Iowa Corn Yields 2010: Forecast, Methodology and Opinion

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Abstract
The August 2010 corn yield forecast by the USDA–NASS is 179 bushels per acre (bu/acre) for Iowa. If this yield is realized, 2010 will boast the third highest yield in Iowa's history behind 2004 (181 bu/acre) and 2009 (182 bu/acre). We need to remember that the USDA-NASS August forecast is derived largely from July ear counts with some ear dimensions, combined with ear weights from the last five years. The next forecast, Sept. 10, will include more ear parameter measurements and actual ear weights providing a more accurate representation of harvestable yields. USDA-NASS uses a complex set of statistical models to forecast grain yields. This is the best source for reliable yield forecasts.

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Iowa Corn Yields 2010: Forecast, Methodology and Opinion

By Roger Elmore and Lori Abendroth, Department of Agronomy

Current yield forecast

The August 2010 corn yield forecast by the USDA–NASS is 179 bushels per acre (bu/acre) for Iowa. If this yield is realized, 2010 will boast the third highest yield in Iowa’s history behind 2004 (181 bu/acre) and 2009 (182 bu/acre). We need to remember that the USDA-NASS August forecast is derived largely from July ear counts with some ear dimensions, combined with ear weights from the last five years. The next forecast, Sept. 10, will include more ear parameter measurements and actual ear weights providing a more accurate representation of harvestable yields. USDA-NASS uses a complex set of statistical models to forecast grain yields. This is the best source for reliable yield forecasts.

Methodology used in estimating yield

Accurate yield estimates result from evaluating many locations, intensive sampling and several assumptions. Producers and agronomists can also attain an estimate of corn yield yet it is subject to more variability and potential errors. The standard technique relies on careful estimates of components that contribute to yield. The most common calculation is:

$$\frac{([\text{# ears/acre}]/1000) \times \text{(# kernel rows per ear)} \times \text{(#kernels per row)}}{90} = \text{estimated bushels/acre}$$

This equation can be used to estimate corn yields as early as two weeks after pollination and until harvest. Obtain representative ear samples from at least three locations in the field; a more accurate estimate will occur with more ears and locations sampled. Determine the number of ears per acre at each location and then count the number of rows per ear and the number of kernels per row on at least three ears per location. The accuracy of the prediction can easily vary by +/- 30 bushels or more. One component that can cause significant variability is kernel weight; the equation assumes that there will be 90,000 kernels per bushel.

Estimating yield using this equation can easily result in projections that are either too low (see example here) or too high (see next section for example). The assumption that there are 90,000 kernels per bushel is likely too high for many producers which results in too low of a yield estimate. Dr. Vyn, Purdue University, recently posted an article describing the standard technique and its pitfalls. Some agronomists suggest that with modern hybrids, average kernel numbers per bushel are closer to 85,000 than 90,000. Dr. Vyn reported data from a plant population trial with a range of 61,500 to 69,300 kernels per bushel across a population range of 19,000 to 41,000 plants per acre. Plants experiencing nitrogen stress had over 100,000 kernels per bushel.

At a recent field day at the ISU Northeast Research & Demonstration Farm, attendees were asked to estimate yield from a plant population experiment. Using the methodology discussed above, yield estimates ranged 30 to 70 bushels per acre within each of three plant populations examined. Consider
yield estimates like this as an interesting piece of information but don’t put a lot of weight on them for decision making.

**Temperature influences grain fill in 2010**

Iowa corn has experienced warmer temperatures since planting. In general, 100 to 300 more growing degree days (GDDs) have accumulated this year compared to normal (using a start date of April 10). Up to a third of this increase can be attributed to the weather during August. Warm night temperatures have sped up heat unit accumulation and crop development. Indeed, the USDA-NASS crop condition report released August 30 states that 77 percent of our crop is denting compared to 25 percent in 2009 and 50 percent in the five year average.

Warmer temperatures after tasseling will decrease yield through reductions in kernel weight. In addition, expect lower test weights this year for most of Iowa. Lower test weight corn doesn’t store as well as heavier test weight corn. Although the crop is maturing quicker than most have seen in the past several years, this will result in lower harvest moistures. The crop has more time for in-field dry down before the day lengths shorten and temperatures decline. Drying costs will be less for producers this year as a result.

Considering expected reductions in kernel weight this year using the typical number of kernels per bushel (90,000 as stated in the above paragraphs) to estimate yields will likely result in an overestimation of grain yield.

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