



The 2018 Illinois Corn Crop at Mid-Season

Emerson Nafziger

Department of Crop Sciences
University of Illinois

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The crop progress report from NASS showed that as of July 8, 76 percent (up from 40% on July 1) of the Illinois corn crop was silking, the crop rating was 81 percent good + excellent (G + E), down from 85% a week earlier, and more than 85 percent of Illinois was reported as having adequate or surplus soil moisture. While this combination is very supportive of prospects for high yields, questions remain about whether the crop is actually as good as it looks, and about how dry weather in the coming weeks might affect crop prospects.

Do high crop ratings point to high yields? In a series of *farmdoc daily* articles ([June 13, 2018](#); [June 14, 2018](#)), Scott Irwin and Todd Hubbs have pointed out that U.S. crop ratings become better predictors of final yield as the season progresses, with the highest correlation reached by about the third week of July. They also showed that when high early ratings drop, most of this drop tends to occur by the time the crop pollinates, which is normally in mid-July.

The largest drop in the Illinois corn ratings we have seen in recent decades was in 2012, when 79% G+E on May 20 dropped to 26% on July 1, and to 5% by the end of July. That was the year of the worst drought since 1988, and by July 1 of that year, only 10% of Illinois soils were judged as having adequate moisture.

In only one of the past five years did Illinois corn condition ratings drop substantially between late May and mid-July; that was in 2015, when very wet June weather resulted in ratings going from the upper 70s in late May to the mid-50s by mid-July. In 2014 and 2016, ratings rose from the low 70s in late May to the lower 80s by mid-July, while in 2013 and 2017, ratings rose from the upper 50s to the mid-60s over the same period. With the help of the very low rating and low yield (105 bushels per acre) in 2012, correlation between mid-July rating and yield was fairly good over the past 6 years: yields were in the mid-170s in 2013 and 2015, and close to 200 the other three years. The most "out of line" year was 2017, when cool weather in August canceled out the mediocre crop ratings to give Illinois the highest average yield on record.

In the five years before 2012, early ratings were high only in 2007, and they stayed high that year. Ratings bounced around some in the other four years, and in 2011 went from the 60s in early June to 40% by August. But in none of the last 11 years did high ratings in late June or early July turn into low

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ratings by August, followed by low yields. So we have no precedent for expecting the crop rating to come crashing down this year, and for yields to be low. When we have had low yields, crop ratings at the time of pollination have usually predicted that this is going to happen. Nothing about the crop in 2018 suggests that this year will be different.

After a cool April, the weather turned warm in early May this year and has stayed warm ever since. As a result, growing degree day accumulation rates have been very high: GDD totals from May 1 through July 8 were about 1,350, or 200 above average in northern Illinois; 1,550, or 300 above average in central Illinois; and nearly 1,700, or 350 above average, in southern Illinois. With about 1,400 GDD needed to reach pollination in most hybrids, the 40 percent figure for silking reported for July 1 increased to 76% on July 8.

GDDs used to track corn development have 86 degrees as the cutoff; a day with a nighttime low temperature of 70 and a daytime high temperature of 95 degrees produces the same GDD total (28) as a day with the same night temperature but a high of 86 degrees. This means that above-normal GDD accumulations during the summer result more from above-normal night temperatures than from high daytime temperatures. With night temperatures running in the 70s as July gets underway, we have been adding about 200 GDD per week. This moderated some with slightly cooler temperatures on July 6-8, but unless the temperature pattern turns consistently cooler soon, the corn crop in central Illinois is on pace to reach maturity by the third week of August. At 180 GDD per week (a little higher than the average for July) it will take only 6 to 7 weeks (from July 8) to go from 1,550 to the 2,700 or so GDD that a mid-season hybrid needs to reach maturity. A couple of stretches of below-normal temperatures like we saw in 2017 would delay maturity, but would very likely add some yield. This past weekend provided a very modest sample of this; even those few days of slightly cooler weather probably improved kernel set for the fields that were pollinating last week.

High temperatures have meant rapid crop development, and while the crop currently has good leaf color and is in good condition in most fields, will continued high temperatures cause problems and lower yields? Good plant height and good crop color now indicate that high temperatures have not been a problem so far. Sunshine amounts were above normal in most of Illinois in June, which helped boost growth. And periods of dry weather have resulted in good root growth, except where water has stood in fields in wetter parts of the state.

This is a good time to remember that plants aren't people – corn plants have no problem with high temperatures in the 90s, and they are affected only a little (the evaporation rate drops some with high humidity, which slows water movement through plants) by the “heat index” used to measure human suffering. Low temperatures in the 70s mean high dewpoints, which can mean wetter leaves in the morning and higher nighttime respiration, both of which are negatives. Good nitrogen uptake as gauged by leaf color (except where water has stood) and lots of sunshine have been positives, though, and on balance the crop condition and our eyes tell us that the 2018 corn crop is in great shape over most of Illinois.

The worry persists that rains will stop and that heat will build, causing rapid deterioration of the crop and stopping grainfill before maturity. We can't rule this out, especially in the region with a radius of about 50 miles centered on Quincy, where June rainfall was less than normal. Elsewhere, the water in the soil now will, in fields with medium or heavier-textured soils, provide good protection against crop water shortages in the coming weeks. The crop coefficient, which is the percentage of evaporation that goes through the crop and out the leaves as water vapor, is at its maximum of about 80% at pollination. It will remain high for a few weeks before starting to decline.

Daily evaporation amounts on hot, sunny days are in the range of 0.25 to 0.3 inches, so crop water use (transpiration) on such days with the crop at full canopy like it is now is in the range of about 0.2 to 0.25 inches. A quarter acre-inch of water is about 6,750 gallons, so in one day each plant in a field with 35,000 plants per acre takes up and transpires about 3 pints of water. While we sometimes say that plants “lose” this amount of water, having the stomata wide open to allow water vapor to exit also means allowing maximum amounts of carbon dioxide into the leaf, where the carbon is used to make dry matter through the process of photosynthesis. Dry matter production can exceed 500 pounds per acre on a good day, so losing water means making yield.

Our deeper prairie soils hold as much as 8 to 9 inches of plant-available water within reach of healthy root systems. That amount would supply the crop for a month of high-demand days. So unless there's no rain at all over the next month, a lot of the Illinois corn crop already has enough water in the soil to set kernels in the coming weeks and to begin the filling process that will end with maturity.

While we know from experience that unexpected problems can come up that threaten to decrease yields, it's hard to imagine having Illinois yields end up being below normal after the season we've had so far in 2018. Leaf diseases haven't blown up in most fields, and as the crop moves past pollination and into grainfilling, the threat of disease outbreaks decreases. Insects such as corn rootworm adults and Japanese beetles will emerge too late to affect pollination, except maybe in the rare fields that were planted (or replanted) late. Weather threats like hail have occurred and will occur again, but the size of affected areas is normally small, and hail means rain, whose benefits usually exceed losses from hail over a wide area. With a crop that should be mature by early September, frost is a non-issue. Finally, the fact that it rained in places last week means that the pattern has not yet turned as dry as some feared that it might.

As is always the case, we will know the potential for yield once we can count developing kernels, by the third week of July in the early-pollinating fields. We won't reiterate the process here, but it's a simple one: ear number per acre x kernel number per ear gives kernels per acre. If that number is 16 to 20 million, good yields will likely follow.

(This article was updated slightly from the article posted in the UI Bulletin on July 6, 2018
<http://bulletin.ipm.illinois.edu/?p=4289>)

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