CORN RESPONSE TO ESN AND OTHER N SOURCES FOR TILLAGE SYSTEMS ON CLAYPAN SOILS

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In the previous article, research evaluated N release from polymer coated urea (ESN) using buried bags to determine the degradation of the polymer throughout the growing season (Nelson and Motavalli, 2007). Limited research has evaluated the interaction between tillage system and slow release fertilizer performance. The objective of this research was to evaluate a high starch standard corn hybrid response to ESN and other N-sources in various tillage systems on claypan soils.

Materials and Methods:
A field trial with four replications was established at the Greenley Research Center in 30 by 30 ft plots. This research was arranged as a split-plot design with tillage system (reduced till corn, no-till corn planted into double crop soybean stubble, no-till corn planted into frost seeded clover and wheat residue) as the main plot and N source (untreated, anhydrous ammonia, urea, and ESN) as the sub-plot. All N sources were applied at 75 and 150 lbs N/acre. 'DK C60-18' was planted at 30,000 seeds/acre on 18 May 2006 and 20 May 2007. Preplant N sources were applied on 18 May 2006 and 14 May 2007. A sidedress application of urea ammonium nitrate was applied on 5 June 2006 and 6 June 2007. Grain yield was determined and samples were collected from each plot. Grain yield was adjusted to 15% prior to analysis. The concentration of starch was determined with a Foss Infratec1241 near-infrared reflectance grain analyzer. All data were subjected to ANOVA and means separated using Fisher's Protected LSD at P=0.05.

Results:
There was no interaction between tillage system and N source in 2006; therefore, N source main effects were presented (Table 1). This location has been in a corn-soybean-wheat rotation for over nine years and was in continuous corn over 10 years before the rotation study was initiated. In general, organic matter was relatively high in this experiment; therefore, response to N rates was limited in 2006. There was no difference in grain yield at the 75 and 150 lb/acre N rates for all N sources. Grain yield increased 14 bu/a when urea was applied at 150 lb/acre when compared to anhydrous ammonia. Starch levels were lower when N was applied at the 150 lb/acre rate when compared with 75 lb/acre. Protein levels were probably larger for the high N application rate since protein is commonly inversely related to starch (data not presented).

Table 1. The effect of nitrogen source on grain yield, and starch concentration in 2006. Data were averaged over tillage system since there was no interaction between tillage system and N source.

N source	Rate	Application timing	Yield	Starch
	lbs/acre		bu/acre	%
Urea ammonium nitrate	75	Sidedress	208	73.88
Urea ammonium nitrate	150	Sidedress	207	73.45
Anhydrous	75	Preplant	198	73.61
Anhydrous	150	Preplant	198	73.23
Urea	75	Preplant	202	73.87
Urea	150	Preplant	212	73.48
ESN	75	Preplant	201	73.63
ESN	150	Preplant	202	73.37
Untreated Control	0		164	74.26
LSD (P = 0.05)			10	0.29