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In This Issue

Tar Spot And Southern Corn Rust Update In Indiana

(Darcy Telenko)

Both tar spot and southern corn rust continue to be documented across Indiana (Figures 1 and 2). I suggest if you have not gotten out and looked for these diseases now is the time. Even if your corn is approaching black layer it will be important to document tar spot in your fields for the future disease management decisions.

There are currently 31 counties with a positive confirmation of tar spot and five probable (Figure 1). Twenty-one counties with southern rust and three probable (Figure 2). As we are learning this season when we have favorable environmental conditions there can be severe pockets of tar spot even in areas that have not seen the significant yield impacts previously. In the map all gray counties indicate that tar spot was found in the county in previous seasons.

I have been getting many questions on if a late season fungicide or 2nd fungicide application should be applied.

Here are my thoughts on what to consider to make that decision.

1. What growth stage is the corn? If at dough or beyond I would not make an application
2. What has been the history of tar spot in your field? How much disease do you see currently?
3. When was a fungicide applied? If more than 3 weeks then the effective period for many of our fungicides has run out.
4. Has the environment be favorable for tar spot development – there's an app you can use to check your field risk – Tarspotter
5. If you do decide to make a fungicide application at this point in the season, leave check strips to determine if the fungicide gave you a return on your investment.

We are still documenting tar spot and southern rust as it is important to understand the disease distribution and severity across Indiana. It is extremely important to know if this disease is present in your fields for future risk assessments and to implement disease management tools if necessary. If you observe tar spot in a county that has not reported this season, then please send a sample to the Purdue Plant Pest Diagnostic Lab (PPDL) https://ag.purdue.edu/btny/ppdl/Pages/Submit-A-Sample.aspx or email me dtelenko@purdue.edu

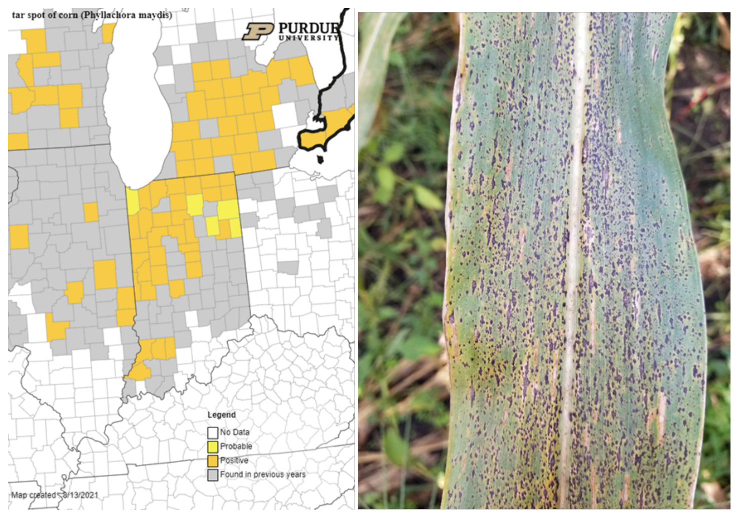


Figure 1. August 13, 2021 map of tar spot and image of a severely infected leaf.

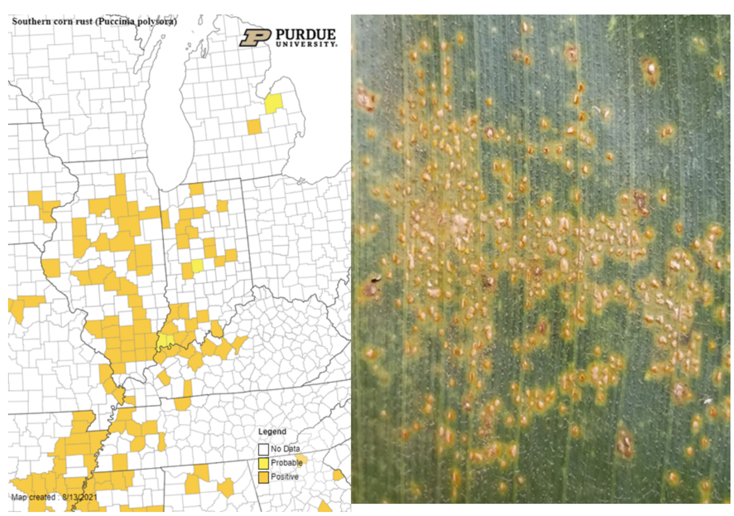


Figure 2. August 13, 2021 map of southern rust.

Estimating Corn Grain Yield Prior to Harvest

(Bob Nielsen)

Fancy colored yield maps are fine for verifying grain yields at the end of the harvest season, but bragging rights for the highest corn yields are established earlier than that down at the Main Street Cafe, on the corner of 5th and Earl. Some patrons of the cafe begin “eyeballing” their yields as soon as their crops reach “roasting ear” stage. Some of the guys there are pretty good (or just plain lucky) at estimating yields prior to harvest, while the estimates by others are not even close to being within the proverbial ballpark. Interestingly, they all use the same procedure referred to as the **Yield Component Method**.

Largest ear of corn in Nebraska, ca. 1908. Courtesy of the Nebr. Historical Society.

Yield Component Method

Other pre-harvest yield prediction methods exist (Lauer, 2002; Lee & Herbek, 2005; Thomison, 2015), but the **Yield Component Method** is probably the most popular because it can be used well ahead of harvest; as early as the so-called “roasting ear” or milk (R3) stage of kernel development. Under “normal” conditions, the kernel milk stage occurs about 18 to 22 days after pollination is complete (Nielsen, 2018b). Estimates made earlier in the kernel development period risk being overly optimistic if subsequent severe stresses cause unforeseen kernel abortion (Nielsen, 2018a).

The Yield Component Method was originally described by the University of Illinois many years ago and is based on the premise that one can estimate grain yield from estimates of the yield components that constitute grain yield. These yield components include number of ears per acre, number of kernel rows per ear, number of kernels per row, and weight per kernel. The first three yield components (ear number, kernel rows, kernels/row) are easily measured in the field.

Final weight per kernel obviously cannot be measured until the grain is mature (kernel black layer) and, technically, at a grain moisture of 15% since that is the typical moisture value used to determine a 56-lb market bushel. Consequently, an average value for kernel weight is used as a proverbial “fudge factor” in the yield estimation equation. As first described many years ago, the equation originally used a “fudge factor” of 90, which represented 90,000 kernels per 56-lb bushel. In terms of how kernel weight is usually measured in research, this would be equal to about 282 grams per 1000 kernels.

Recognize that actual kernel numbers per 56-lb bushel among years or fields within years can vary significantly and are influenced by both growing conditions and hybrid genetics. Kernel weight among hybrids can easily vary from less than 65,000 kernels per 56-lb bushel to more than 100,000 kernels per 56-lb bushel. Kernel weight from year to year for the same hybrid can easily vary by 20,000 kernels per bushel or more simply due to variability in growing conditions during the grain filling period.

Crop uniformity also influences the accuracy of any yield estimation technique. The less uniform the field, the greater the number of samples that should be taken to estimate yield for the field. There is a fine line between fairly sampling disparate areas of the field and sampling randomly within a field so as not to unfairly bias the yield estimates up or down.

1. At each estimation site, measure off a length of a single row equal to 1/1000th acre. For 30-inch (2.5 feet) rows, this equals 17.4 linear feet.

TIP: For other row spacings, divide 43,560 by the row spacing (in feet) and then divide that result by 1000 (e.g., [43,560 / 2.5] / 1000 = 17.4 ft).

2. Count and record the number of ears on the plants in the 1/1000th acre of row that you deem to be harvestable.

TIP: Do not count dropped ears or those on severely lodged plants unless you are confident that the combine header will be able to retrieve them.

3. For every fifth ear in the sample row, record the number of complete kernel rows per ear and average number of kernels per row. Then multiply each ear’s row number by its number of kernels per row to calculate the total number of kernels for each ear.

TIPS: Do not sample nubbins or obviously odd ears, unless they fairly represent the sample area. If row number changes from butt to tip (e.g., pinched ears due to stress), estimate an average row number for the ear. Don’t count the extreme butt or tip kernels, but rather begin and end where you perceive there are complete “rings” of kernels around the cob. Do not count aborted kernels. If kernel numbers per row are uneven among the rows of an ear, estimate an average value for kernel number per row.

4. Calculate the average number of kernels per ear by summing the values for all the sampled ears and dividing by the number of ears.

EXAMPLE: For five sample ears with 480, 500, 450, 600, and 525 kernels per ear, the average number of kernels per ear would equal: (480 + 500 + 450 + 600 + 525) divided by 5 = 511.

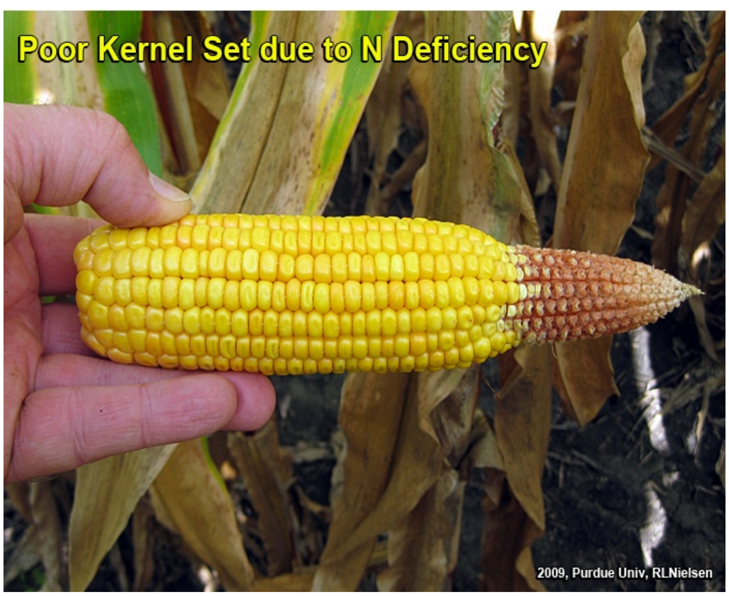
5. Estimate the yield for each site by multiplying the ear number (Step 2) by the average number of kernels per ear (Step 4) and then dividing that result by a kernel weight “fudge factor”. Unless

your seed company can provide some insight into kernel weight values for their hybrids, I suggest simply performing separate calculations using "fudge factor" kernel weight values equal to 75, 85, and 95. This range of values probably represents that most commonly experienced in the central Corn Belt.

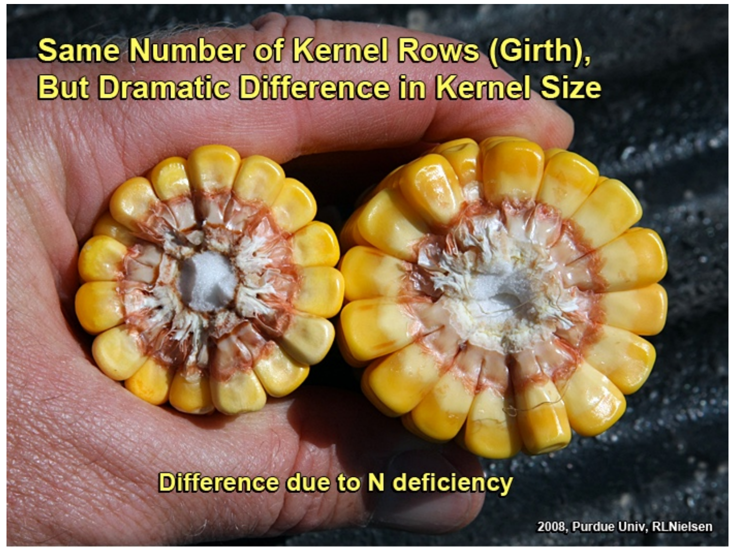
EXAMPLE: Let's say you counted 30 harvestable ears at the first thousandth-acre sampling site. Let's also assume that the average number of kernels per ear, based on sampling every 5th ear in the sampling row, was 511. Using "fudge factor" values of 75, 85, and 95; the estimated range in yield for that sampled site would (30 x 511) divided by 75 = 204, or divided by 85 = 180, or divided by 95 = 161 bushels per acre.

Repeat the procedure throughout field as many times as you deem representative. Tally and average the results separately for each "fudge factor" used for the calculations.

Random sample of ears.



Poor tip fill due to N deficiency.



Kernel size differences due to N deficiency.

Remember that this method for estimating pre-harvest grain yield in corn indeed provides only an estimate. Since kernel size and weight will vary depending on hybrid and environment, this yield estimator should only be used to determine "ballpark" grain yields. Yield can easily be overestimated in a year with poor grain fill conditions (e.g., low kernel size and weight from a drought year) and underestimated in a year with excellent grain fill conditions (e.g., larger kernel size and weight from non-stress grain fill periods). The closer to kernel black layer stage you sample, the more accurately you can "guesstimate" whether kernel weight will be above or below average for this year. Recognize that the **Yield Component Method** for estimating corn grain yield is probably only accurate within plus or minus 20 bushels of the actual yield. Obviously, the more ears you sample within a field, the more accurately you will "capture" the variability of yield throughout the field. Use the yield estimates obtained by this method for general planning purposes only.

Smart Phone and Mobile Tablet Apps

There are a number of apps available for download to your smart phone or mobile tablet that can be used to simplify the calculations of the Yield Component Method. Some crop scouting apps include grain yield estimators as one of their features. Be sure to thoroughly test the calculations of any app you choose to use on your phone to ensure that the math is correct. Some offer multiple kernel "fudge factors", but do not literally specify what kernel numbers per 56-lb bushel they use. Some only allow you to sample 3 ears at a time. Most do not allow you to sample AND save the results of multiple sites within a field or multiple fields in an operation. As the old adage says… "Buyer beware!"

This curmudgeon prefers to do the math the old-fashioned way… with my smart phone calculator and a note pad.

The Pro Farmer Midwest Crop Tour Method

The Pro Farmer division of Farm Journal Media sponsors an annual Midwest Crop Tour that sends out teams of "scouts" to visit corn fields throughout the Midwest to estimate yields. The method used in that effort is a variation of one described years ago by

University of Minnesota agronomist Dale Hicks (now Professor Emeritus) that combines the use of several yield components (ears per acre and kernel rows per ear) with a measurement of ear length (a proxy for kernel number per row).

The focus of the crop tour is not to necessarily estimate the yields of specific fields, but rather to more broadly estimate the yield potential within regions of the Midwest, so one probably should exercise caution in using this method for estimating yields within an individual field. Nevertheless, folks who have heard about the Pro Farmer Tour may be interested in trying the method themselves, so here are the steps involved with the Pro Farmer method (Flory, 2010; Micik, 2013). I would certainly suggest that these steps be repeated in several areas of an individual field because of natural spatial variability for yield.

1. Measure and record the row spacing (inches) used in the field.

EXAMPLE: 30 inches

2. Walk through the end rows into the bulk of the field, then walk about 35 paces down the rows to the first sampling area.

TIP: For subsequent yield estimates within the field, I would suggest walking even further into the field and crossing over multiple planter passes to sample different areas of the field.

3. Measure or step off 30 feet down the row, then count all ears in the two adjacent rows. Divide that number by two and record it.

EXAMPLE: (42 ears in one row + 45 ears in other row) divided by 2 = 43.5

4.Pull the 5th, 8th and 11th ears from plants in one row of the sampling area.

TIP: Frankly, I would suggest harvesting up to 5 ears from each of the two adjacent rows to better sample the area and minimize the effect that one oddball ear could have on the calculated average ear lengths and kernel row numbers.

5. Measure length of the portion of each ear that successfully developed kernels. Calculate the average ear length of the three ears and record it. Because cob length increases during the grain filling process, it is important that fields not be sampled any earlier than kernel dough stage or even kernel dent stage.

EXAMPLE: (6 inches + 7 inches + 5 inches) divided by 3 = 6

6. Count the number of kernel rows on each ear. Calculate the average kernel row number and record it.

EXAMPLE: (16 rows + 14 rows + 16 rows) divided by 3 = 15.3

7. Grain yield for the sampling area is calculated by multiplying the average ear count by the average ear length by the average kernel row number, then dividing by the row spacing.

EXAMPLE: (43.5 ears x 6 inches x 15.3 rows) divided by 30-inch rows = 133 bu/ac yield estimate

Related Reading

Elmore, Roger. 2017. Estimating Potential Corn Yield. CropWatch, Univ. Nebraska. https://cropwatch.unl.edu/2017/estimating-corn-yield [URL accessed Aug 2018].

Flory, Chip. 2010. Crop Tour Insider. Pro Farmer, Farm Journal Media. [Originally online, but no longer accessible. See Mick, 2013].

Lauer, Joe. 2002. Methods for Calculating Corn Yield. Agronomy Advice, Univ. of Wisconsin-Madison. http://corn.agronomy.wisc.edu/AA/pdfs/A033.pdf [URL accessed Aug 2018].

Lee, Chad and Jim Herbek. 2005. Estimating Corn Yields (AGR-187). Univ. of Kentucky. http://www.ca.uky.edu/agc/pubs/agr/agr187/agr187.pdf. [URL accessed Aug 2018].

Licht, Mark. 2017. Estimating Corn Yields Using Yield Components. ICM Newsletter, Iowa State Univ. https://crops.extension.iastate.edu/cropnews/2017/08/estimating-corn-yields-using-yield-components [URL accessed Aug 2018].

Micik, Katie. 2013. How the Crop Tour Arrives at Yield Estimates. DTN/Progressive Farmer. https://www.dtnpf.com/agriculture/web/ag/perspectives/blogs/market-matters-blog/blog-post/2013/08/19/crop-tour-arrives-yield-estimates [URL accessed Aug 2018].

Nielsen, RL (Bob). 2012. Opportunities to Assess Yield Potential of Drought-Stressed Corn. Corny News Network, Purdue Extension. http://www.kingcorn.org/news/articles.12/YldAssessment-0727.html [URL accessed Aug 2018].

Nielsen, R.L. (Bob). 2018a. Effects of Stress During Grain Filling in Corn. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/GrainFillStress.html [URL accessed Aug 2018].

Nielsen, R.L. (Bob). 2018b. Grain Fill Stages in Corn. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/GrainFill.html [URL accessed Aug 2018].

Nielsen, R.L. (Bob). 2018c. Kernel Set Scuttlebutt. Corny News Network, Purdue Univ. http://www.kingcorn.org/news/timeless/KernelSet.html [URL accessed Aug 2018].

Thomison, Peter. 2015. Estimating Corn Yields. C.O.R.N. Newsletter, Ohio State Univ. http://agcrops.osu.edu/newsletter/corn-newsletter/2015-25/estimating-corn-yields [URL accessed Aug 2018].

Thomison, Peter. 2018. Estimating Corn Yields at Early Stages of Kernel Development. C.O.R.N. Newsletter, Ohio State Univ. https://agcrops.osu.edu/newsletter/corn-newsletter/2018-24/estimating-corn-yields-early-stages-kernel-development [URL accessed Aug 2018.

USDA Crop Report Predicts State Record Corn Yield For Indiana

(Dan Quinn)

The USDA recently released their first monthly crop report on August 12, which includes crop production data for the U.S., including estimates for 2021 area harvested, yield, and total production. The link to this report can be found here: https://usda.library.cornell.edu/concern/publications/tm70mv177?locale=en

The USDA currently estimates the Indiana corn crop yield in 2021 at 194 bushels per acre which would be 5 bushels per acre greater than the state record yield average produced in 2018 (189 bushels per acre) and a 7 bushel per acre increase from the 2020 state yield average (187 bushels per acre). The predicted value of 194 bushels per acre is also the highest yield average predicted for Indiana from an August USDA crop report. Furthermore, this predicted yield average value also ranks Indiana second in the corn belt in predicted yield average behind Illinois which has a predicted yield average of 214 bushels per acre.

The value of 194 bushels per acre is currently 8-9% above yield trend (Figure 1) and is likely driven by timely planting, adequate soil moisture, and high crop condition ratings throughout the 2021 growing season. The most recent crop condition rating placed Indiana Corn at 74% good to excellent on August 9th (https://www.nass.usda.gov/Statistics_by_State/Indiana/Publications/Crop_Progress_&_Condition/index.php), which is currently the highest mid-August crop condition rating since 2013, which measured 77% good to excellent on August 11, 2013.

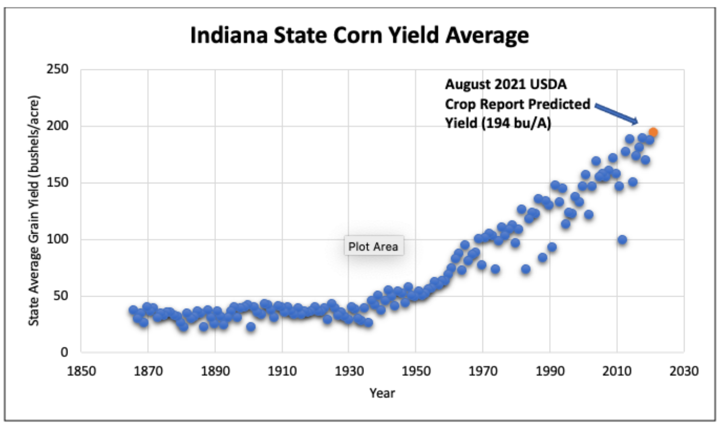


Figure 1: Current 2021 USDA Crop Report predicted yield average in comparison to Historic Indiana State Corn Yield Average (1866 – 2020).

The question I have been asked often since the report was released is do I believe the predicted yield average of 194 bushels per acre? Well, looking at historic yield trends and also pulling state yield averages from years with similar mid-August crop condition ratings which includes: 2018 (74% good to excellent), 2014 (72%), 2006 (72%), 2001 (73%), and 1993 (74%), I predicted the yield average prediction would be around 6.5 to 7.5% above trend or around 191 to 192 bushels per acre. Each previous year with similar mid-August crop condition ratings produced above trend final yield averages which ranged from 3 to 12% above trend. Therefore, I think when you look at the historic data and the overall health of the corn crop this year across the state, I believe the predicted yield average by the USDA is in the range of what we believed it would be.

However, there is still time left in the current growing season, and still plenty of yield left to be determined. For example, from growth stage R5 (dent) to growth stage R6 (maturity or black layer), corn still has approximately 50% of its kernel weight left to be accumulated, which can be influenced by environmental and crop conditions. Furthermore, significant disease progression from pathogens such as tar spot and southern rust, significant saturated conditions and ponding from June and July rainfall in certain areas of the state, and decreased sunlight and solar radiation due to cloudy and hazy conditions during pollination and early grain fill have me cautiously optimistic about the potential for state record yield averages in the state this year. The state of Indiana is on pace for a strong corn crop in 2021, yet time will only tell once the combines start rolling this fall.

Pollinating corn field in West Lafayette, IN, photo taken July 21, 2021. (*Photo Credit: Dan Quinn*)

Historical Corn Grain Yields In The U.S.

(Bob Nielsen)

- Corn grain yields in the U.S. have steadily increased since the late 1930's.
- Only two major shifts in U.S. corn yield trends have occurred since statistics were first published in 1866.
- Year-to-year departures from trend yield are influenced primarily by year-to-year variability in growing conditions.

Historical trends of grain yield improvement offer us a glimpse of yields yet to come, although, like the stock markets, past performance is no guarantee of the future. The historical yield data for corn in the U.S. illustrate the positive impact of improved crop genetics and improved crop/soil management practices.

American farmers grew open-pollinated corn varieties until the rapid adoption of hybrid corn began in the late 1930's. From 1866, the first year USDA began to publish corn yield estimates, through about 1936, yields of open-pollinated corn varieties in the U.S. were fairly stagnant and only averaged about 26 bu/ac (1.6 MT/ha) throughout that 70-year period (Fig. 1).

It is amazing that there was no appreciable change in productivity over that 70-year time period, even though farmers' seed-saving practices represented a form of plant breeding that one would have expected to result in small increases in yield over 70 years. Kutka (2011) suggests that the absence of significant yield improvement in these open-pollinated varieties was not so much a result of ineffective plant breeding by farmers as it was the inability to produce, or maintain, high quality seed for the next year's planting and farmers' generally low adoption of agronomically sound crop and soil management practices.

Rapid adoption of double-cross hybrid corn by American farmers began in the late 1930's, in the waning years of the Dust Bowl and Great Depression. Within a very few years, the national yield statistics indicated that a genuine "miracle" of corn grain yield improvement had occurred. The annual rate of yield improvement, which heretofore had been about zero, increased to about 0.8 bushels per acre per year from about 1937 through about 1955 (Fig. 1). This dramatic improvement in yield potential must have truly seemed like a miracle to American farmers.

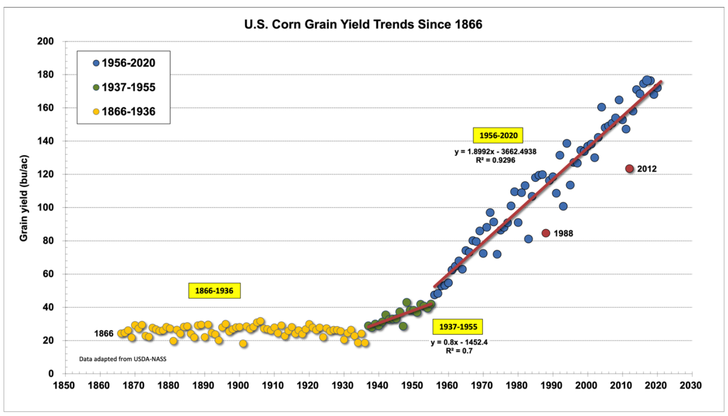


Fig. 1. Annual U.S. Corn Grain Yields and Historical Trends Since 1866. Data derived from annual USDA-NASS Crop Production Reports.

The second "miracle" of corn grain yield improvement began in the mid-1950's (Fig. 1) in response to continued improvements in genetic yield potential and stress tolerance plus increased adoption of N fertilizer, chemical pesticides, agricultural mechanization, and overall improved soil and crop management practices. The annual rate of corn yield improvement more than doubled to about 1.9 bushels per acre per year and has continued at that steady rate ever since, sustained primarily by continued improvements in genetics and crop production technologies (Fig. 1).

Some speculate that a third "miracle" of corn grain yield improvement began in the mid-1990's with the advent and rapid adoption of transgenic hybrid traits (insect resistance, herbicide resistance). In fact, a number of seed industry 'experts' confidently promised that average US corn grain yield would approach 300 bushels per acre by 2030 due to these advances in biotechnology (Schill, 2007). However, the USDA-NASS yield data show little to no evidence that yield trend over the past 25 years has deviated from the long-term 1.9 bushels per acre per year (Fig. 1). Indeed, these data simply reflect the fact that currently available transgenic hybrid traits do not literally increase genetic yield potential above and beyond "normal" genetic improvements in corn hybrids. Rather, these traits simply protect the inherent yield potential of modern hybrids while potentially reducing farmers' reliance on chemical pesticides. A true third "miracle" of corn yield improvement remains somewhere "beyond the horizon".

Trend Line Trivia: Historical trend lines offer a useful way to visualize changes over time. The historical trend yield lines shown in Fig. 1 are technically linear regression lines and represent the best "fit" method for describing the changes in U.S. corn yields over time. The equation associated with the trend line that begins in the 1950s can be used to predict U.S. corn yield for the current cropping year under "normal" growing conditions. Year-to-year departures (changes) from the trend line are caused primarily by year-to-year variability in growing conditions. However, significant changes in the trend line itself (i.e., the slope of the line) are usually caused by significant changes in the adoption of farming technologies (e.g, hybrids, pest control, soil management, mechanization, precision ag. technologies). Irwin and Hubbs (2020) offer an interesting read on how these trend lines are affected by what year you choose to begin the estimation. In particular, one must be cautious when using short time periods because of the greater effect that unusual individual years (e.g., drought of 2012) can have on that estimation. My personal preference is to use the time period beginning with 1956, which accounts for 93% of the variability in corn grain yields between then and now (Fig. 1).

Reliance on corn yield trend lines to estimate future corn grain yields is inherently not precise. Annual corn yields fluctuate above and below their respective historical trend lines (Fig. 2), primarily in response to variability in growing conditions year to year (e.g., weather and pests). The "Great Drought" of 2012 certainly resulted in dramatic and historic reductions in corn grain yield relative to trend yield (-22%), but the greatest negative departure from trend yield actually occurred more than 100 years earlier during the "Great Drought" of 1901 (-30%). Conversely, the greatest single positive departure from trend yield occurred in 1906 when the corn crop that year yielded 23% higher than the expected trend yield. The magnitude and range of annual departures from trend yield since the mid-1950's reinforce the evidence from Fig. 1 that the adoption of transgenic hybrid traits beginning in the mid-1990's has not resulted in yields unusually higher than the long-term yield trend.

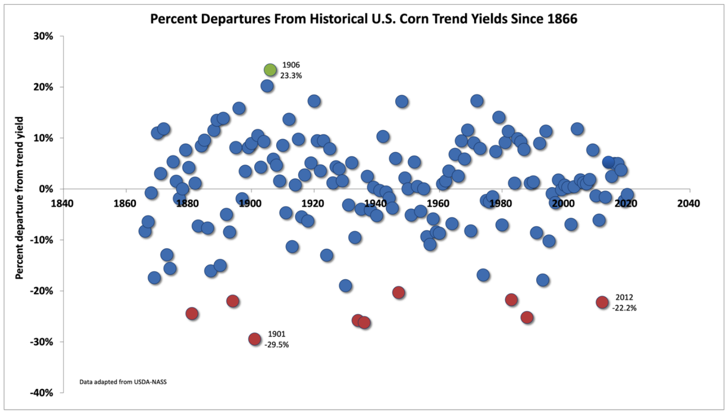


Fig. 2. Annual percent departures from estimated corn trend yields in the U.S. since 1866.
Data derived from annual USDA-NASS Crop Production Reports with respect to historical trend lines depicted in Fig. 1.

Bottom Line

The GOOD NEWS is that corn grain yields in the U.S. have steadily increased since the 1950's at almost 2 bushels per acre per year. The SOBERING NEWS is that, in order to support the ever-burgeoning world population in the years to come, a third "miracle" that dramatically shifts the annual rate of corn yield improvement will be required.

Related Reading

Irwin, Scott and Darrel Good. 2012. The Historic Pattern of U.S Corn Yields, Any Implications for 2012? farmdoc daily (2):21, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign. https://farmdocdaily.illinois.edu/2012/02/the-historic-pattern-of-us-cor-1.html [accessed Aug 2021].

Irwin, Scott and Todd Hubbs. 2020. How Sensitive Are Trend Yield Projections for U.S. Corn to the Starting Year of the Estimation Period? *farmdoc daily* (10): 107, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign. https://farmdocdaily.illinois.edu/2020/06/how-sensitive-are-trend-yield-projections-for-us-corn-to-the-starting-year-of-the-estimation-period.html [accessed Aug 2021].

Kucharik, Christopher and Navin Ramankutty. 2005. Trends and Variability in U.S. Corn Yields Over the Twentieth Century. Earth Interactions (American Meteorological Society) 9:1-9. https://doi.org/10.1175/EI098.1 [accessed Aug 2021].

Kutka, Frank. 2011. Open-Pollinated vs. Hybrid Maize Cultivars. Sustainability 2011, 3, 1531-1554; doi:10.3390/su3091531. https://www.mdpi.com/2071-1050/3/9/1531/pdf [accessed Aug 2021].

Schill, Susanne Retka. 2007. '300-Bushel Corn is Coming' Ethanol Producer Magazine. BBI International. http://www.ethanolproducer.com/articles/3330/300-bushel-corn-is-coming/ [accessed Aug 2021].

Schnitkey, Gary. 2019. The Geography of High Corn Yields. farmdoc daily (9):2, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign. https://farmdocdaily.illinois.edu/2019/01/the-geography-of-high-corn-yields.html [accessed Aug 2021].

Schnitkey, G., C. Zulauf, K. Swanson and N. Paulson. 2021. Recent State Soybean and Corn Yields in Illinois. farmdoc daily (11):68, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign. https://farmdocdaily.illinois.edu/2021/04/recent-state-soybean-and-corn-yields-in-illinois.html [accessed Aug 2021].

USDA-NASS. 2021. Quick Stats. United States Dept. of Agr – Nat'l Ag. Statistics Service, Washington, D.C. URL: https://quickstats.nass.usda.gov [accessed Aug 2021].

Ward, Robert De C. 1901. Some Economic Aspects of the Heat and Drought of July, 1901, in the United States. Bull. Amer. Geog. Soc. 33(4):338-347. DOI: 10.2307/198424. https://www.jstor.org/stable/pdf/198424.pdf [accessed Aug 2021].

Dry Conditions Have Returned To Indiana

(Beth Hall)

Well, it was a nice 4 weeks with no drought or abnormally dry designated areas across the state. Unfortunately, the lack of rain over the past few weeks have led to browning lawns, cracked soils, and other tell-tale signs that drought may be returning. The US Drought Monitor has designated three areas in Indiana as being *Abnormally Dry* (Figure 1). Looking at the national climate outlooks over the next few weeks is suggesting that spotty rain and dry conditions may persist, though there are slight indications that above-normal precipitation may be possible (Figure 2). Unfortunately, that confidence is low. This past week has been extraordinarily warm and muggy with temperatures in the 90s (Fahrenheit) and dew point temperatures in the upper 70s to lower 80s. Dew point temperature tend to stay relatively constant throughout the day and don't vary as much as humidity. It is a truer measure of how much water vapor is in the air and indicates the temperature the air would need to cool down to in order for the air to be saturated and dew to form on surfaces. This is why glasses that have been in air-conditioned environments will fog up quickly when one goes outside in these conditions! When the dew point temperature is that high, there is little if any cooler relief over the nighttime hours. How rare are dew point temperatures this high? Over the past 10 years, dew point temperatures exceeding 75°F on 21 days at the Indianapolis Airport. Last year, there were only 3 days when this happened.

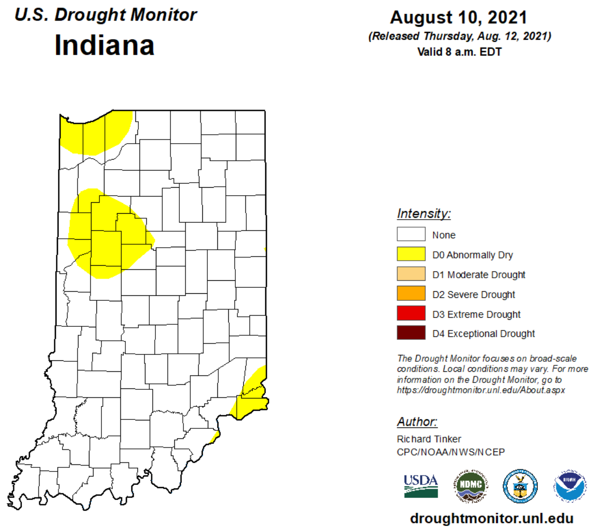


Figure 1. US Drought Monitor for data through August 10, 2021.

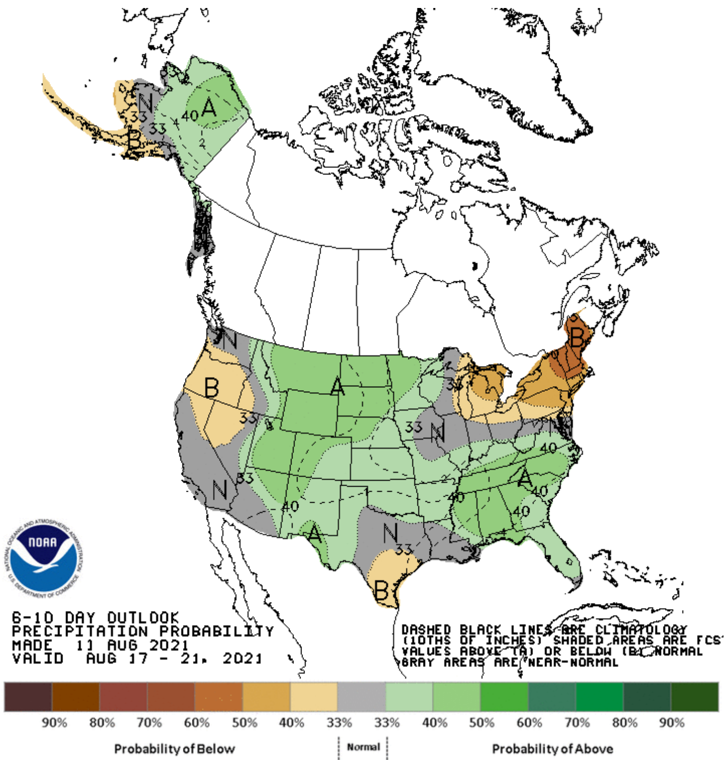


Figure 2. Precipitation outlook for August 17-21 indicating normal conditions likely throughout central Indiana with slight probabilities of above-normal precipitation in southern Indiana and below-normal precipitation in northeastern Indiana.

Modified growing degree days continue to accumulate, though accumulation caps the upper temperature threshold at 85°F. What this means is if the maximum temperature is over 85°, then the maximum temperature is replaced with the number 85 when deriving the daily average. For example, let us assume the minimum temperature was 68°F and the maximum temperature was 92°F, then a traditional growing degree day (base 50°F) would find the average temperature ((68+92)/2=80) and then subtract 50 (i.e., 80-50=30 growing degree-day units). However, some vegetation negatively responds to excessively warm temperatures, so modified growing degree days cap that upper limit at 85°F. In the example, therefore, the average temperature would be (68+85)/2=76.5 and the MGDD would be 76.5-50 = 26.5 MGDD units. Accumulated MGDD units range from 1900 in northern Indiana to over 2500 in southern Indiana (Figure 3). This is relatively comparable to recent years (Figure 4).

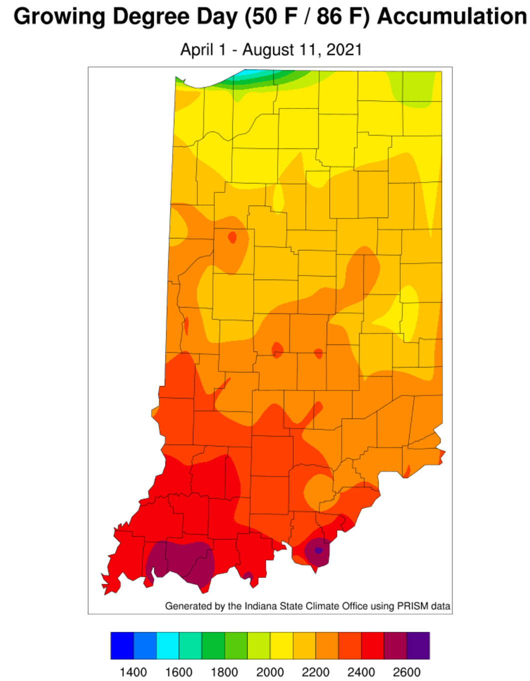


Figure 3. Modified growing degree day accumulations from April 1 to July 28, 2021.

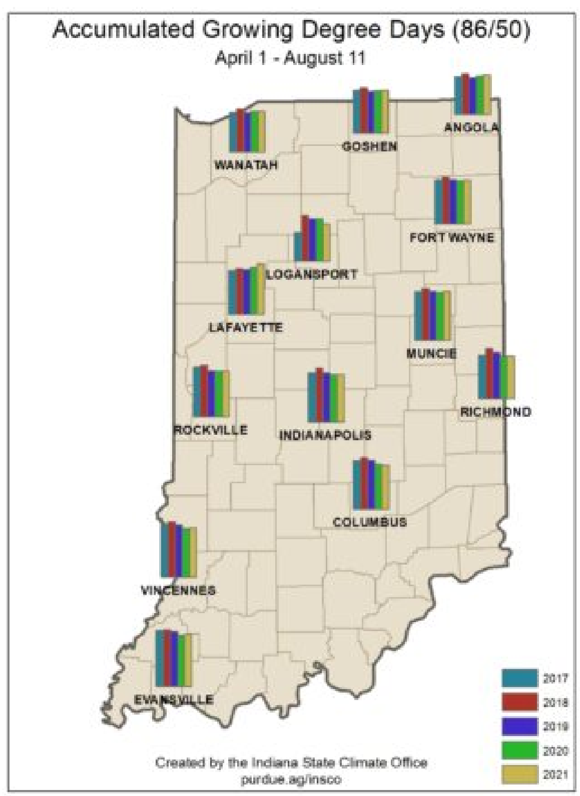


Figure 4. Comparison of 2021 modified growing degree day accumulations from April 1 – August 4 to the past four years.

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