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# Yellow Corn, Wet Soils, and N Loss – Part 4

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**Abstract**
Last summer I provided observations in three ICM News articles (June 19, June 26, and July 8, 2008) on corn growth and response to nitrogen (N) applied in an anhydrous ammonia study conducted at the Iowa State University research farm between Ames and Boone. This series of articles was written in response to the record wet conditions encountered in 2008. Following is a summary of the grain yield response to N timing and rate.

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**By John Sawyer, Department of Agronomy**

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**Response to Anhydrous Ammonia Application – Corn Grain Yields**
In that study anhydrous ammonia was applied in late fall (Oct. 31, 2007), spring preplant (April 30, 2008) and sidedressed (June 18, 2008) at five rates with corn following soybean. Corn was planted May 15. The study was located "low" on the landscape, and like many fields in Iowa in 2008 part of the study area was wetter than the rest, with a portion where the corn was killed due to standing water.

The corn was quite resilient, for the majority of the study area it grew well once soils dried, and produced decent grain yield. Generally the corn located on the "higher" ground grew "better" than plants on the "lower" ground and areas where water had ponded. Yields were good, but more variable than normal. As I stated in the last article, growing conditions during the entire growing season would be the final determinate of maximum N need.

Grain yields showed that the site was very N responsive due to the extremely wet conditions, and responsive to N rates higher than typical for corn following soybean. Maximal N rate response was larger with fall than spring preplant or sidedress timing, and the response was the same for spring preplant and sidedress application. Mean yields for the different timings were respectively (for N rates of 0, 80, 120, 160, and 200 lb N/acre) 116, 150, 145, 161, and 180 bu/acre for the fall application; and 113, 156, 170, 184, and 181 for the spring and sidedress average.

Fitting a regression model to the N responses separately for the fall and spring/sidedress applications indicated that the fall timing resulted in a yield increase to the highest applied N rate (200 lb N/acre), but the spring/sidedress response had an economic optimum rate at 173 lb N/acre. With the wet spring/early summer conditions, the fall application was apparently more at risk of loss than the spring application. However, due to loss of soil derived nitrate with the wet conditions, the overall N fertilization requirement was also increased.

Hopefully the wet conditions will not repeat in 2009. These and results of other N rate trials conducted across Iowa indicate that in 2008 it would have been yield and economically viable to have applied in-season N in addition to that applied in the fall or spring (assuming a normal application rate had originally been applied), and when sidedressing, a higher rate than normal would have been profitable.

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

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