BETWEEN THE ROWS

July 15, 2010 | MANAGING CORN IN A SUSTAINED WET ENVIRONMENT | Length: One page

CURRENT CROP SITUATION

Despite reports of a good to excellent corn crop in the Midwest, there are considerable acres where performance has been impacted by excessive rainfall.

After an early start in April, corn planted in May was delayed and impacted by a period of cold, wet soils. Corn-on-corn fields were particularly affected as a result of spring tillage, causing increased crop residue on the soil surface. Soils were much slower to warm under these conditions, resulting in slowed growth, reduced stands and uneven growth. Complicating the situation, a heavy rainfall pattern continued in many areas throughout June. The result was flooded fields and saturated soils for an extended period of time.

The impact from weeks of saturated soils during fast growth (knee-high to tasseling) can be significant. Flooded and saturated conditions compress the soil and force air out of the root zone, which reduces the pore space (similar to the effect compaction has). The root zone then lacks oxygen, which the roots need in order to take up nutrients and water. Under these conditions, nutrient uptake stops, growth halts and is stunted, and plants turn a pale green color.

Survival of corn plants is dependent on temperature, stage of growth and length of time soil is saturated. Warm temperatures under saturated or flooded conditions can cause plant loss in a week, particularly in small plants. Recovery of stunted plants is dependent on soil drainage and restoration of aeration in the soil. Saturated or ponded soils are usually sealed or crusted over at the surface as they dry. This impedes air exchange into the root zone, causing recovery in this area to be slow, if it happens at all.

A secondary consequence of the flooded or saturated soils is the loss of nitrogen (N). Most water-damaged fields lack the usual dark green color associated with a normal corn crop. Roots' inability to take up N due to lack of oxygen will cause plants to appear stunted and lack good coloring. This poor color is not necessarily from lack of N in the soil. However, significant N can be lost under these conditions through denitrification (change of fertilizer N to N_2O gas under anaerobic conditions) and leaching of nitrate with water percolation into the soil profile.

LIMITED MANAGEMENT OPTIONS THIS SUMMER

Several weeks of heavy rainfall or saturated conditions can cause N loss and resulting leaf N deficiency symptoms in plants. This will manifest itself as a V-shaped yellow or brown area starting at leaf tip of lower leaves. If these symptoms are evident before tasseling, N loss could be a yield-limiting factor.

A corrective application of N fertilizer could be beneficial, but few options are available. If ground equipment can be used, 28 percent N solution can be dribbled on the soil surface between the rows. Other applications by air may show detrimental plant effects (foliage burn).

Late season (after tasseling) N applications are less consistent in prompting a yield response. N is needed throughout the growing season but about 40 percent of the total N is needed after tasseling. Research has shown that in some cases late N applications can increase grain protein content without increasing yield. This may only be important to some livestock producers who feed their own grain. Weather conditions after a late N application can have an impact on success of this action. Rainfall is needed to move the N fertilizer on the soil surface down into the root zone.

MANAGEMENT OPTIONS FOR WET ENVIRONMENTS

Tillage: For many corn growers, fall tillage is a key part of their crop residue management strategy, particularly corn-on-corn acres. Starting the crop residue decomposition in the fall is a great benefit to the next crop. The decomposing residue has less impact on the soil drying process, and therefore, soil temperature in the spring. It appears that soil temperature is the most important factor impacting the newly planted crop. Keeping residue off the planted row with row cleaner attachments on the planter can aid soil temperature improvements. Iowa State research has demonstrated cleaning a 6-inch band over the planted row greatly improves emergence and stand establishment.

N Fertilizer Management: Research has generally shown differences in the effectiveness of fall-applied versus spring-applied N fertilizer, particularly when anhydrous ammonia is used. Year-to-year variation does exist, but fall-applied N fertilizer is 10 to 15 percent less effective than spring applied N. There are, however, economic and logistic advantages to fall-applications. Fall applications make sense to help the spring work load, with side dress application still an option if the weather cooperates. A side dress application puts the N fertilizer in place for the high demand growth period, and it has less time to be affected by soil loss factors.

Drainage: Excess water has a huge impact on the growing crop. Soil drainage improvements are a long-term management strategy that can enhance whole field performance. With today's yield-mapping technology, the yield reduction cost of the "wet spot" can be calculated with reasonable certainty, and a cost benefit analysis can determine the probability of success (pay-back) in resolving drainage situations, whether it's surface water or internal drainage.

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