AGRONOMIC // UPDATE

Assessing Corn Yield Potential

Estimating corn yield potential can help with harvest decision making. The corn yield component method can be used as early as the R3 (milk) growth stage. The ear weight method is used after corn is physiologically mature.

Crop uniformity has a large influence on the accuracy of any estimation method. Samples should be taken randomly throughout a field to provide the best yield estimate. One sample for every 10 to 15 acres should be sufficient unless conditions are variable. More samples should be taken to represent a non-uniform field and improve the accuracy of the estimate. The yield component method and the ear weight method are two ways to estimate corn grain yield potential prior to harvest. Each method may produce yield estimates that are within 20 bu/acre of actual yield.[2]

Corn-Yield Component Method

This method is used widely and can be used as early as the milk growth stage (R3). It's risky to make estimates prior to R3 because stresses can affect kernel development and cause kernel abortion.[3] This method is based on the assumption that grain yield can be estimated using the number of ears per acre, number of kernel rows per ear, number of kernels per row, and kernel weight. The first three components can be measured from field samples, but kernel weight is unknown until physiological maturity (black layer) and must be represented by a calculated factor. The average value for kernel weight (90) is derived using 85,000 kernels per 56 pound bushel (Table 2, Page 2)[1]. Some agronomists think that a kernel weight of 80 to 85 is a more appropriate factor for current use because kernel size has increased since this formula was first developed many years ago.[3]

Step 1. At each sample site, measure 1/1000th of an acre (Table 1). Don't sample nubbins, abnormal ears, aborted kernels or count dropped ears or ears on severely lodged plants. Count kernels where there are complete rings of kernels around the cob and avoid counting kernels on the extreme ends of the ear (Figure 1).[1]

Step 2. Count the number of kernel rows per ear on every fifth ear and determine the average.

Step 3. On the same fifth ears, count the number kernels per row and determine the average.

Step 4. To determine an estimate of yield potential per acre at each sample site, multiply the number of ears times the average number of rows times the average number of kernels and divide by 90 or the factor that best represents growing conditions (Table 2).

Step 5. Repeat this procedure at a representative number of sample sites in the field. Calculate the average yield potential for all of the sites to get an estimate of the yield potential of the entire field.

Table 1. Stand count evaluation for 1/1000th acre based on row width and number of plants in a given row length.[2]

Row Width (inches)	Row Length 1/1,000th acre (feet, inches)
20	**26'2"**
22	**23'9"**
30	**17'5"**
36	**14'6"**
38	**13'9"**

Assessing Corn Yield Potential

Example: Harvestable ear count is 30. The average number of kernels per ear from every fifth ear is 511. Growing conditions were average (85). The estimated yield potential for that site would be (30 times 511) divided by 85, or a 180 bu/acre estimate of yield potential.[3]

Poor conditions during grain fill can cause lower kernel weights, resulting in an underestimation of yield potential with the yield component method. Conversely, it can overestimate yield potential if kernel weight is higher than normal, during superior growing conditions.[3] Kernel size and weight can vary by corn product and environmental conditions, which can compromise the accuracy of the estimate.

Corn-Ear Weight Method

This method should only be used after corn has reached physiological maturity or black layer (R6). This method may be more accurate than the yield component method because it is based on actual kernel weight. It does have a factor to account for average shell out percentage.[3] Sample several representative sites in a field. Count the number of harvestable ears in 1/1000th of an acre at each site (Table 1) at several random sites throughout the field. At each site: 1) weigh every fifth ear and calculate the average ear weight per site, 2) hand shell kernels from those ears, and 3) determine the average grain moisture with a moisture tester.

Calculation Steps for each site:

- Step 1. Multiply the number of ears by the average ear weight.
- Step 2. Multiply average grain moisture by the factor 1.411.
- Step 3. Add 46.2 to the average grain moisture ×1.411 (step 2).
- Step 4. Divide result from step 1 by the result from step 3.
- Step 5. Multiply result from step 4 by 1,000.

Example: The number of harvestable ears is 24. Average ear weight of every fifth ear is 0.5 pound. The average grain moisture is 30%. The estimated yield potential is [(24 x 0.5) divided by ((1.411 x 30) + 46.2)] times 1,000, or 135 bu/acre.[2] There are several other methods to estimate corn yield potential that are less widely used than the yield component and ear weight methods.[2]

Table 2. Kernel number/bushel based on growing conditions during grain filling.[3]

Growing Conditions	Factor	Range in Kernel Number/bushel.
Excellent	**75-80**	75,000-80,000
Average	**85-90**	85,000-90,000
Poor	**90-105**	95,000-105,000

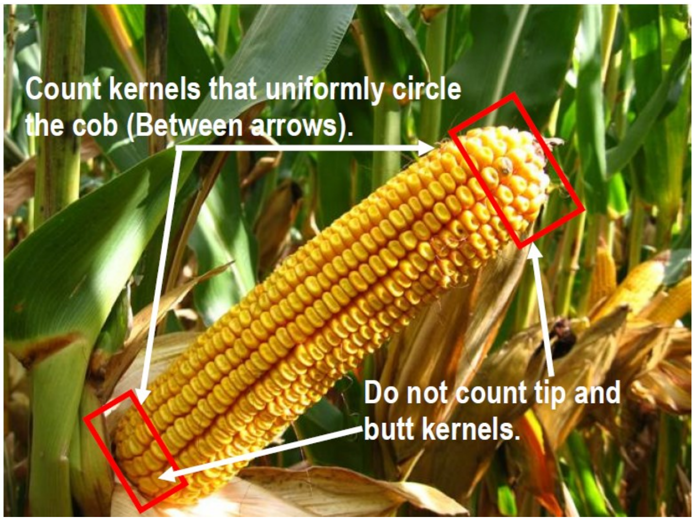

Figure 1. Example of normal ear and kernels to be counted.

Sources:
[1]Nielsen, R.L. 2018. Effects of stress during grain filling in corn. Corny News Network, Purdue University. https://www.agry.purdue.edu/.
[2]Nafziger, E.D. 2002. Illinois agronomy handbook, 24th edition. Chapter 2. University of Illinois Printing Services. Urbana, IL. 23-25.
[3]"Predicting" corn yields prior to harvest. C.O.R.N. newsletter. Ohio State University.
Other Source:
Lauer, J.L. 2002. Methods for calculating corn yield. Agronomy Advice. University of Wisconsin. Web sources verified 08/18/2018. 130816033001