PURDUE UNIVERSITY Extension - Entomology

Pest&Crop newsletter

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In This Issue

"Tip Back" In Corn – What Is It And What Does It Mean?

(Dan Quinn)

Each year as corn harvest approaches and the anticipation for *finally* being able to get behind the wheel of the combine heighten, it is not uncommon to find work benches, dinner tables, and agronomist office desks full of corn ears. Examining corn ears from your fields each year can help provide an estimate of what the yield might be, however examining corn ears prior to harvest can also help paint the picture of how the corn plant was impacted throughout the year, and why your yield maybe wasn't as good as you hoped.

One of the biggest concerns observed on corn ears examined in 2022 is that of "tip back". Tip back can be described as corn ears that did not fill kernels from the base of the ear all the way to the tip of the ear, thus ear tips may exhibit some length of missing and/or incomplete kernels (Figure 1). There are two main reasons for tip back, which include 1) poor pollination, causing the absence of kernel formation and 2) kernel abortion. First, it is important to remember that the silks that emerge last from an ear during pollination and the kernels that fill last during grain fill are located on the tip of the ear. Therefore, any significant stresses exhibited shortly before pollination, during pollination, and shorty after pollination can negatively impact these "youngest" kernels. If many of your corn ears exhibit tip back, then examine the tips of the ears closely to understand the cause of the problem. Poor pollination can occur when stressful conditions occur a few weeks prior to and during pollination (e.g., silk and tassel emergence). For example, drought conditions can delay silk emergence and cause poor synchrony between pollen drop and silk emergence. In addition, since the last emerging silks are located at the tip of the ear, pollen drop (which occurs only for 7-10 days) can be completed prior to silk emergence, thus causing the ovules (potential kernels) at the tip of the ear to never be pollinated. In contrast to missing tip kernels caused by poor pollination, kernel abortion can be identified by shrunken and shriveled kernels on the tip of the ear. Kernel abortion is mainly caused by stresses that reduce plant photosynthetic output (e.g., drought, hail damage, nutrient deficiencies, foliar disease) during the first several weeks following pollination and through the R3 (milk) growth stage. Even consecutive days of cloudy weather can reduce plant photosynthesis enough to cause kernel abortion. Overall, any plant stresses that limit photosynthetically active leaf area or the photosynthetic "factory" of the corn plant, can cause tip fill problems in corn. One example of this were the June drought conditions observed in certain areas of Indiana in 2022, which coincided with the rapid growth phase of corn, and thus limited total plant photosynthetic output, or the total "factory", needed for grain fill.

Now, is all tip back bad? Well, the answer is no, not always. For example, in certain years, ideal environmental conditions present during corn ear size formation (i.e., kernel row number from V6 to V8 and kernel number per row from V6 to a few weeks prior to pollination) may cause ear size to be larger than normal and causing tip back to appear despite high yield conditions. Therefore, if tip back is observed, it is still important to examine total kernel numbers per ear to understand the extent the potential yield impacted.

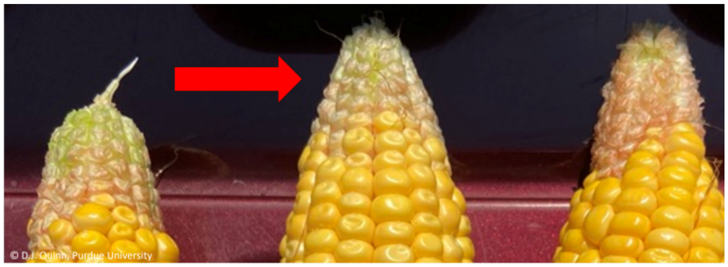

Figure 1. Corn ear tip back observed due to kernel abortion during the 2022 growing season.

Making Sense Of Grain Test Weight In Corn

(Dan Quinn)

What is test weight?

Although yield is always at the forefront of many corn farmers and agronomists' minds during harvest, another important discussion topic each fall is that of grain test weight. Although grain test weight is often discussed when determining how well someone's corn did, this number can often be confusing when understanding its importance, especially in relation to corn grain yield. Grain test weight is used as a grain quality measurement and is identified as the volumetric weight of grain (pounds per bushel). Test weight is based on the official volumetric bushel measurement of 1.244 cubic feet. In addition, the USDA defines the minimum allowable test weight as 56 lbs/bu and 54 lbs/bu for No. 1 yellow corn and No. 2 yellow corn, respectively. Corn grain in the U.S. is marketed specific to a 56-lb bushel regardless of test weight. Furthermore, since test weight is dependent on grain moisture, grain buyers will pay based on "dry" bushels (15 – 15.5% grain moisture).

Corn farmers are often concerned with low test weight because that means local grain buyers may have to discount the market grain prices paid. In addition, if you were to deliver a semi-load of low test weight grain (e.g., 52 lbs/bu) then this specific load would contain less "56-lb bushels" and you would be paid less for the load on a per volume basis. Whereas, if you were to deliver a semi-load of high test weight grain (e.g., 58 lbs/bu) then that load would contain more "56-lb bushels" and you would be paid more for the load on a per volume basis. This concern amongst farmers regarding test weight often drives the question of "if my corn yielded well, shouldn't I also have high test weight?" And the short answer to that question is no, not always, as there is very little evidence that high corn yield equates to high test weight.

Does high test weight equal high corn yield?

Examples of the lack of relationship between grain test weight and corn yield are presented in the figures below (Figures 1 and 2). The data was collected from multiple corn research trials from Purdue University in West Lafayette, IN in 2021. In Figure 1, there seems to be a slight negative relationship between grain test weight and yield, whereas in Figure 2, there seems to be a slight positive relationship between grain test weight and yield. In addition, both graphs produce trend lines with low R^2 values (0.17 and 0.07, respectively) which indicates that the equation and trend line do not do a good job in explaining the variability of the data. In other words, both graphs highlight both the variability and overall lack of relationship between grain test weight and yield. In many instances, similar test weight values can exist across a wide range of hybrid genetics and environmental conditions. In addition, low yielding corn with smaller kernels can sometimes result in a higher test weight than higher yielding corn with larger kernels (e.g., smaller kernels can result in more "fitting" within the volumetric measurement of a bushel). Therefore, just because your corn may have yielded poorly, does not necessarily mean that test weight is also low.

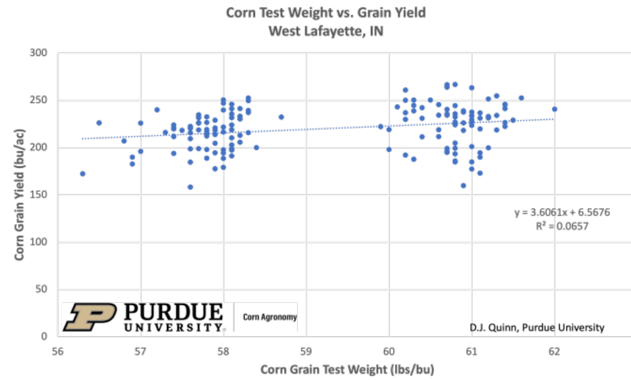

Figure 1. Comparison of corn grain test weight (lbs/bu) in comparison to corn grain yield (bu/ac). Data obtained from Purdue University corn research trials in West Lafayette, IN. 2021.

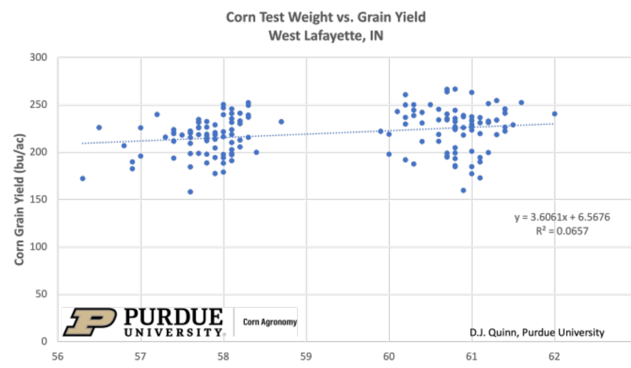

Figure 2. Comparison of corn grain test weight (lbs/bu) in comparison to corn grain yield (bu/ac). Data obtained from Purdue University corn research trials in West Lafayette, IN. 2021.

Factors affecting test weight

Specific factors that can influence grain test weight in corn include hybrid type, kernel physical characteristics, grain moisture, and stress incurred during the grain fill period. First and foremost, an important factor to remember is that corn grain test weight and grain moisture are inversely related. Therefore, the higher the grain moisture, the lower the test weight at that specific point in time. As grain begins to dry, test weight is increased due to kernel volume shrinkage and increased grain "slickness", thus allowing a greater number of kernels to occupy a volume bushel. In addition, other factors that can impact final test weight include plant stresses such as plant foliar disease, insect damage, nutrient deficiencies, and environmental conditions (e.g., early frost, hail damage, drought). Plant stresses that can cause significant reductions in plant photosynthetic processes or even premature plant death may result in premature plant maturation (e.g., black layer), thus resulting in sub-optimal starch deposition into the kernels resulting in low test weight. Overall, when asking "is test weight important?", the answer is yes, especially from an economic standpoint. However, it is important to understand that high test weight does not always mean high grain yield and vice versa.

Additional Resources:

Nielsen, R.L. 2021. Grain Test Weight Considerations for Corn. Corny News Network. Purdue Univ. Ext., West Lafayette, IN. https://www.agry.purdue.edu/ext/corn/news/timeless/testweight.html

Rankin, M. 2009. Understanding Corn Test Weight. UW Ext. Team Grains. Univ. Wisconsin-Madison, Madison, W. https://fyi.extension.wisc.edu/grain/files/2009/12/CornTW09.pdf

Purdue Crop Chat Episode 42, Early Soybean Yield Numbers & Winter Wheat Planting

(Shaun Casteel) & *(Dan Quinn)*

Purdue Crop Chat is a regular podcast from Hoosier Ag Today and the Purdue University Extension Service, featuring Purdue Extension soybean specialist Dr. Shaun Casteel and Extension Corn Specialist Dr. Dan Quinn. On this episode, Shaun and Dan talk about the slow start to the harvest season and some early soybean yield numbers. They also discuss winter wheat planting with a slower start to corn and soybean harvest.

This podcast is made possible by the Indiana Corn Marketing Council and Indiana Soybean Alliance. Your Indiana corn and soybean checkoff investments yesterday are paying off today. New research, new uses, demand creation — bringing dollars back to the farm. Check it out at YourCheckoff.org.

Dry Pattern Continues

(Beth Hall)

As another dry week passes, we are left to wonder when the next significant rain event will occur. The 7-day precipitation forecast is indicating little-to-no precipitation until the end of next week where amounts are still likely to be below half an inch. Climate outlooks beyond this next week is favoring near-normal precipitation – which may not be enough to get most counties out of their current precipitation deficit. Temperatures seem to be wildly transitioning from above normal to below normal at a time of year when evapotranspiration rates are declining. This could help reduce the rate of drought impacts increasing, but Indiana is still likely to see some in the form of burn bans, mild dust storms, low lakes and streams, and stressed vegetation. With farm equipment entering fields, this could bring additional risk for unplanned ignitions.

According to the U. S. Drought Monitor (USDM), abnormally dry (D0) conditions have expanded significantly across northern Indiana with conditions teetering on the edge of needing that classification for more southern counties (Figure 1). Reports have been coming in of dry lawns and soil conditions across the state, so it is likely these USDM classifications will expand or possibly even intensify.

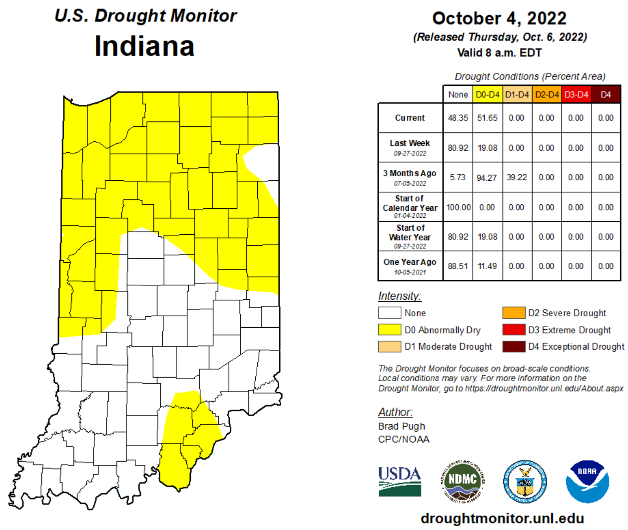

Figure 1. U.S. Drought Monitor for data through October 4, 2022.

Figures 2 and 3 show the recent accumulated modified growing degree day totals and departures for Indiana since April 15, 2022.

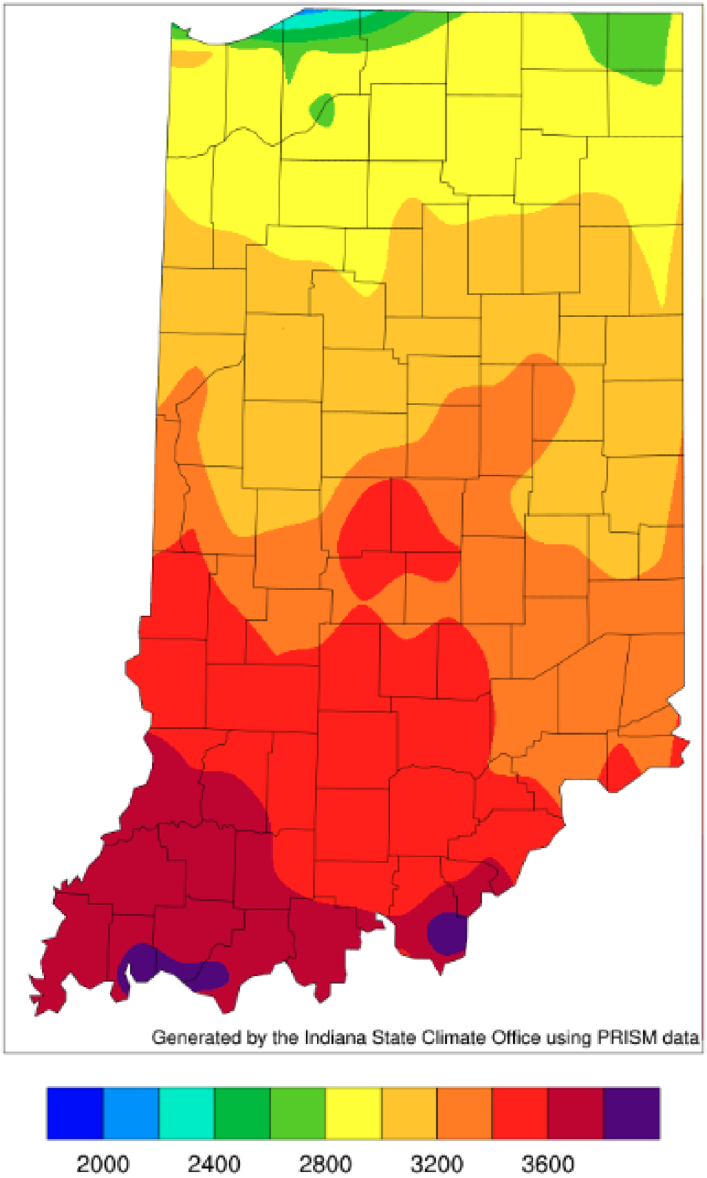

Figure 2. Modified growing degree day (50°F / 86°F) accumulation from April 15-October 5, 2022.

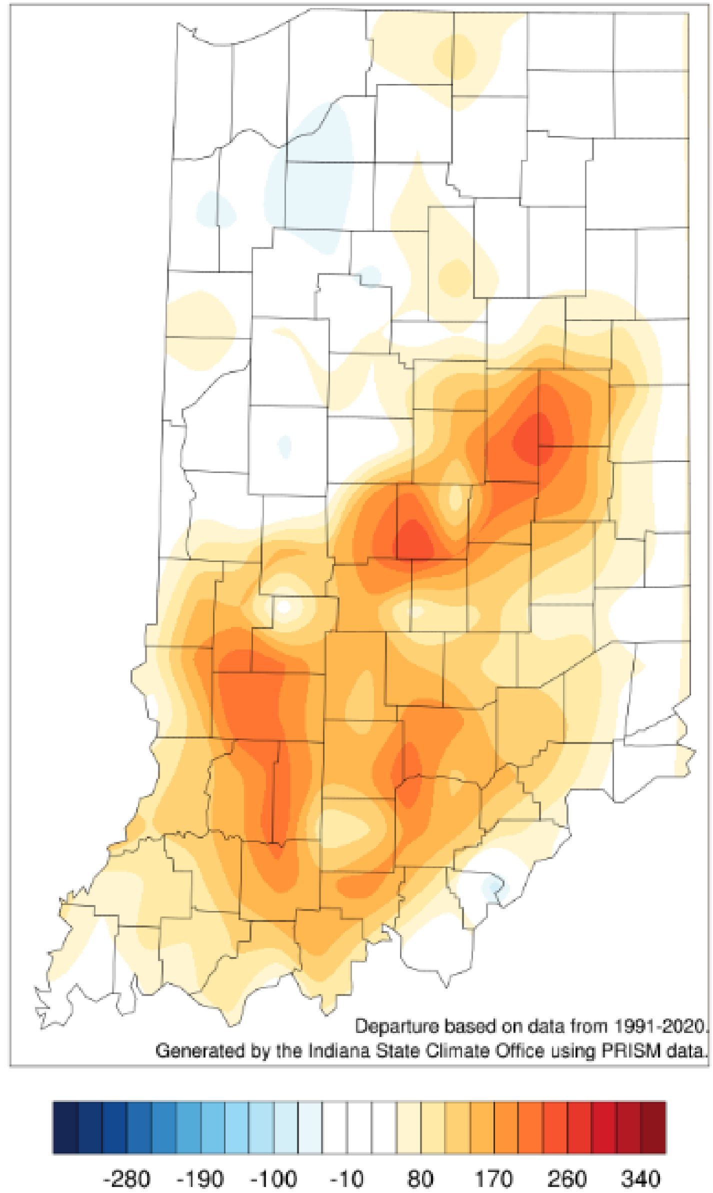

Figure 3. Modified growing degree day (50°F / 86°F) accumulation from April 15-October 5, 2022, represented as the departure from the 1991-2020 climatological average.

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