Managing Corn Plant Health to Maximize Yield Potential

- Managing corn plant health and reducing plant stress during critical growth stages can help maximize yield potential.
- Understanding the significance of different growth stages and the effect stress may have on corn plants during various stages can help determine management decisions needed to improve overall plant health and protect yield potential.

Determining Corn Yield Potential
Corn yield potential is determined by the number of ears per acre, the number of kernels per ear, and the weight of each kernel. The interactions between corn product genetics, weather conditions, soil types, pest pressure, and available nutrients during specific times in the growing season can affect corn yield potential.

Critical Growth Stages
Understanding the critical growth stages of corn is important to help determine final yield potential. Because corn does not have the ability to compensate for poor stands early in the season, establishing a uniform stand is the first step in optimizing yield potential. The second critical growth stage occurs during the rapid stage of corn vegetative growth at V6 to V8 (6 to 8 leaf collars), when kernel number determination is almost complete. Stress-free corn plants during this time can help maximize the potential number of harvested kernels.1

The third critical growth stage occurs during the pollination process. Pollination is critical to converting potential kernel numbers into developing kernels. Weather can greatly affect the success of pollination. Drought stress can desiccate silks and pollen grains, which may result in barren ears and/or short ears with unfilled tips (Figure 1).

The final critical growth stage is the grain fill or kernel development period. This stage begins at pollination and ends at kernel black layer formation. Stress during this stage can reduce kernel number, size, and weight of harvested kernels.1

Photosynthesis and Crop Stress
During the grain fill stage, any stress on the photosynthesis process can reduce yield potential. Photosynthesis produces the energy (carbohydrates) that a corn plant needs to survive and produce grain. Drought, high temperatures, extended periods of cloudy weather, foliar diseases, hail damage, and nitrogen (N) deficiency can, individually or in combination, significantly reduce photosynthesis.2

After pollination, corn plants redirect carbohydrate movement to fill the developing kernels, which may reduce the health of the stalk, leaves, and roots.2 This process can physically weaken the plant, resulting in the plant being more susceptible to stalk and root diseases. Fields that are at the highest risk for stalk rot are those that have developed ears with high yield potential because of ideal conditions during vegetative growth, but have experienced severe stress during the grain fill stage.

The effects of plant stress can be intensified by sandy soils that have minimal water-holding capacity or plants that have a restricted root system due to compacted soils, nematode damage, or corn rootworm feeding.

Severe stress during the dough and dent stages of grain fill can lead to premature formation of kernel black layer. This can reduce yield potential due to decreased kernel size and weight.3 When the black layer forms, no additional nutrients can flow into the kernel and drydown begins.

Managing Stress
Controlling plant stress due to periods of hail, drought, and high temperatures can be difficult; however, the following issues can be mitigated with proper management and treatment:

Fertility. Optimal fertility is essential to maintain late-season plant health. Nitrogen deficiency is a common photosynthetic stress that can occur during late grain fill, which can cause the leaves to turn yellow and die. Saturated corn fields, due to wet conditions early in the season, may cause a loss of N from denitrification and leaching. Losing leaves during grain fill can reduce the plant’s ability to produce photosynthate and also decrease the nutrients that can be remobilized to the ear.

Nitrogen should be applied according to crop need and is recommended to be applied two to three times per season, depending on growing conditions. Split applications can help...
reduce the potential of N loss through denitrification and leaching. Corn requires the most N during rapid vegetative growth, so applications of N should occur prior to this stage, or within the V5 to V8 (5 to 8 leaf collars) growth stages.

Potassium (K) is a critical nutrient during pollination and grain fill. If K is limited, silk emergence may be delayed, possibly resulting in unfilled ear tips. Potassium is also essential for the plant to move energy from the leaves to filling grain. Low levels of K in combination with excessive N can also lead to higher levels of stalk rot. Apply K according to soil test results. Lower K values may occur in fields where crop residue is removed or in fields previously planted with a soybean crop, as soybean typically removes more K from the soil than corn.4

- Reduce plant material that may be used to harbor populations of disease organisms by rotating to other crops and removing crop residue and weeds.
- Promote vigorous and healthy plant growth by applying fertilizer according to soil test recommendations.
- Lessen compaction that may impede root growth by subsoiling below the row.
- Apply fungicides when needed to help reduce potential losses.6

Foliar fungicides are typically active for 14 to 21 days after application. An optimal application of a fungicide can protect leaves from foliar fungi during grain fill. When foliar diseases are controlled, corn also may be less susceptible to stalk rots.

Fungicide efficacy depends on accurate application rate, timing, and method as stated on the product label and disease presence in the field. Deciding to apply a fungicide should be based on scouting, environmental conditions, management practices, disease pressure, and potential economic advantage. Potential yield increase of the crop should cover the cost of the application.

**Summary**

- Maximizing corn yield potential can be helped by reducing stress on photosynthesis during critical growth stages.
- Nutrient and disease management can help preserve yield potential and are critical in managing corn plant health throughout the growing season.

**Sources:**


**Web sources verified 05/16/16.**