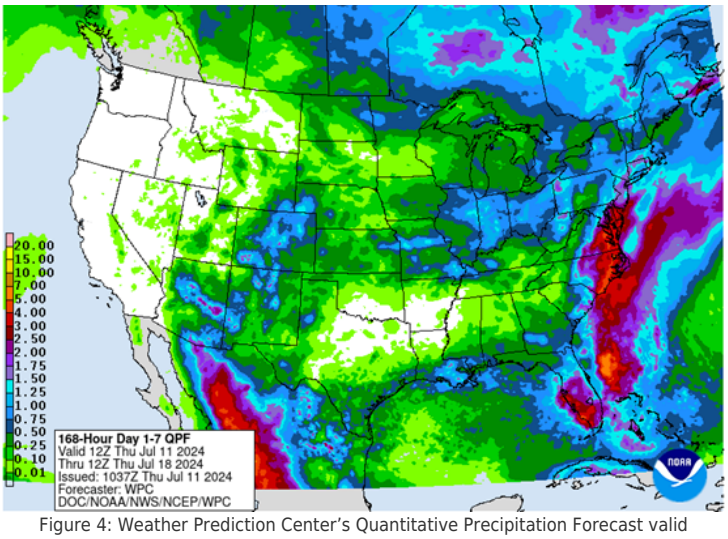


Figure 4: Weather Prediction Center's Quantitative Precipitation Forecast valid Thursday July 11 – Thursday, July 18.

Pest&Crop newsletter © Purdue University - extension.entm.purdue.edu/newsletters/pestandcrop
Editor: Tammy Luck | Department of Entomology, Purdue University, 901 Mitch Daniels Blvd, West Lafayette, IN 47907