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In This Issue

Droopy Ears? – Understanding Premature Ear Drop In Corn

(Dan Quinn)

As corn advances through grain fill and approaches physiological maturity (black layer), one thing to watch for is premature ear declination or premature “ear drop” (Figure 1). Premature ear drop in corn can be a significant issue when the ear shank begins to collapse (Figure 2) and the ear drop occurs ***before*** the plant reaches maturity. Whereas, when the ear drop occurs ***after*** physiological maturity this is normal and ideal to avoid potential issues with rainfall and rewetting of kernels.

Figure 1. Premature ear drop symptoms on drought stressed corn plants in Jennings County, Indiana. 2021.

Figure 2. Collapsed or “kinked” ear shank resulting in premature ear drop on drought stressed corn plants in Jennings County, Indiana. 2021.

The most common factor for causing this issue is significant drought stress, specifically occurring in the later stages of corn grain fill. Many areas in Indiana, particularly in the eastern and southwestern parts of the state this year have experienced hot and dry conditions during late August and early September, which has resulted in the observance of premature ear drop within various field locations. The collapsed or “kinked” ear shank (Figure 2) causing the droopy ears suggests a loss of turgidity in the ear shank and potentially some cannibalization of the ear shank tissues due to photosynthetic stress, thus causing the ear to drop too early.

The main question when this issue is observed is always how much will this impact corn yield? The answer to this question can be challenging and it is also a function of 1) when did the premature ear drop occur during grain fill? and 2) how restricted is the ear shank when the ear drop occurred? As an example, I often think of the ear shank similar to a garden hose and instead of transporting water, it is transporting photosynthates into the ear which are essential for optimum grain fill. Therefore, if a garden hose is “kinked” or restricted, water transport can be severely limited or even stopped, which also means a collapsed ear shank can severely limit or even stop the transportation of photosynthates into the ear, thus restricting grain fill.

One method to determine yield loss severity due to premature ear drop is to pull some ears and assess how close they are to physiological maturity, or where the milk line is at on the kernel after the dent stage. If premature ear drop occurs at beginning full dent (milk line barely visible near the dent of the kernels) and grain fill is stopped, yield losses can be upwards of 30 – 40% for the impacted plant. Whereas, if this occurs at half milk line (milk line halfway between the dent of the kernel and the kernel tip), then yield loss for that individual plant may only be 10%. Using this method and getting an idea of the total amount of plants impacted throughout the field can help give you an estimate of what the potential yield impacts may be.

Additional resources:

Nielsen, R.L. 2020. Do your ears hang low? (Premature ear declination in corn).
https://extension.entm.purdue.edu/newsletters/pestandcrop/article/do-your-ears-hang-low-premature-ear-declination-in-corn-2/

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 (or debated) 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 and Wanatah, IN in 2023. In Figure 1, there seems to be a slight positive relationship between grain test weight and yield for trial 1 and a slight negative relationship between test weight and yield for trial 2. In Figure 2, there seems to be a negative positive relationship between grain test weight and yield. In addition, both graphs produce trend lines with low R^2 values (0.06, 0.02, and 0.07, respectively) which indicates that the trend line does 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 addition, the test weight data pulled was from trials containing large differences in nitrogen fertilizer rates and different hybrids.

Therefore, this data showcases that similar test weight values can exist across a wide range of hybrid genetics, fertility levels, and locations. 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 kernels "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.

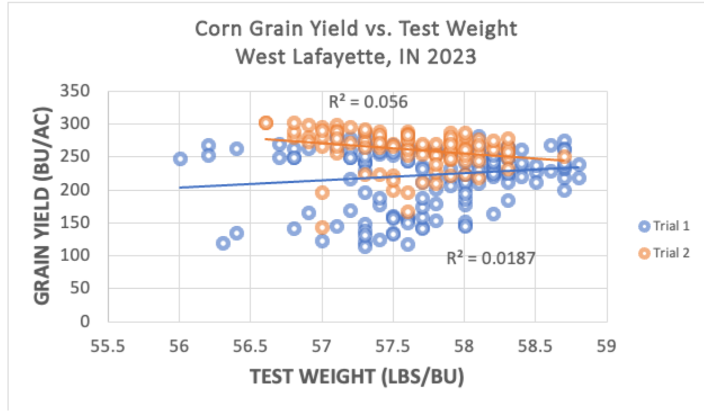

Figure 1. Comparison of corn grain test weight (lbs/bu) in comparison to corn grain yield (bu/ac). Data obtained from Purdue University corn research trials in West Lafayette, IN. 2023.

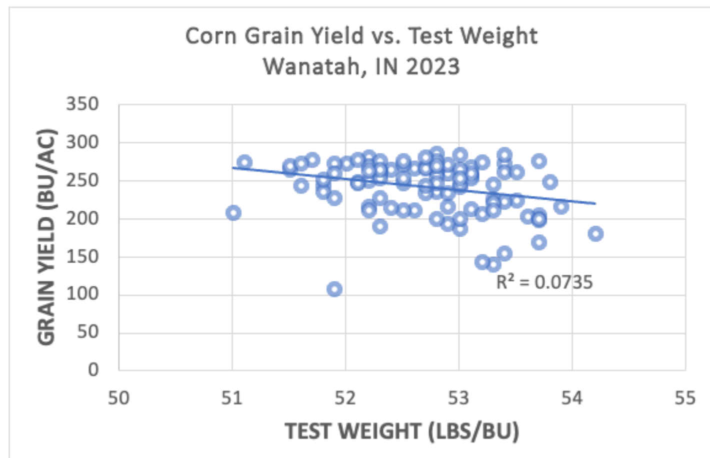

Figure 2. Comparison of corn grain test weight (lbs/bu) in comparison to corn grain yield (bu/ac). Data obtained from Purdue University corn research trials in Wanatah, IN. 2023.

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

Poison Hemlock

(Tommy Butts), *(Bill Johnson)* & *(Marcelo Zimmer)*

The presence of poison hemlock (*Conium maculatum* L.) in pastures, fencelines, and field edges (Figure 1) is a frequent concern in many parts of Indiana. This plant can be noticed throughout the year, but it is most noticeable when emerging in the fall or coming out of dormancy in the spring, as it is typically one of the first weeds to green up, usually in late February to early March if temperatures are favorable. The appearance of poison hemlock on roadsides and fencerows of Indiana is not new as we can find articles in the Purdue Weed Science database dating back to 2003. The largest threat of this weed is the toxicity of its alkaloids if ingested by livestock or humans, but it can also reduce the aesthetic value of landscapes and has been reported to creep into no-till corn and soybean fields as well.

Figure 1. Poison hemlock infestation on roadside (*Photo Credit: Travis Legleiter*)

Biology and Identification

Poison hemlock is a biennial weed that exists as a low-growing herb in the first year of growth (Figure 2) and bolts to three to eight feet tall in the second year, when it produces flowers and seed (Figure 3). It is often not noticed or identified as a problem until the bolting and reproductive stages of the second year. The alternate compound leaves are pinnate (finely divided several times) and are usually triangular in outline. Flowers are white and occur in an umbel inflorescence. ***Poison hemlock is often confused with wild carrot but can be distinguished by its lack of hairs and the presence of purple blotches on the stems.***

Figure 2. Poison hemlock rosette (*Photo Credit: Travis Legleiter*)

Figure 3. Flowering poison hemlock plant (*Photo Credit: Purdue Plant and Pest Diagnostic Lab*)

Toxic Properties

Poison hemlock contains five alkaloids that are toxic to humans and livestock and can be lethal if ingested. The plant’s alkaloids may also be absorbed through the skin, so if you find yourself hand pulling poison hemlock, it would be a good idea to wear gloves. All parts of the plants contain the toxic alkaloids with levels being variable throughout the year. Symptoms of toxicity include nervousness, trembling, and loss of coordination followed by depression, coma, and/or death. Initial symptoms will occur within a few hours of ingestion or exposure.

Cases of poisoning due to poison hemlock ingestion are rare as the plants emit a mousy odor that makes them undesirable and unpalatable to livestock and humans. Consumption and toxicity in animals usually occur in poorly managed or overgrazed pastures where animals are forced to graze poison hemlock because of lack of desirable forages.

Control

Control of poison hemlock with herbicides is most effective when applied to plants in the fall/first year of growth. Fall applications should be timed when weeds are likely beginning to enter their winter survival stage, which generally occurs once average high temperatures are around 60°F for at least a week. These fall applications are beneficial as the plant begins sending sugars and reserves to the large taproot system to survive the winter. If systemic herbicides are applied at this time, the herbicide is translocated to the taproot to completely kill the weed. Applications prior to bolting and flowering in the second year can also be effective; however, the closer to reproductive stages, the less effective the herbicide. In roadside ditches, pastures, and waste areas, herbicides containing triclopyr (Remedy Ultra, Garlon, many others) or triclopyr plus 2,4-D (Crossbow, Crossroad) are most effective in controlling poison hemlock. Other herbicides that provide adequate control when applied at the proper timing are dicamba (Clarity, many others), metsulfuron-methyl (Escort XP), metsulfuron-methyl plus dicamba plus 2,4-D (Cimarron Max) and clopyralid plus 2,4-D (Curtail).

For no-till fields, mixtures of 2,4-D plus dicamba will be most effective for fields going to soybean. If applications are delayed until spring, be sure to pay attention to preplant intervals when these herbicides are used. Preplant intervals will vary based on the soybean herbicide-resistance trait to be planted and whether or not 2,4-D and dicamba were used together to control the weed. For fields going to corn, mesotrione (Callisto™ and other names) and mesotrione premixes + 2,4-D or dicamba have been effective in reducing infestations along field edges.

For further information on toxic plants in Indiana refer to the Purdue University Weed Science Guide to Toxic Plants in Forages (https://www.extension.purdue.edu/extmedia/WS/WS_37_ToxicPlants08.pdf).

Rain Brought Some Relief, But Still Not Enough

(Beth Hall)

From September 19th through 25th, Indiana was fortunate to receive between a quarter inch to almost three inches of precipitation (Figure 1). This seemed to be a sight for many a sore eye since it had been weeks since any appreciable rain had fallen. But was this enough for us to get out of drought and return to "normal"? Not exactly. Figures 2 and 3 show how these recent events impacted the recent 30-day percent of normal precipitation and the departure from normal amounts across the state. In other words, most of the state is still in a moisture deficit with some locations having receive almost three inches less precipitation over the past 30-day period that what normally has occurred in that same period, historically. As a result, the U.S. Drought Monitor continues to show all of Indiana at least *Abnormally Dry* (D0) with a growing percentage of *Moderate* (D1), *Severe* (D2), and even a small area of *Extreme* (D2) drought areas (Figure 4).

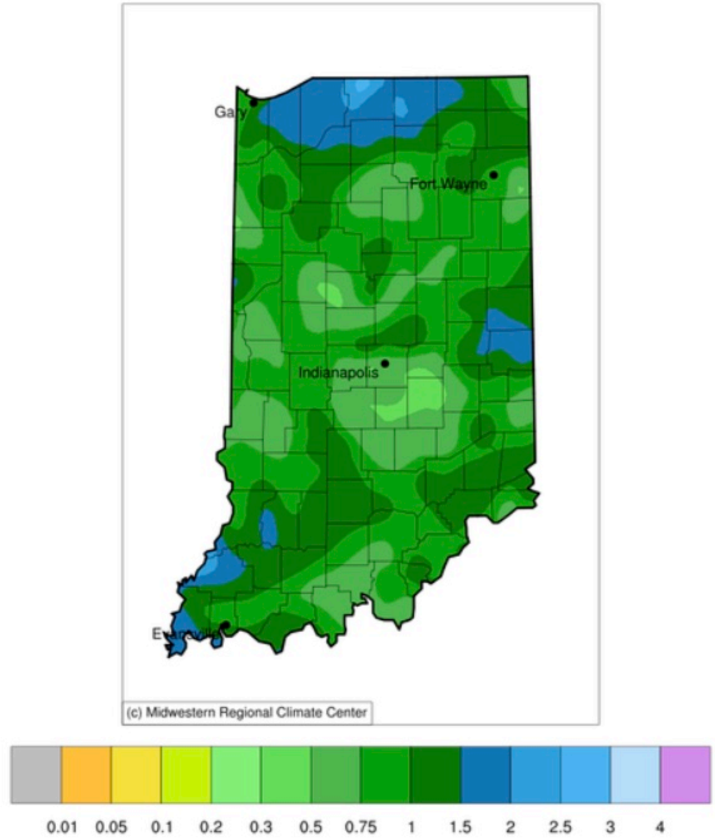

Figure 1. Accumulated precipitation (inches) for September 19-25, 2024.

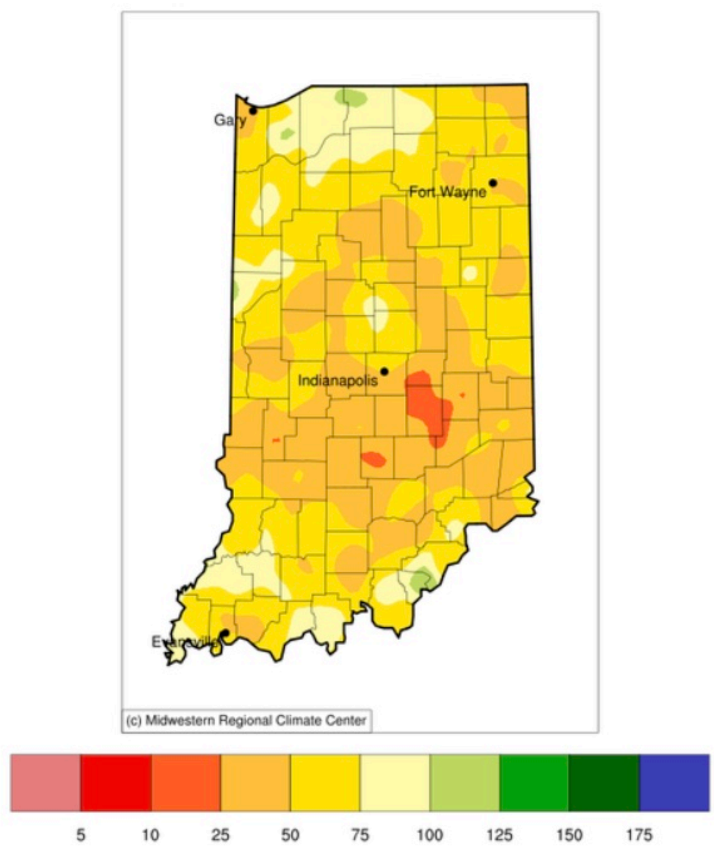

Figure 2. Precipitation from August 27 through September 25, 2024, represented as a percentage of the normal amount from that 30-day period from 1991-2020).

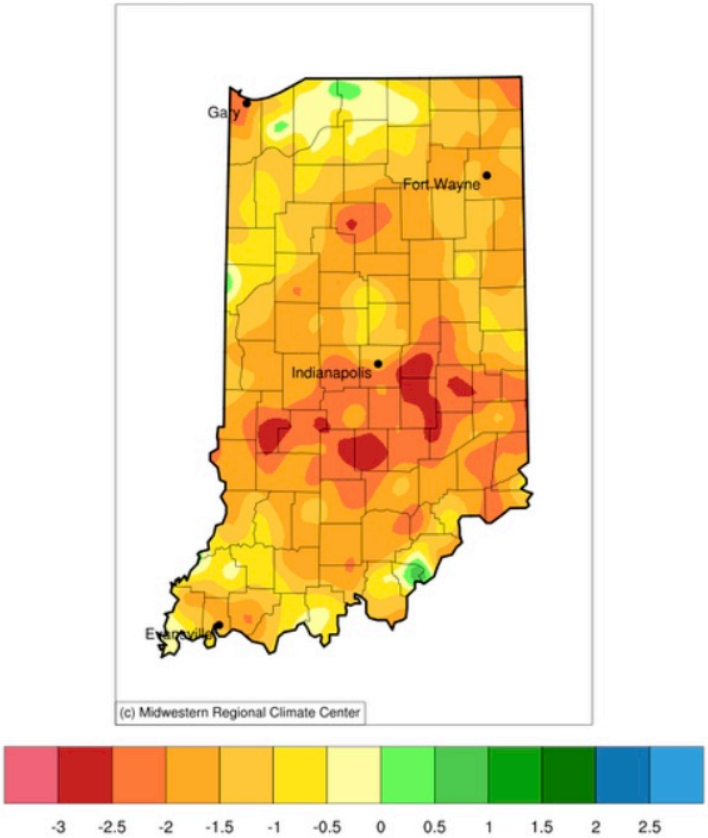

Figure 3. Precipitation from August 27 through September 25, 2024, represented as a departure from the normal amount (in inches) from that 30-day period from 1991-2020).

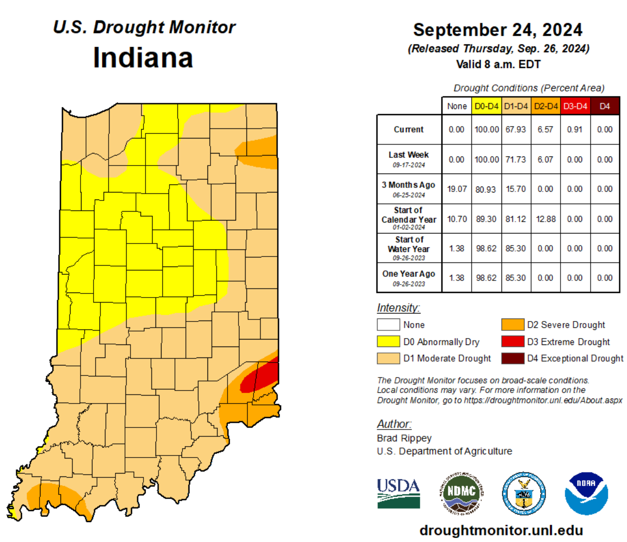

Figure 4. U.S. Drought Monitor considering data through Tuesday morning, September 24, 2024.

Hurricane Helene is expected to move heavy rain northward toward Indiana, but there is still some uncertainty how far north into the state the impacts will occur. At this point, there is moderate confidence that southern Indiana should benefit some from this storm, but central and northern Indiana may not see significant amounts. The seven-day precipitation forecast is favoring amounts over three inches for counties along the Ohio River with amounts rapidly decreasing northward (Figure 5).

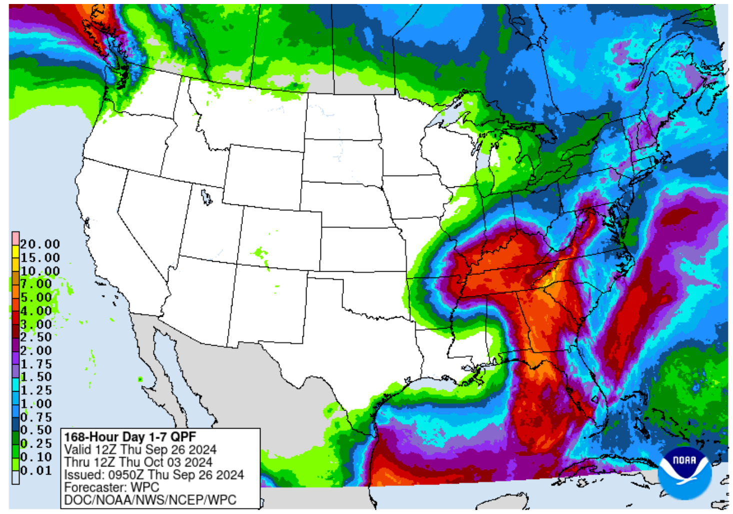

Figure 5. Precipitation total amount forecasted for September 26 through October 3, 2024.

The 6-to-14-day (October 1-9) climate outlooks are currently favoring a return to warmer-than-normal and drier-than-normal conditions across Indiana. Therefore, it would be great if we can somehow maximize as much rain as possible over the next few days to at least keep water supplies strong.

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