May 2020 Corn Outlook

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The Bottom-Line Up Front

Atmospheric and Environmental Research is applying our world-class seasonal forecasting to give the agricultural community information to make better-informed decisions with actionable yield projections for the upcoming season. The analogs from our current seasonal forecast model **suggest the 2020 national corn yield will be 183.0 bushels per acre (bpa) with a total production of 15.83 billion bushels (Figure 1, below).** This forecast yield is an increase of 15.0 bpa over 2019 and ~ 6.8 bpa above trend. This production estimate is ~2.14 billion bushels higher compared to 2019 and is based on an estimate of 86.5 million harvested acres. The AER yield and production estimates respectively are 4.5 bpa and 330 million bushels higher than the March USDA estimate for the upcoming season.

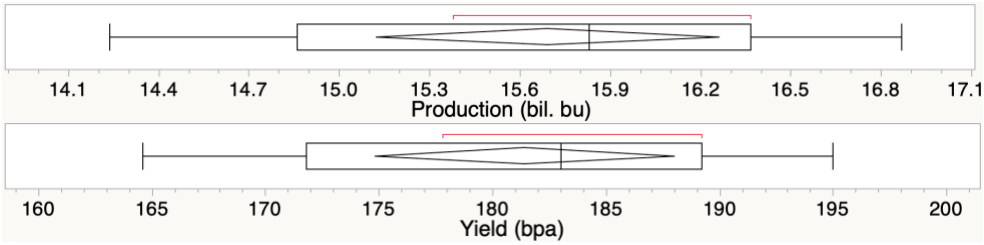

Figure 1. Distribution of corn production (top; billions of bushels) and yield (bottom; bpa) based on the weighting of our forecast. The most likely range for production is between 15.2 and 16.2 billion bushels and 175-187 bpa for yield. The worst (best) case scenarios based on our forecast are 14.3 (16.9) billion bushels for production and 165 (195) bpa for yield.

The Details

Above trend corn is the expectation in 2020. Indeed, our current forecast is for corn to finish about 4 points above trend at the national level. However, our current forecast shows some risk for below trend corn and a slight chance for significantly above trend corn, in excess of 190 bpa.

Here are the reasons we are currently forecasting above trend corn this season:

1) A drier than average spring has materialized for much of the Corn Belt. This generally has been beneficial as most of the region had abnormally wet soils going into March so the drier weather has led to a much better planting season than in 2019. The remainder of the spring and into early summer are likely to be wetter than average but not like in 2019.
2) At this time drought is not expected to develop over large sections of the Corn Belt, though regional pockets of flash drought are certainly possible.

3) The analogs suggest a possibility of a cooler than average July, which would increase the probability of not just above trend corn, but corn possibly exceeding 185 bpa. A prolonged period of excessive heat is a lower risk at this time.

Here are a few reasons why 2020 could end up being below trend for corn:

1) A Corn Belt wide drought coupled with a prolonged heat wave is unlikely. But some places in the western section of the Corn Belt have been abnormally dry this spring and this area does need to be watched for drought development. If a drought does develop in Nebraska and western Iowa and spreads into other sections of the Corn Belt before tasseling, below trend corn becomes much more likely.
2) If the next month ends up being much wetter than expected across the central and eastern Corn Belt, a dry spell later in the season will be detrimental to higher yields.
3) Prolonged stretches of warm minimum temperatures are a non-zero risk later in the summer, which could accelerate the reproductive stage and lower yield potential.

Corn Yield Risk for Crop Reporting Districts:

Above trend corn is likely and over half of the districts in the Corn Belt are currently considered a marginal (i.e., low) risk. This includes nine of the top fifteen most productive districts for corn (Figure 2). There is a slightly higher risk for below trend corn across Nebraska, the Dakotas, and western Minnesota, western Illinois, and parts of the eastern Corn Belt. There is an enhanced risk across southern Indiana, though above trend corn is not out of a question there.

We have broken the map into four risk categories for below trend corn this upcoming season for each district:

Marginal (M, white): A relatively low (but not zero) risk of below-trend corn. This does not necessarily equate to an increased probability for significantly above trend corn though. Approximate below trend chance: 1 in 10.
Slightly elevated (S, yellow): The analogs suggest a slightly elevated but less than 50 percent chance for below trend corn. Approximate below trend chance: 3 in 10.
Enhanced (E, orange): Below trend corn is likely though isolated pockets of above trend corn are possible. Approximate below trend chance: 6 in 10.
High (H, red): There is a high risk for below trend corn and some risk for significantly below trend corn according to the analogs. Approximate below trend chance: 8 in 10.

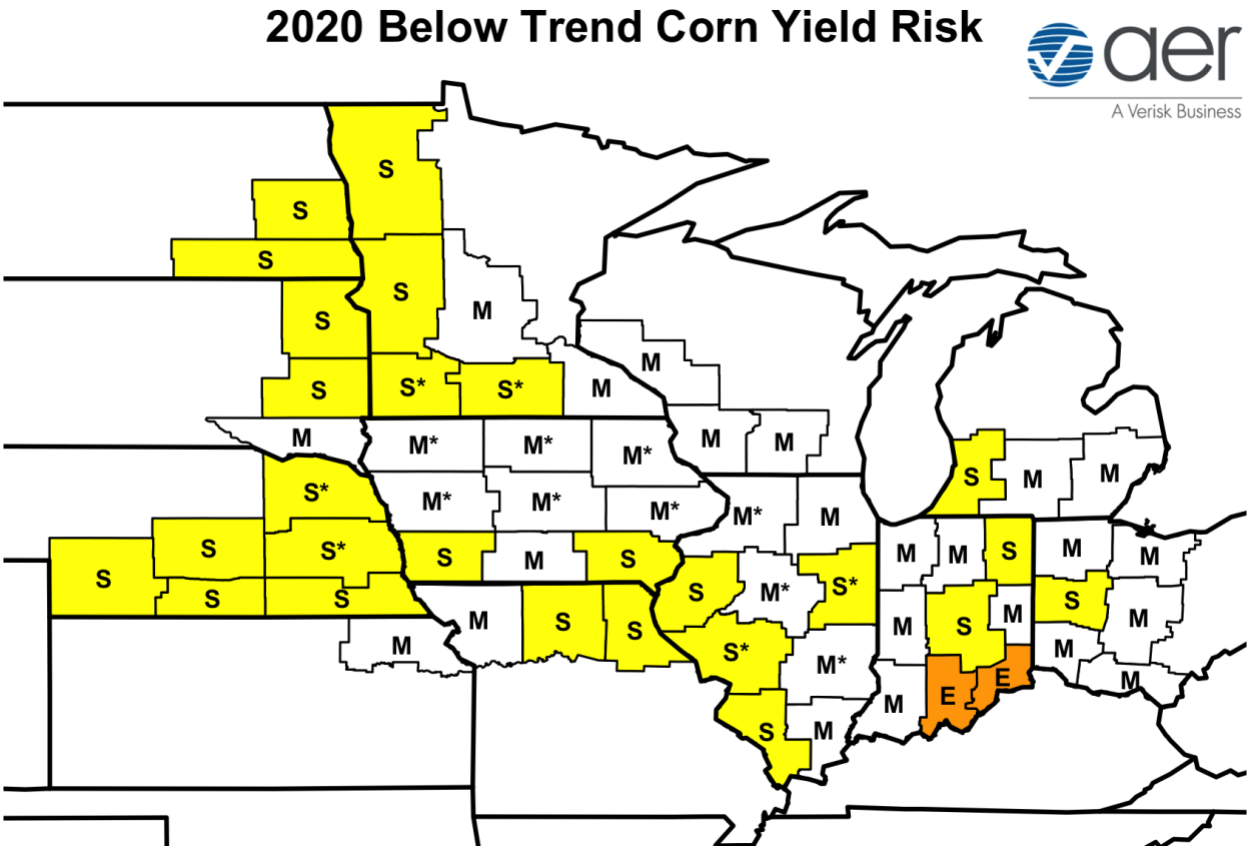

Figure 2. Categorical projections of below trend corn yield risk for the 60 crop reporting districts in the U.S. Corn Belt. M- Marginal risk (white); S- Slightly elevated risk (yellow); E- Enhanced risk (orange); H- High risk+ (red). The districts with asterisks were in the top quartile for corn production over a twenty-year period spanning 1999-2018 as shown in Hunt et al. (2020).

The Methods

Our corn forecast is based on a proprietary weighting scheme using analog years and conditions so far this spring. For this season, the analog years are 1994, 2000, 2011 and 2019. The analog years from the AER seasonal forecast are based on a number of factors, including phase of ENSO, predominant phase of the Arctic Oscillation and strength of the polar vortex. Corn yield forecasts later in the season will incorporate season to date conditions, the AER forecast for the remainder of the season, historic yield, production, and acreage data from NASS, and a proprietary parametric model. General details on the AER seasonal forecast can be found on our website. For more specific questions, please contact Eric Hunt at ehunt@aer.com.

2019 Corn Forecast Verification:

Where we were right: We were within 0.1 bpa of the observed national yield with our August 1st forecast of 167.9 bpa (168.0 observed). Figure 3 shows we also correctly projected 38 out of 60 districts (63%) in the Corn Belt. We correctly forecast below trend yields for most districts in Illinois, Indiana, and across southern Minnesota. We correctly forecast above trend yield on rainfed corn in Nebraska (irrigated was below trend as expected) and in North Dakota.

Where we were wrong: The expectation for a favorable end to the season in eastern South Dakota and across central Minnesota certainly did not materialize. Yields in the eastern Corn Belt exceeded expectations and a few districts even ended up with above trend corn. The early season excessive precipitation across parts of Kansas, Missouri, and Iowa also did lead to below trend corn as expected.

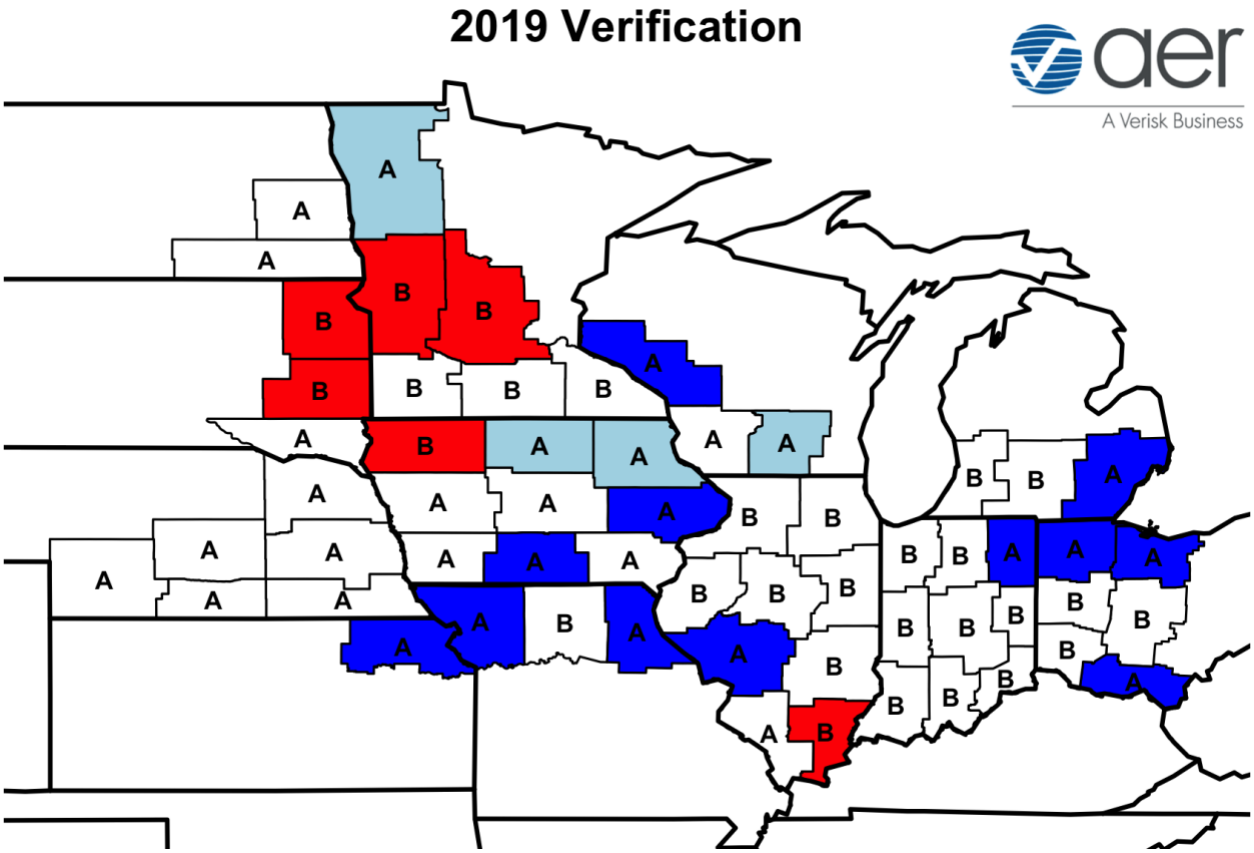

Figure 3. The projected vs. observed trend for 2019 corn yields. The letters in the individual districts correspond to the ***observed*** trend. The colors are determined as follows:

White: Correct Projection (38/60)
Light Blue: Forecast near-trend, above observed (4/60)
Blue: Forecast below trend, above trend observed (12/60)
Red: Forecast above trend, below trend observed (6/60

About the authors:

Dr. Eric Hunt is an agricultural climatologist from Lincoln, NE and has several members of his extended family actively farming in Illinois and Nebraska. Eric has been with AER since 2012 and received his Ph.D. from the University of Nebraska. Among other activities, he is currently working on NASA funded projects to study the evolution of flash drought. He routinely blogs about agriculture and weather on the AER website.

Dr. Judah Cohen is the Director of Seasonal Forecasting at AER's home office in Lexington, MA. Judah has been with AER since 1998 and received his Ph.D. from Columbia University. Judah is perhaps best known for his NSF funded work documenting Arctic-midlatitude connections and the Arctic Oscillation, which he routinely blogs about on AER's website.

About AER:

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