

# Pest & Crop newsletter

**Purdue Cooperative Extension Service and USDA-NIFA Extension IPM Grant**

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## Bean Leaf Beetle Leaf AND Pod Feeding; Some High Beetle Numbers And Damage!

(Christian Krupke) & (John Obermeyer)

Soybean fields throughout the state are rapidly undergoing their annual color changes, deep green to golden yellow. Those soybean fields still green, especially those that are behind neighboring fields in development, should be monitored for bean leaf beetle. Remember that earlier, or later planted crops in a region, can often be magnets for insect pests, depending on time of year. Bean leaf beetle will be attracted to these "trap crops" and begin to feed on the softer green pods as the foliage begins to yellow. Bean leaf beetles scar the surface of pods, but only occasionally feed through the pod to the developing beans. The problems come later, during pod maturation. At that time, this scar often cracks as it dries out, leaving an entry hole for moisture and airborne plant pathogens (primarily fungi and yeasts) that may cause discolored, moldy, or shriveled beans.

It is important for pest managers to be able to predict whether economic damage will occur based on the numbers of beetles that are present now and the stage of pod development (i.e., green, yellow, yellow-brown, or brown pods). Once the pods turn yellow to yellow-brown, they become unattractive and less susceptible to damage (this is also part of the reason behind the movement from drying beans to still-green fields). Control is normally **not** warranted when pods are yellow or brown, and you likely **won't** contact many beetles with these sprays – they are not interested in you and your yellow pods.

For leaf feeding, 15% or greater defoliation in soybean growth stages R1-early R5 should be considered for treatment if beetles are still active. For reference, this is a pretty high level of defoliation for this time in the year, and quite uncommon historically. For growth stages R5-R6, scout bean fields for pod damage: randomly select 2 plants in each of 5 areas of the field and count the number of pods per plant and the number that show damage (i.e. 10 total plants). Calculate the percentage of damaged pods per plant for the field as a whole. Note whether the pods are green, beginning to turn yellow, or are yellow/brown. You should also determine the number of beetles per sweep using an insect sweep net. Take 5 sets of 20 sweeps in the field. Determine the number of bean leaf beetles per sweep.

Use the following table to determine when a treatment may be necessary.

No. of beetles per sweep in 30 inch (7 inch) row spacing			
Pot Injury Level	Less Than 4 (3)	4(3) to 7(5)	More than 7(5)
0 to 8%	Discontinue sampling	Sample again in 5 days	Control (preventive) if pods still green
8 to 12%	Sample again in 5 days	Control if pods are still green	Control if pods are green to yellow
Over 12%	Control if pods are still green and beetles are present	Control unless pods are completely dry	Control unless pods are completely dry

*Table modified from the University of Illinois.*

If a treatment is deemed justified, be mindful of the insecticide's pre-harvest interval (**PHI**) which is stated on the label, this is the number of days before one can legally harvest those soybeans. It varies widely, with some recommended insecticides having a PHI of 45 days, which will likely be too long for some planned harvest windows.



While driving by this soybean field, something just didn't look right. Here is a view from an adjacent hill. (Photo Credit: John Obermeyer)



Just one step into this field showed all the little round holes...a.k.a., defoliation.  
(Photo Credit: John Obermeyer)



To assess the defoliation throughout the canopy, it is helpful to hold up plants for a full view. Two plants were measured for percent defoliation using a free app, LeafByte, but it takes some time to do. One plant measured 10.7% and the other 15.8% total defoliation. Rule of thumb, the damage always looks worse than what it really is. Notice how most damage is in the upper canopy. (Photo Credit: John Obermeyer)



The next logical step is to identify the pest and numbers, will damage continue? The plastic bag contains the contents of 20 sweeps with a sweep net, 326 bean leaf beetles and a few green cloverworms. That is 16.3 beetles/sweep, compare with the threshold table! (Photo Credit: John Obermeyer)



Incredible as it may seem, the defoliation percentages, in these late R5 soybeans, didn't justify a rescue treatment alone...BUT there's more to the story. As this photo reveals, the bean leaf beetles are beginning to feed on the pods (see accompanying article). Now we consider the bean leaf beetle biology (will feed until frost), the incredible numbers in this field, and their feeding switch from foliage to pods in the very near future. This soybean field needs protection!!! (Photo Credit: John Obermeyer)



Not from this field, but a pod split open reveals the results of moisture entering through the bean leaf beetle scar. (Photo Credit: John Obermeyer)

## A Forage Agronomist's Reflections And Response To The Fall Armyworm Invasion

(Keith Johnson)

This past week has been problematic.

For the world - Afghanistan

For the southeastern USA - Hurricane Ida

For Indiana and surrounding states - Fall armyworm

### Reflections regarding the fall armyworm

- Fall armyworm invasion was predicted in early August by Purdue University entomologists. Their expertise is valued. Thank you to the individuals that track moth flights during the year.
- Taking time to scout crops is very important. Those that did this "best management practice" had an opportunity to control the fall armyworm before extreme devastation occurred.
- Extreme defoliation of the forage is somewhat equivalent to a

- close grazing or machine harvest.
- Availability of many approved insecticides with varying harvest restrictions was important to meeting the varying needs of producers.
  - The effort of the agricultural industries response to providing and applying insecticides in a timely manner was appreciated.

#### Response to the fall armyworm

- Continue scouting fields often for several more weeks. The entomologists indicate that there may be more armyworm egg hatch occurring.
- Devastated forage that was ready to be harvested by machine or grazed by livestock will be less impacted as compared to those that were not because carbohydrate and protein reserves in storage organs used for regrowth were adequate.
- Do not take another machine harvest from damaged fields. We are at the time of year anyway when the last growing season harvest should be completed.
- Avoid grazing extremely defoliated pastures for the rest of the year unless growth is abundant after plants are dormant. If grazing occurs in the late fall, do not overgraze.
- If fertilizer is recommended by soil test, apply now as this may help weakened forages.
- Continue reading the *Purdue University Pest & Crop Newsletter* and encourage others to become weekly recipients. It just might make a difference in keeping your agronomic crops healthy.



Fall armyworms invaded many forage fields in Indiana and surrounding states this past week. (Photo Credit: Brad Shelton, Superintendent, Feldun-Purdue Agriculture Center)

## Why The R5 Growth Stage In Corn Still Matters

(Dan Quinn)

The majority of the corn across the state of Indiana has either just entered the dent growth stage (R5) or has already been in the dent stage as it approaches physiological maturity (R6, black layer). Once corn reaches R5, there can be a preconceived notion that we are now home free if any stress were to occur, and that grain yield has been made. However, it is still important to understand the importance of this final growth stage of the corn plants life prior to reaching maturity, and why a significant amount of grain yield is still being determined during this period.

The R5 growth stage in corn can occur approximately 30 – 40 days following silking and is defined when nearly all kernels are ‘dented’ at the crown of the kernel and hard starch or solid endosperm has begun to form (Abendroth et al., 2011; Larson, 2018) (Figure 1). The ‘dent’ at the kernel top is a result of starch content increasing and moisture content decreasing within the kernel (Abendroth et al., 2011).



Figure 1. Appearance of kernel dent at the beginning R5 growth stage in a white corn hybrid.

The R5 growth stage of corn takes about 30-33 calendar days and approximately 337 to 360 growing degree days (GDDs) to complete and can depend on hybrid maturity (Brown, 1999; Abendroth et al., 2011; Nielsen, 2021). Corn also advances much quicker through the beginning stages of R5 compared to the later stages of R5 (Table 1).

Understanding and staging the progression of the R5 growth stage in corn is determined through the identification of the milk line (Figure 2). The milk line is the line within the kernel that separates the solid endosperm and liquid endosperm. As the corn plant approaches maturity, more moisture is lost from the kernel, and the milk line progresses toward the cob. Identifying the milk line is important for understanding 1) what is my approximate kernel moisture, 2) what is my approximate kernel dry matter accumulation, and 3) how much time do I have left until corn reaches maturity? (Table 1). Milk line progression can also help gauge when irrigation should be terminated.

**Table 1. Kernel moisture percentage, kernel dry matter percentage, and approximate calendar days for milk line progression during the R5 growth stage of corn (Abendroth et al., 2011).**

R Stage	% Grain Moisture	Kernel Dry Matter (% of Total Dry Weight)	Calendar Days
5.0	60%	45%	3

**Table 1. Kernel moisture percentage, kernel dry matter percentage, and approximate calendar days for milk line progression during the R5 growth stage of corn (Abendroth et al., 2011).**

R Stage	% Grain Moisture	Kernel Dry Matter (% of Total Dry Weight)	Calendar Days
5.25 (1/4 Milk Line)	52%	65%	6
5.5 (1/2 Milk Line)	40%	90%	10
5.75 (3/4 Milk Line)	37%	97%	14
6.0 (Physiological Maturity)	35%	100%	59

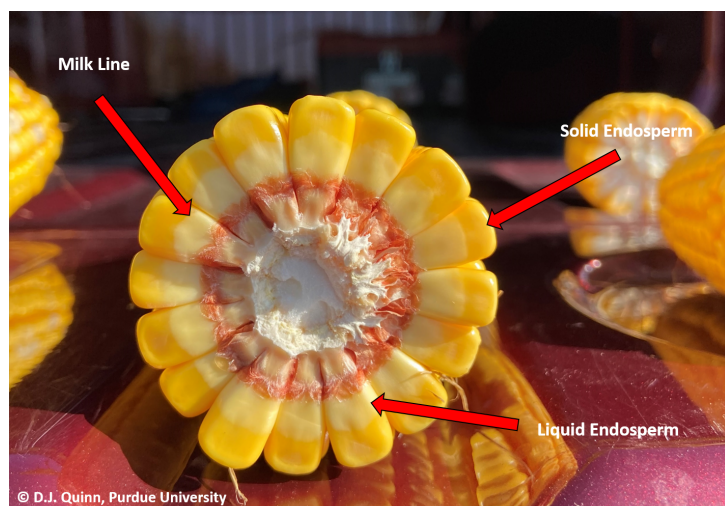


Figure 2. Solid endosperm, liquid endosperm, and milk line appearance in corn during the R5 growth stage.

What is important about the R5 growth stage in terms of grain yield is specific to the amount of kernel dry matter accumulation that is occurring during this stage. At the beginning of the R5 growth stage, even though corn is getting close to maturity, percent total kernel dry weight is only 45% (Table 1; Abendroth et al., 2011). This means that there is still approximately 50 to 55% kernel dry weight left to be accumulated. Therefore, if significant environmental stress (drought, nutrient deficiency, etc.) were to occur during beginning R5, significant yield losses can still occur. Kernel weight is a major yield component for corn, and achieving excellent grain fill and maximum kernel weight is important for achieving high corn yields. Previous research has shown that complete plant death from frost, or complete leaf loss at beginning R5 can reduce corn yield by approximately 41 and 27%, respectively (Carter and Hesterman, 1990). However, once corn has reached half milk line, approximately 90% of kernel dry matter has been accumulated and yield losses may only be 5 to 10%. The importance of kernel weight can also be highlighted when performing yield checks in your fields using the yield component estimation method (Nielsen, 2021). The “fudge factors” used to estimate corn grain yield are based on kernel weight or the number of kernels per 56 lb bushel. The most common number used is 90 or 90,000 kernels per 56 lb bushel. However, using a range from 65 (heavy kernels) to 105 (light kernels) can give you an indication of the importance of kernel weight for yield and the impacts environmental stresses can have during corn grain fill.

It is important to remember that although corn has reached the R5 growth stage, there is still a significant amount of yield left to be made. Factors such as photosynthetic leaf area loss, high temperatures, drought, premature ear drooping, termination of irrigation too early,

nutrient deficiencies, foliar diseases, and insect damage can still impact corn yield at R5 by limiting the amount of carbohydrates provided by the plant and reducing kernel weight. However, these yield losses can drastically decrease as the milk line progresses and the corn plant approaches maturity. Therefore, it is still important to be scouting and walking your fields later in the season, pulling some ears, and understanding where the milk line is at to determine what potential impacts environmental stresses may have and how much longer until that corn plant reaches maturity.

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## Hurricane Ida Shares Her Rain In Southern Indiana

(Beth Hall)

While Hurricane Ida and her remnants have wreaked havoc down south and in the mid-Atlantic states, she was relatively kind and generous when it came to Indiana. Some southern counties received between 4 and 5 inches from Ida (Figure 1). In east central Indiana, similar amounts were felt (e.g., Delaware County), but due more to isolate thunderstorms around August 29<sup>th</sup>. Will this help alleviate the abnormally dry and moderate drought conditions that have been lingering around the state? Figure 2 puts the last 30 days of precipitation into climatological perspective showing that even with those recent rain events, a considerable amount of the state (particularly those with drought concerns) has only received 50% to 75% of what is typical for this time of year with respect to precipitation amounts.

**Accumulated Precipitation (in)**  
August 27, 2021 to September 02, 2021

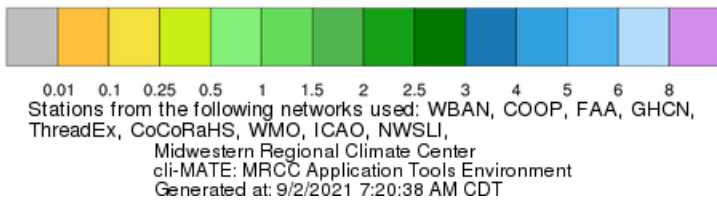
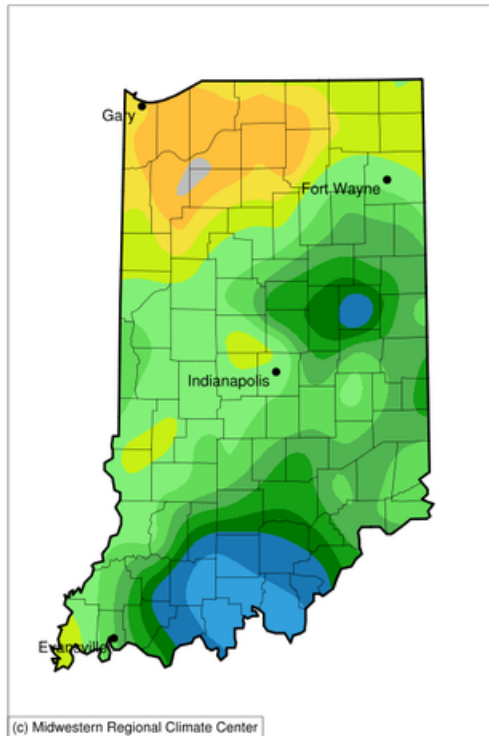


Figure 1. Total precipitation from August 27 to September 2, 2021.

**Accumulated Precipitation (in): Percent of 1991-2020 Normals**  
August 04, 2021 to September 02, 2021

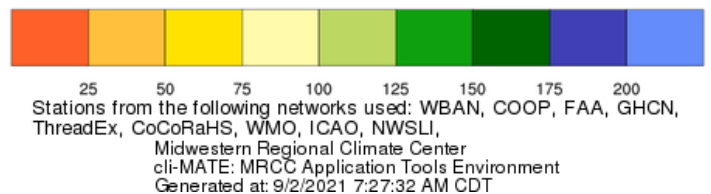
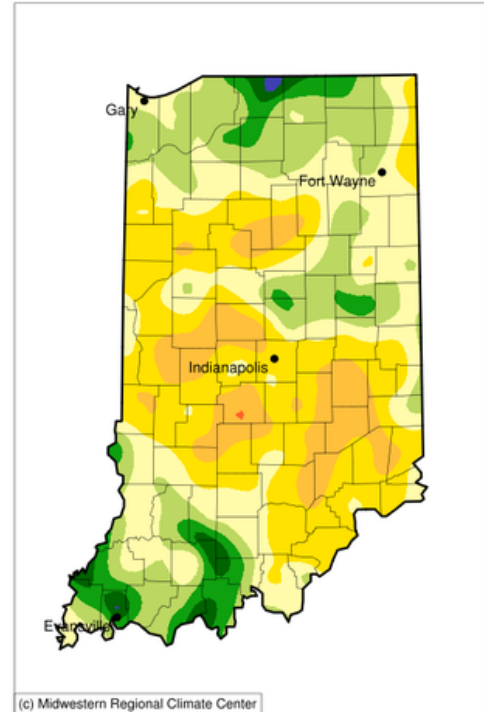


Figure 2. Precipitation from August 4 to September 2, 2021 presented as a percentage to the 1991-2020 climatological normal.

Heat index values have been high lately due to high humidity and calmer winds. However, the forecasts are predicting dew point temperatures in the 50s\*, which should make conditions feel less muggy. For the next several weeks, climate outlooks are favoring below-normal temperatures and precipitation. By mid-September, outlooks are suggesting temperatures should return to normal or may lean towards above-normal conditions with precipitation still remaining fairly dry. It seems fall conditions are trying to push summer behind us!

Modified growing degree-day accumulations are now ranging from around 2400 units in northern Indiana to above 3000 units in southern Indiana (Figure 3). While southern Indiana seems to still be lagging behind the climatological average for this period (April 1 through September 2), the northern part of the state is now around 100 to 150 units ahead of average (Figure 4). Figure 5 shows the comparison of this year's modified growing degree-day accumulations compared to recent years.

\*The lower the dew point temperature, and further away it is from the actual temperature, the drier the air.

### Growing Degree Day (50 F / 86 F) Accumulation

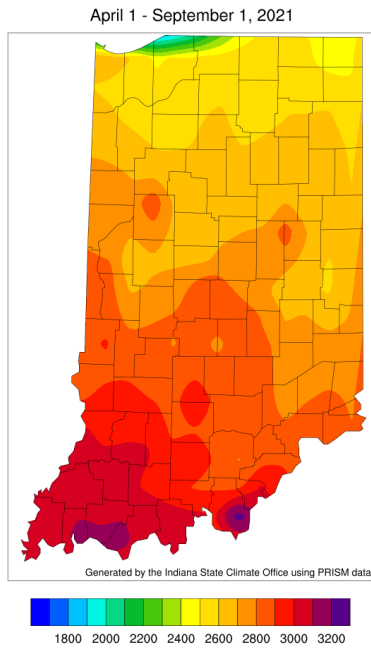
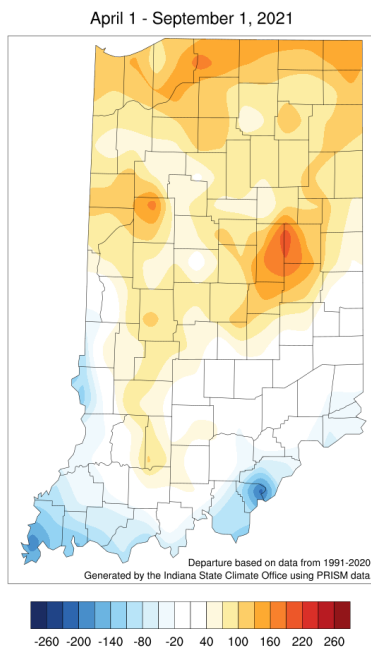


Figure 3. Accumulated modified growing degree days from April 1 through September 1, 2021.

### Growing Degree Day (50 F / 86 F) Departure From Average



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Figure 4. The accumulated modified growing degree day departure from the 1991-2020 average for April 1 through September 1, 2021.

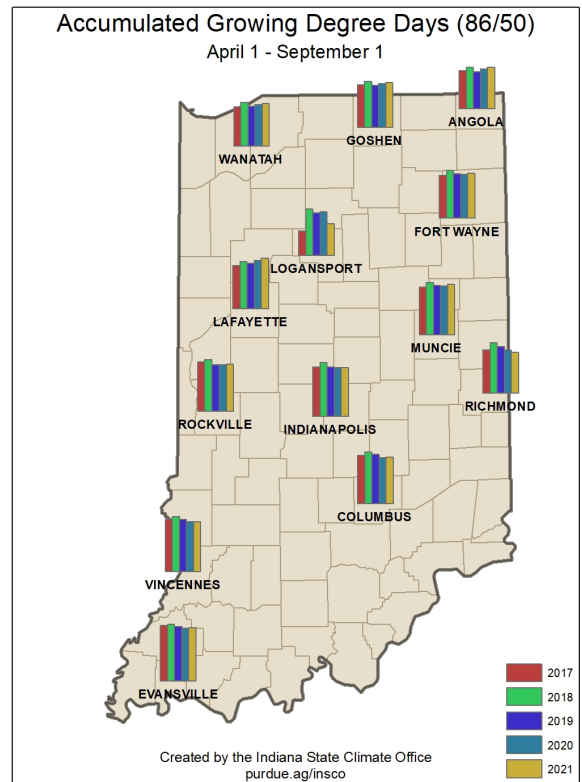


Figure 5. Comparison of 2021 modified growing degree day accumulations from April 1 - September 1 to the past four years.