



## Where Should We Be Now With Corn Yield Expectations?

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Based on an analysis of the recent trend in the U.S. average corn yield and a near record early planted crop, the USDA's May and June WASDE reports indicated prospects for a record U.S. average corn yield of 166 bushels in 2012. With much of the Corn Belt crop now entering the critical stage of the growing season, this seems to be an appropriate time to re-assess yield prospects.

To date, weather conditions have been generally favorable for crop development in a portion of the Northwest Corn Belt and in some far eastern growing areas. This is reflected in the crop condition ratings included in the USDA's weekly *Crop Progress* report. As of June 24, 71 percent or more of the crops in Minnesota, North Carolina, North Dakota, Pennsylvania, and South Dakota were rated in good or excellent condition. Weather conditions have been far less favorable in the areas traditionally identified as the Eastern Corn Belt and in a few states in the western Corn Belt. As of June 24, 51 percent or less of the crops were rated in good or excellent condition in Colorado, Illinois, Indiana, Kansas, Kentucky, Missouri, Ohio, and Tennessee. Ratings were especially low in Illinois, Indiana, and Missouri. The rest of the states included in the weekly report (Iowa, Michigan, Nebraska, Texas, and Wisconsin) had 60 to 68 percent of the crops rated in good or excellent condition.

The 18 states included in the *Crop Progress* report represent nearly 92 percent of the acreage intended for planting, as reported in the USDA's March *Prospective Plantings* report. About 38 percent of the acreage in the 18 states is in those states with near average crop conditions, 23 percent is in states with very good crop conditions, and 39 percent is in states with below to well below average conditions as of June 24.

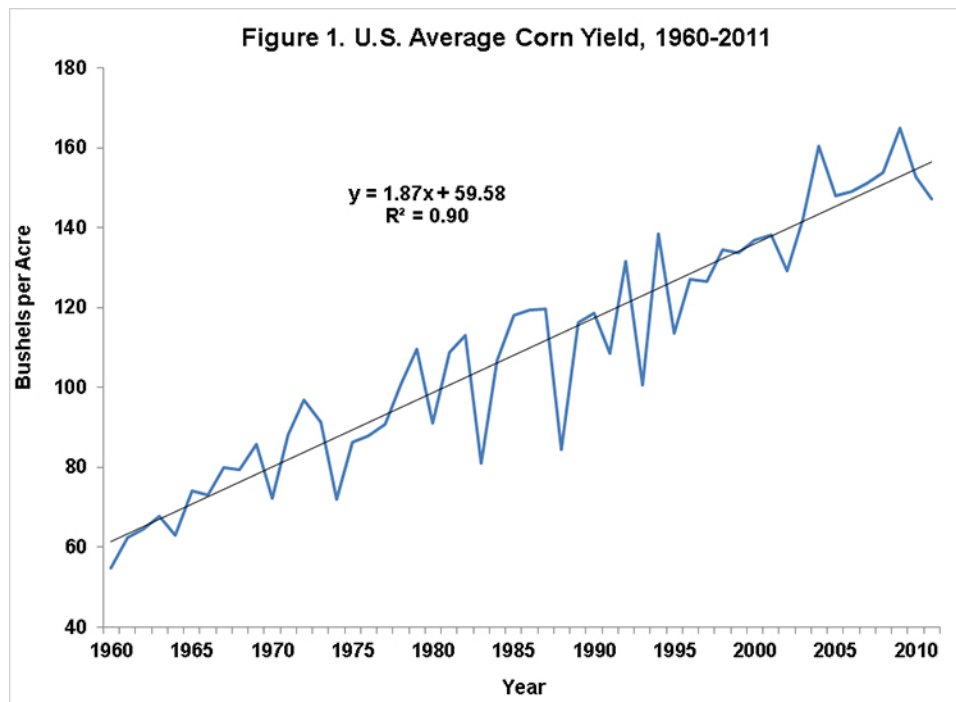
Based on growing season weather to date and current crop conditions, what level of yield should now be expected? First, we should note that an above-trend corn yield requires timely planting and very favorable weather conditions over a very wide area throughout the entire growing season. Most important are weather conditions during the reproductive and grain filling stages of the growing season, about late June through August in much of the Corn Belt this year. Above average precipitation and below average temperatures during that period are most conducive for high yields. Most recently, these type of conditions prevailed in 2004 and 2009. Based on weather and crop conditions to date and the hot, dry near term forecast, an above trend yield is clearly not in the cards this year.

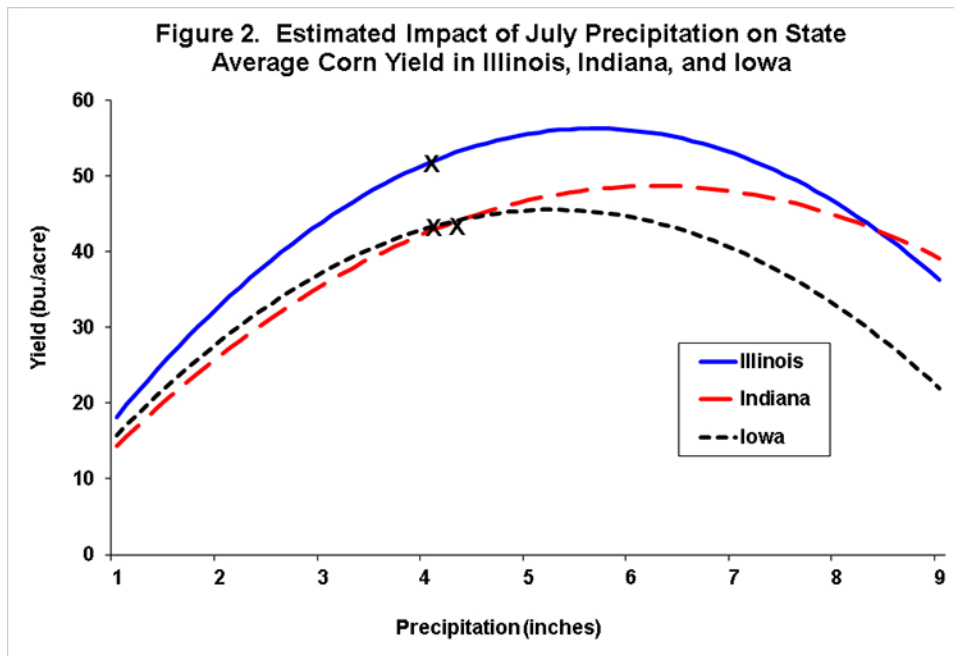
What about the chances for a yield near trend value? To achieve a trend U.S. average yield, high yields

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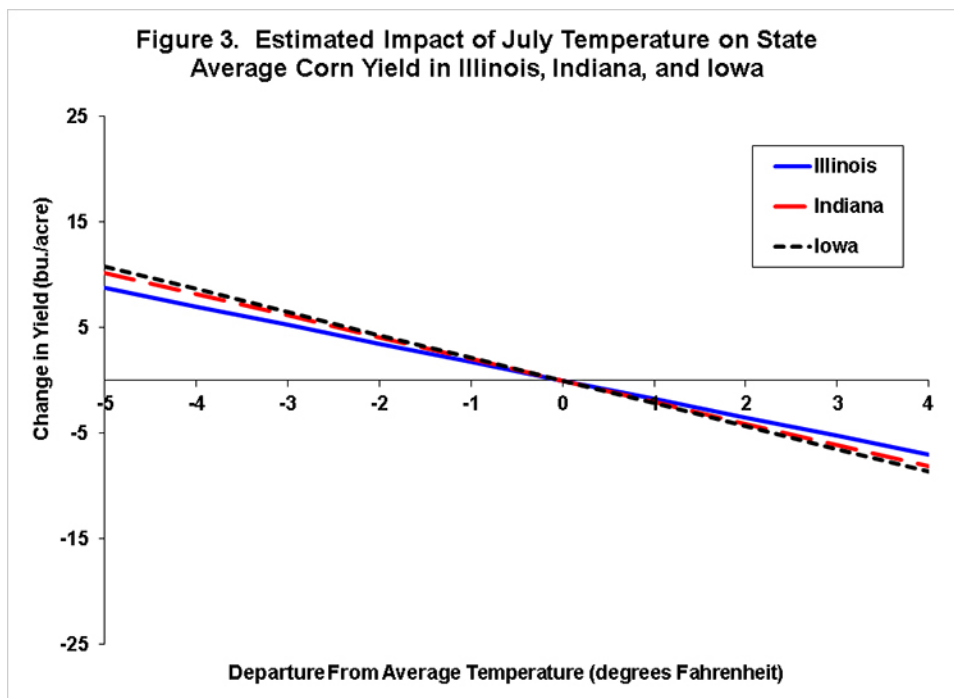
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in those states with very favorable growing conditions would have to offset low yields in those states with unfavorable conditions. That currently seems highly unlikely for two reasons. First there are currently 72 percent more corn acres in those states experiencing very poor growing conditions than in those states with very favorable conditions. The second reason is that the yield impact of weather is not linear. That is, poor weather tends to reduce yield proportionately more than good weather increases yield. That can be seen in Figure 1 which shows actual U.S. average yields and the linear trend of those yields from 1960 through 2011. Deviations from trend tend to be larger when yields are below trend (bad weather) than when yields are above trend (good weather). The non-linear impact of weather is also illustrated in Figure 2 which shows the impact of the level of precipitation in July on the state average corn yield in Illinois, Indiana, and Iowa. The relationship is derived from a crop weather model of corn yields in those three states published in [this report](#). Notice that the average July precipitation in each state (marked as X) is near 4 inches. Yields tend to fall rapidly as precipitation declines below 4 inches, but increases slowly for precipitation levels above 4 inches. A similar, but less distinct, relationship exists for June precipitation as well. These relationships suggest that yield losses in those states with less than average summer precipitation in 2012 will be greater than the yield gains in those states with above average precipitation. The result would be an average yield below trend value.





In addition to the yield implication of the magnitude and distribution of summer precipitation is the yield implication of summer temperatures. The weather models reveal a negative, but linear, relationship between monthly average temperatures in July and August and state average corn yields (illustrated in Figure 3). If the current and upcoming period of above average temperatures extends further into the growing season, additional yield losses would be expected.



### Conclusions

Current conditions point to a U.S. average corn yield below trend again in 2012, but the extent of the yield shortfall will remain uncertain for another 10 weeks. With the large increase in corn acreage this year, an average yield above 150 bushels would require minimal rationing during the year ahead. Based on current and upcoming weather conditions, however, there is risk that the average yield will fall below that

level, requiring higher prices to ration the crop. The USDA's June 29 *Acreage report*, on-going weather conditions, and weekly crop condition ratings will be followed closely in order to assess production prospects. The USDA's National Agricultural Statistics Service will provide the first survey-based yield forecast of the season in the August 10 *Crop Production* report.