

LATE NITROGEN APPLICATION DEMONSTRATION

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Nitrogen (N) Rate Trial Demonstration

Each year at the ISU Field Extension Education Laboratory we run a N rate demonstration where fertilizer N rates (0-250 lb N/acre in 50 lb increments) are applied to corn at planting (rates have been applied for 11 years to the same plots each spring). This year (2010) we only applied the at-planting N to half of the plots and left the other half with no N applied (in continuous corn).

During the Field Diagnostic and Crop Management Clinics this summer attendees asked if the corn that did not have N application would respond (growth and grain yield) to N applied at the time of the clinics. The corn on July 12 was near tasseling (tassels in the whorl but not emerged, see Photo 1), and was severely N deficient in all plots with no N applied (similar deficiency with all previous N rates). The field was not flooded, so plant N deficiency symptoms were from high rainfall and lack of available N.

To take a look at what would happen if N were to be applied at that late timing (corn stage and calendar date), ammonium nitrate was surface broadcast to the soil (dribbled between each row on July 14) in the 50 and 100 lb N/acre plots where no spring N had been applied in 2010. The late N was applied at 50 and 100 lb N/acre to those two respective N rate plots. The first significant rain after that N application was approximately one inch total on July 18/19, with total rainfall more than thirteen inches from July 14 to August 13.

This is not a replicated study, with visual representation of only a few corn plants/ears, so do not over-evaluate the results (photos taken August 13). The corn did respond to the late N, visually with whole plants becoming darker green (Photo 2), green husks (Photo 3), and increased ear size (Photo 4) (not number of rows or potential kernel number per row as those were set earlier in the season). My impression is there will be a yield increase from the late N application. Would the yield increase pay for N applied; probably but that is a guess. Obviously the yield level will be low since the ear size (yield potential) was depressed by the severe and long N deficiency (Photo 5). It is also impossible from this demonstration to know what N rate would be best. Of course it would have been much better to not have the corn get so N stressed, and for so long, but it is interesting the plants did respond to the late N and should provide greater yield. This small demonstration does show the potential for supplemental N applications to help corn production when conditions have caused N loss or made planned and timely applications impossible. Other discussion and information on in-season N applications is provided in the following references.

Resources for In-Season N Application Decisions

Sensing Nitrogen Stress in Corn:

<http://www.extension.iastate.edu/Publications/PM2026.pdf>

In-Season Nitrogen Management for Corn Production:

<http://www.agronext.iastate.edu/soilfertility/info/NC2007-p38-Sawyer.pdf>

ISU Agronomy Extension Soil Fertility Web site:

<http://extension.agron.iastate.edu/soilfertility/>

Photo 1. Corn with no N applied in foreground (none in 2010) and corn with at-planting N rates in background. Photo taken July 15.



Photo 2. Corn showing response to late N application. Six rows in the middle had 100 lb N/acre applied on July 14 (three rows on each side of orange stakes), rows on left had no N applied (250 lb N/acre in previous years), and rows on right no N applied (200 lb N/acre in previous years). Photo taken August 13.



Photo 3. Ears and husks showing response to late N (applied July 14). From the left, late N at 50 lb N/acre, no N, N at 100 lb N/acre, and no N. Photo taken August 13.



Photo 4. Ears showing response to late N (applied July 14). From the left, late N at 50 lb N/acre, no N, N at 100 lb N/acre, and no N. Photo taken August 13.



Photo 5. Ear with 200 lb N/acre applied at planting (top) and ear with 50 lb N/acre late-applied on July 14 (bottom), showing the lower yield potential from the prolonged N stress. Photo taken August 13.

