

Short Corn, Short Yields?

URBANA, ILL.

The Illinois corn crop condition continues to deteriorate, with less than 40 percent now rated as good to excellent on June 24, according to University of Illinois crop sciences professor Emerson Nafziger

On the positive side, the current corn crop has good color, is mostly disease-free, and has uniform stands with few drowned-out areas. These factors will contribute to increasing kernel set in fields pollinating now, at least where there is enough soil water. Cooler weather this past week has prolonged the period of adequate water, and cooler nights reduce respiration, thus helping the sugar supply.

On the negative side is the lack of rainfall, with deficits for May and June ranging from 1 to 6 inches in different parts of Illinois. On June 26 the U.S. Drought Monitor showed the entire state as dry, with most of the state in moderate to severe drought and the southern counties in "extreme drought."

As the crop enters the critical yield-producing stage, many are wondering about the effects the lack of soil water has had, and will have, over the next weeks. "The 2012 corn crop is well-rooted, healthy, and tough, but it's unrealistic to expect it to continue to thrive as the soil water supply continues to decline in dry areas," Nafziger said. Plants that are unable to take up enough water to keep leaves from rolling in the afternoon are not fully productive, and this takes a toll on the crop.

"As of June 24, 17 percent of the state's corn crop was pollinating, the highest percentage for this date on record," he continued. "This week we would expect most of the crop that was planted by mid-April in central and southern Illinois to begin to pollinate, bringing the number by July 1 to perhaps 40 percent."

While pollination is the most critical period in terms of yield potential, breeding for aggressive emergence of ear shoots and silks has considerably lessened the likelihood that pollination will fail completely. However, the number of kernels set may be lowered on plants that have been undergoing stress from dry soils, and the number of fertilized kernels that survive the weeks after pollination may continue to decline if the weather stays dry.

Observers in the fields note that corn is entering or approaching pollination while plants are shorter than normal. This raises questions about the connection between plant height and yield.

"Plant height is the best visible indicator of how well the plant has been able to take up the water it needs to expand cells," Nafziger explained. "Cell expansion is sensitive to water supply, so shortened internodes are one of the first things we notice on plants that have struggled to take up enough water to keep growing."

This year, many fields have plants only 5 to 6 feet tall at tasseling, several feet shorter than normal. These plants may grow some after tasseling but will reach full height by the end of pollination. Some of the fields in the driest areas have tried to pollinate while the plants were still very short.

Most of these fields will produce low yields; some may produce no yield at all. Short plants

may not be able to form the complete canopies needed for maximum yield because, if they have had trouble getting enough water to elongate their stalks, they may have shorter-than-normal leaves.

Even if the leaf area is normal, leaves may be stacked more closely together on short stalks, allowing for less interaction among neighboring plants and less flexibility of leaf movement. Hence, the plants' ability to form the complete canopy that is needed to intercept nearly all of the sunlight is reduced. This problem is coupled with ongoing water stress that limits photosynthetic rates.

Is there anything we can do to help the crop get through this dry period?

Not much, according to Nafziger. "When water is clearly the major limitation to plant function, we would expect little or no response to anything we can apply that's not water."

As an example, he does not think that applying fungicides to reduce respiration and increase the plant's sugar supply is likely to help much.

"Strobiluron fungicides do act by reducing respiration, some of which is considered wasteful," he explained. "But plants that are not photosynthesizing well do not have much sugar to respire away, so reducing respiration probably won't do much good." Moreover, fungal diseases that would respond to fungicides are not a threat in most fields today.

By the same token, applying products said to reduce the "ethylene effects" in stressed plants is unlikely to have a positive effect when there is not enough water to keep open the stomata, which they need to do to allow photosynthesis to take place.

Protecting the crop from anything that reduces effective leaf area, such as applying insecticides if enough insects are present to do damage, can help the corn to retain its potential to fill grain if there is rainfall. Foliar nutrients are unlikely to be of much benefit, and the good canopy color in most fields indicates adequate nutrient levels.

While the focus has been on corn, soybean plants are also showing stress effects. Soybeans planted around April 20 at Urbana are now about 24 inches tall and at stage R2 or full flower. With fair-to-good growth and warm temperatures, soybeans are moving quickly into flowering, with 11 percent blooming by June 24.

"An early start to soybean flowering is generally positive, but we remain concerned about how water shortages might affect soybean pod formation," Nafziger said.

The period over which new flowers appear will last for up to a month as the soybean plants continue to increase node numbers and stem height, and can even recur if stress is relieved after that. This longer flowering period makes the soybean crop better able to set pods and to start filling seeds even if there is some stress during July.

"But if we continue with little or no rainfall, abortion of flowers or of pods will likely continue," said Nafziger. As with corn, applying materials promoted to reduce stress in soybean is not likely to do much good as long as water supply remains inadequate. Δ