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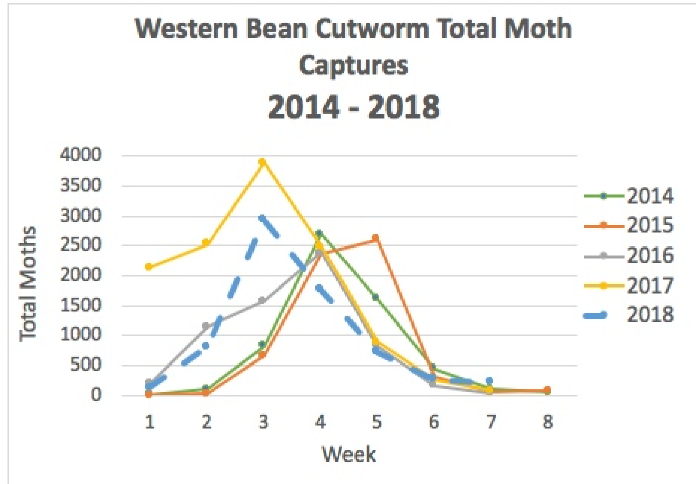
Editor: Tammy Luck | Department of Entomology, Purdue University, 901 W. State St., West Lafayette, IN 47907

Western Bean Cutworm: A No-Show in 2018

Authors: Christian Krupke and John Obermeyer

For reasons that are unclear – but likely related to two seasons of increased monitoring and spraying – the western bean cutworm damage is far lower than the past two seasons. Very few reports of ear infestations have been received from northern Indiana counties, where risks are greatest. In looking at a comparison of the 5-year moth captures (see graph below), there were plenty of moths flying. However, this only tells a portion of the story. "Week 3," just after Independence Day, was when most moths were present, mating and laying eggs. However, because of this year's rapid pace of corn growth and development, over 50% of the corn had already been pollinated. Western bean cutworm's egg laying preference is pre-tassel corn, meaning that their flight lined up poorly this year. Perhaps the lower damage this year can simply be attributed to their poor timing…likely there is much more we don't understand, e.g., abnormally wet soil conditions in that region this spring. Remember also that they have hosts other than corn, and may move to those when corn is not at the right stage for oviposition.

Tracking the western bean cutworm moth flight wouldn't be possible without the many pheromone trap cooperators in our network. To those volunteers, we are all in debt! Please thank any of those cooperators that you may know for their efforts. Hug them, if possible and appropriate.



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Corn Earworm Late Moth Flight Quite Impressive

Author: John Obermeyer

Corn earworm moth numbers have been relatively low this season until recently, as numbers have exploded in pheromone traps. These moths will lay their eggs on numerous crops, with late-market sweet corn being particularly vulnerable at this time. Tomato and pepper growers should also be aware of the potential for earworm (also called fruitworm) damage, especially if these crops are surrounded by cornfields that are drying down are no longer attractive for egg laying.

Hartstack trap for corn earworm in sweet corn field. (Photo credit: Kira Albright)

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WANTED: Corn Tar Spot Samples

Author: Darcy Telenko

We are collecting corn tar spot samples and we need your help!

Tar spot of corn is a new corn disease first identified in the United States in 2015 in Illinois and Indiana. It has since been confirmed in Iowa, Michigan, Wisconsin, and Florida.

What to look for: Small, black, raised spots (circular or oval) develop on infected plants, and may appear on one or both sides of the leaves, leaf sheaths, and husks. Spots may be found on both healthy (green) and dying (brown) tissue. Often, the black spots are surrounded by a tan or brown halo; this is especially obvious on healthy leaves (see images).

The University of Illinois needs samples of corn infected with tar spot from across the United States as part of a new research project investigating the variability of populations of the corn tar spot pathogen.

We would also like to know if the disease is an issue this year in Indiana and identify the counties where it is present so that we can map the distribution of the disease here in the state.

If you have (or think you have) corn tar spot, please collect several leaves showing the symptoms and send them with a PPDL form https://ag.purdue.edu/btny/ppdl/Documents/Forms/PPDL-Form_13MAY15FILLABLE.pdf. There will be no charge for corn tar spot samples since they are needed for research.

Please wrap the leaves in newspaper and ship in a large envelope. Please ship early in the week. If you are sending samples from multiple locations please label them and provide the date collected, variety of corn, field zip code or county, and previous crop.

Mail to: Plant and Pest Diagnostic Laboratory
LSPS-Room 116, Purdue University
915 W. State Street
West Lafayette, Indiana 47907-2054

Question please contact Darcy Telenko (764-496-5168) or Gail Ruhl (765-494-7071)

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Estimating Corn Grain Yield Prior to Harvest

Author: 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.

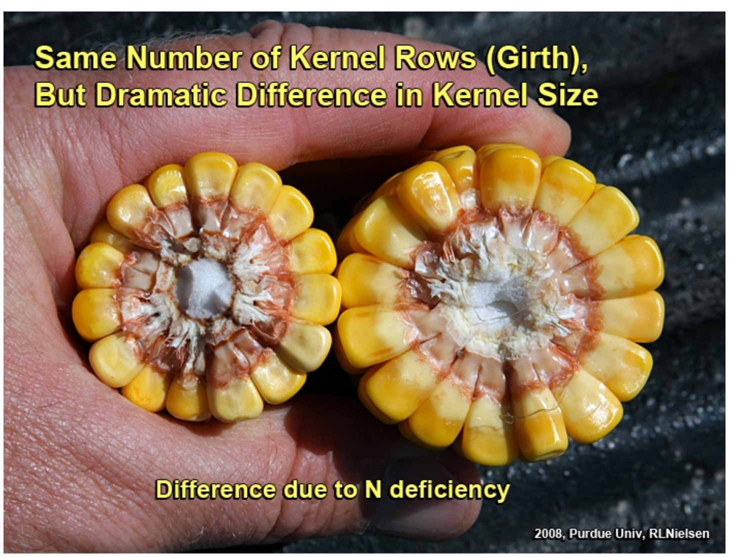
5. Estimate the yield for each site by multiplying the ear number (Step 2) by the average number of kernels per ear (Step 4) and then dividing that result by a kernel weight “fudge factor”. Unless your seed company can provide some insight into kernel weight values for their hybrids, I suggest simply 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

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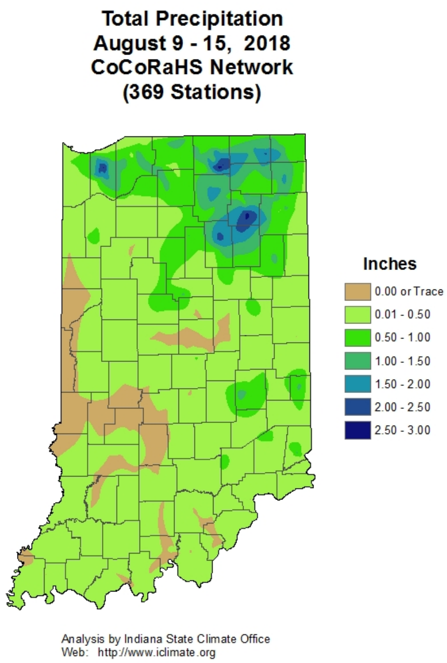

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