Soil Nitrogen and Organic Matter Response Over Three Years to a Single Application of Manure or Commercial Nitrogen Fertilizer

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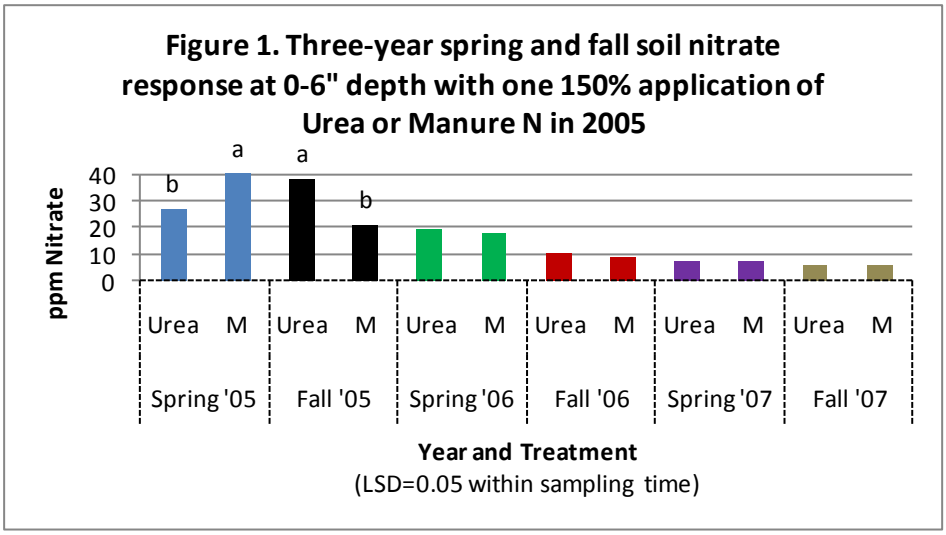
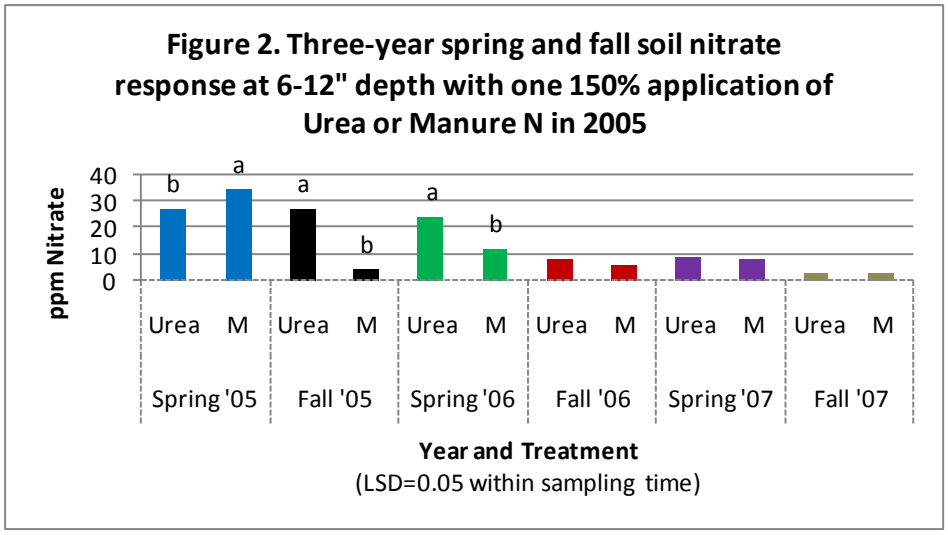
Introduction: A study was initiated in 2005 to determine the mineralization rate and amount of nitrogen (N) carryover from manure applications vs. commercial N fertilizer. The study compared the yield response of a corn-wheat-sunflower rotation to manure N and urea N at 1x and 1.5x rates with corn responding to a single fertility application and the wheat and sunflowers responding to the carryover N from that single application. Soil samples were collected in the spring and fall of each year to track the soil N and organic matter (OM) response to the single N application at the 0-6", 6-12", and 12-24" depth. Soil OM was tested at the 0-6" depth. This report will outline the soil N and OM response over the three-year rotation for the 1.5x N (urea) and M (manure) treatments since the other treatments showed no differences. There were no differences in crop yields of the 1.5x N and manure treatments.

Results: Results in Figure 1 show that in the spring of 2005, residual soil N levels at the 0-6" depth were higher for plots that were going to receive manure than the urea plots. However, in the fall of 2005, there was significantly more N remaining in the soil for the urea plots. In years 2 and 3, there was no difference in carryover soil N levels based on treatment or time of year.



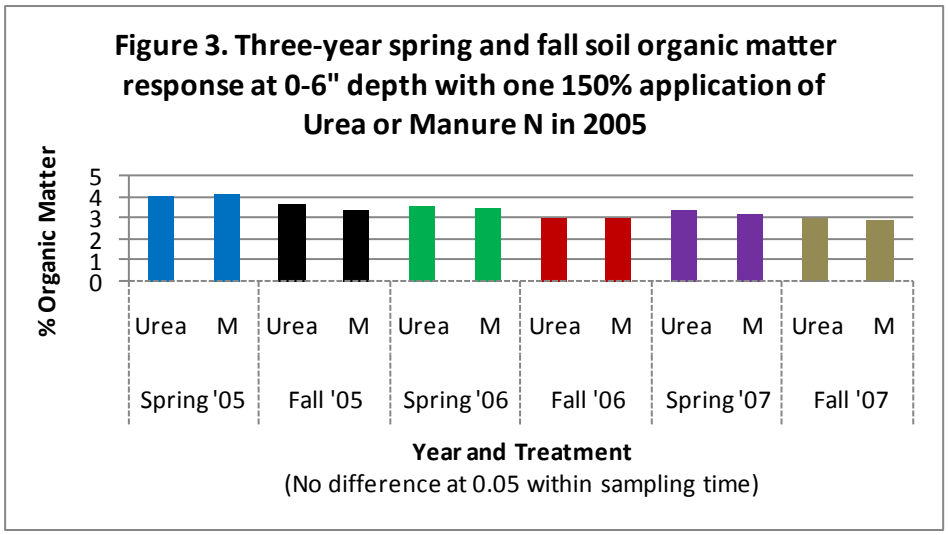
[ab] Values with the same letter are not significantly different.

According to Figure 2, at the 6-12" depth in the spring of 2005, the soil N level was analogous to the 0-6" depth with the plots targeted for manure application having significantly higher soil N levels than the plots receiving urea. Similar to the 0-6" depth, at the 6-12" depth, the manured plots had significantly less residual soil N in the fall of 2005 than urea plots. This trend followed through into the spring of 2006 with the urea plots continuing to have higher carryover soil N than manured plots. For the remainder of the study, there was no difference in soil N levels based on treatment or time of year. Data from the 12-24" depth showed the same results as the 6-12" depth (data not be shown).



[ab] Values with the same letter are not significantly different.

Soil OM results in Figure 3 show no differences in OM regardless of treatment or time of year.



Conclusion: These results show that manure is a slow-release N fertilizer leading to less residual soil N available for loss over the winter. Even though there was no difference in soil OM, there was a trend of lower OM levels over the duration of the study. This trend will be investigated with more thorough statistics in another report.