6-21-2008

Yellow Corn, Wet Soils and N Loss

John E. Sawyer
Iowa State University, jsawyer@iastate.edu

Yellow Corn, Wet Soils and N Loss

Abstract
As many are well aware, the wet conditions this spring have resulted in tremendous corn coloration and growth variation across fields. In my travels to the ISU research farms west of Ames this week for research work, it is clear that corn is recovering and beginning rapid growth, but that growth is very uneven and varies on a quite small scale.

Keywords
Agronomy

Disciplines
Agricultural Science | Agriculture | Agronomy and Crop Sciences

Integrated Crop Management NEWS

Yellow Corn, Wet Soils and N Loss

By John Sawyer, Department of Agronomy

Yellow Corn
As many are well aware, the wet conditions this spring have resulted in tremendous corn coloration and growth variation across fields. In my travels to the ISU research farms west of Ames this week for research work, it is clear that corn is recovering and beginning rapid growth, but that growth is very uneven and varies on a quite small scale.

Where soils were "wetter" for a longer period, the corn is still yellow and stunted. At this time, this variation is mostly due to water, rooting and compaction issues, and much less to nitrogen (N) supply. When corn is small, the total plant N requirement is low and easily met by soil and applied N. As soils dry and rooting depth increases, plants will improve growth and access to N.

Crop rotation is also having an impact on early growth of corn this year. At our crop rotation by N rate study site at the ISU research farm west of Ames (on a Clarion loam), the corn following corn (CC) is not growing nearly as well as corn after soybean (SC). The CC is not as "tall" and is not as "green" as the SC, even at the highest N rate (240 lb N/acre). This means the growth response difference is not due to simply N supply. The N in this study is spring preplant incorporated urea. Looking at the corn plants in the SC rotation, there is good response to the applied N and the plants are getting their "deep green" coloration.

Response to Anhydrous Ammonia Timing – Some Observations
It is very confusing to look at corn plants and decide if the yellow coloration is due to water stress, roots not reaching applied N, or N loss. To help answer these questions, I visually evaluated corn plants in an anhydrous ammonia rate study being conducted at the ISU research farm between Ames and Boone. In this study, anhydrous ammonia is applied in late fall (October 31, 2007), spring preplant (April 30, 2008), and sidedressed (June 18, 2008) at different depths of injection and application rates. Corn was planted May 15. The study is "low" on the landscape, with soils going from a small area of Clarion loam to mostly Webster clay loam and Harps loam.

The white stake is in the border between two four row plots. The plot on the right had no N applied and the plot on the left had 80 lb N/acre applied last fall. (J.E. Sawyer, June 19, 2008)

Like many fields this year, part of the study area is wetter than the rest, with a small part where the corn is dead due to standing water. As of Thursday, June 19, the corn is around the V4 growth stage, so is still small. Plants on the "higher" ground are growing better and responding better to applied N, plants on the "lower" ground are smaller and not showing much growth response to applied N, and plants near the "dead"

area are quite small but alive and showing no response to applied N.

Looking at the plant coloration and growth, I can generally see a better response to the spring applied ammonia compared to the fall applied ammonia, especially at lower N rates. It is too early to tell what amount of N may have been lost this spring, but it is clear either N loss is greater from the fall application, or nitrate from that timing is deeper in the soil and roots have not gotten to the N, or wet soil is restricting deeper root growth, or a combination of all.

It is clear that the corn is not growing as well on the more poorly drained (lower landscape, wetter) areas compared to the "higher" and better drained areas, and the corn response to fall and spring applied N is better on the areas where corn is growing better.

What does this all mean? I suspect N losses have occurred with the fall application, less with the spring application, and time will tell how much. It's just too early now to make a determination of how much N loss from the visual corn growth and coloration. Also, wet conditions have restricted corn root growth and access to the applied N. I will attempt to watch these plots over the next week or so and see how the corn continues to grow and respond.

Rescue N Applications
The best approach is to get sidedressed N into the soil. Injection several inches into the soil places N in the root zone, and helps avoid placement on or near the surface where dry soils can limit root uptake. Injection is not always an option and sometimes it is just necessary to surface apply N materials. In those instances, rain will be needed to move the N into the soil. This (rain) is not exactly what we want right now, but the N needs to get into the soil for plant uptake.

Past research has also shown that sidedress N will not perform as well in dry conditions. At this time we want corn to grow root systems. Trying to "green up" corn with foliar application of fertilizer materials or application of low nutrient rates will not help promote root growth or help plants recover from poor aeration in the root zone. Corn will soon reach a rapid growth phase, and adequate N must be present in the active root zone to meet plant demands. Corn requires a large amount of N for high yields, and the way this large N demand is met is through root uptake.

Additional References
The wet conditions this spring have been widespread throughout the Midwest. Folks in many states are struggling to deal with N losses and determining rescue N applications for the corn crop. Following are links to several university articles for assessing N losses. These may provide you with some different perspectives and additional help as you make decisions about rescue applications. Do remember that geographic and soil differences will influence N losses, suggested N applications and potential for corn to respond to additional N.

Purdue University
http://www.agry.purdue.edu/ext/corn/news/articles.08/FloodingNitrogen-0613.html

University of Minnesota
http://www.soils.umn.edu/extension/extension_publications/Soil%20Nitrogen%20and%20Management/Nitrogen%20W

University of Missouri
http://ppp.missouri.edu/newsletters/ipcm/archives/v18n10/v18n10.pdf

University of Wisconsin
http://ipcm.wisc.edu/Portals/0/Blog/Files/17/564/WCM_15(14)b.pdf

University of Illinois
http://www.ipm.uiuc.edu/bulletin/article.php?id=952

John Sawyer is a professor of agronomy with research and extension responsibilities in soil fertility and nutrient management.

---

is republished in any other manner.