

Estimating Yields Of Stressed Corn

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Even as the Illinois corn crop continues its rapid development, with 8 percent in dent stage by July 22, the crop rating continues to decline; on July 22, only 7 percent was rated as good, none was rated as excellent, and 66 percent was rated as poor or very poor. It's of little comfort, but at least we're getting close to the end of the slide in ratings, since they can't get much worse.

Having so little of the corn crop rated as good and so much rated as poor highlights the pressing question of how much crop there might be to harvest in 2012. Those who drive past fields can't fail to note that, at least in areas where there has been some rain, and at least in the morning before leaves wilt in the afternoon heat, the crop does have some ears and it retains some green leaf area. Do such fields, many of which are likely rated as poor, really have little chance of producing a yield that's worth harvesting?

Some reports from recent tours and visits to fields in central Illinois, where good and poor fields are often close to one another this year, suggest that the ratings might be lower than the crop's potential. It is true that actually achieving the yield potential that exists today will take some rain, so to the extent that a poor rating reflects uncertainty about a return to better conditions, this might be reasonable. In dry areas, canopy deterioration continues or is complete, with leaf area dead or dying as plants deplete the soil water supply. We already know that many such fields will produce no grain.

In fields where no green leaf area remains but some kernels have been set and remain active, the stalks will be depleted of sugars and nutrients until the kernels stop growing due to lack of nutrients or death of conductive tissue. In most such fields, the stalks have not been able to accumulate much sugar or nutrients. One exception might be nitrate, which can remain as nitrate in stalks because there's not enough energy to convert it to ammonium and then amino acids, and there's little demand for amino acids anyway due to leaf and plant deterioration.

Stalk quality is a concern when stalk nutrients are depleted to fill kernels, as often happens under dry conditions. Stalks are likely to be weak this year, but with small ears, there won't be much need for strong stalks in stressed fields. Even so, lodging may start in fields that died prematurely, even before grain has dried down much.

In fields with green leaf area and some kernels set, where leaves are active (not rolled or wilted) for half of each day or so, it might be possible to get a good idea now of how many kernels are likely to fill. How well they will fill will remain in doubt, but with growing degree days continuing to accumulate rapidly, the earliest-planted corn should now be in dough stage, with some starting into dent. According to our estimates in the Illinois Agronomy Handbook, the milk stage (R3) is reached at about 1,925 GDD, dough stage (R4) at 2,190 GDD, and dent stage (R5) at 2,450 GDD.

At Urbana, corn planted on April 1 has accumulated about 2,140 GDD, and since March 15, when the earliest corn was planted, some 2,350

GDD has accumulated. So while dry soils have accelerated leaf death, plant drydown, and the maturation process in general, corn that is now at R4 in central Illinois is not far ahead of where GDD totals suggest it should be.

As a general indicator, the more advanced that kernel development is compared to where GDD accumulations predict it should be, then the more stress the plant has endured and the lower its yield potential. There are already a few reports of grain harvest having taken place in southern Illinois, and as we might expect, yields with such early plant death and drying will be low. In severely stressed areas, we can see fields with no green leaf area left. In such fields where ears are present, either kernel number or kernel size, or both, will be small.

Estimating yield potential starts, as always, with an estimation of kernel number. With so much variability within stressed fields this year – for example, low areas might have ears and higher areas might have none – getting an accurate estimate of ear number is nearly impossible. While such obviously low yields may not really need estimating, it may be possible to use a previous yield or topographic map to estimate how much of the field might have ears and to sample only in those with ears, writing off the rest after confirming the lack of ears there.

To get kernel counts, first count the number of ears in 1/1000 of an acre (17 feet, 5 inches in 30-inch rows). If most plants have ears but ear size is highly variable, select five or six ears (instead of the usual three) to represent the range of ear sizes from the row section. Count kernels per ear, average these counts, and multiply by the number of ears (with kernels) to get number of kernels per 1/1000 of an acre.

To estimate yield, divide the number of kernels in 1/1000 of an acre by the number (in thousands) of kernels expected to be in a bushel at maturity. In recent years we have been using the number 80 (thousand) kernels per bushel, which under good conditions is reasonable. But this number can range from less than 60 to more than 120, and it's almost impossible to guess what it might be at maturity for a particular field when we do not know how long stress will last.

If there's a fair amount of green leaf area and kernels have already reached dough stage, using 90 might be reasonable. It typically doesn't help much to try to estimate depth of kernels at dough stage, when kernel depth is typically rather shallow anyway, especially if there are 16 or more kernel rows on the ear. If green leaf area is mostly gone, however, and kernels look like they may be starting to shrink a little, kernels may end up very light, and using 120 or even 140 might be more accurate.

While I do think there will be a corn crop in Illinois – and even a good crop in some areas – the only way to get an idea of potential yield in a given field is to visit it to make an objective assessment. In a field where the crop has dried up prematurely and has few if any ears, there won't be many surprises, and a visit may not be needed. But in some fields, the ability of the crop to produce grain even under stressful conditions might be surprising. Δ

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