

Slow Release Nitrogen Evaluation for Irrigated Corn – 2006 Clay Center, NE

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Objectives:

Increasing fertilizer prices, as well as concern about low use efficiency of conventional fertilizers, has resulted in the consideration of products usually associated with turf and horticultural applications for agronomic crops. This project was implemented to evaluate irrigated corn response to methylene urea slow release fertilizers.

Procedures:

This study originated in 2005 at the South Central Agricultural Laboratory to evaluate an occluded methylene urea dry fertilizer. In 2006, a liquid methylene urea was used. Experimental variables have included: fertilizer formulation and N rate. Fertilizer treatments were applied April 19, 2006. Golden Harvest GH9209 BT was planted April 27 (30,500 ppa) and was harvested Oct. 3.

Results:

Treatment Variables		2006 Yield (bu/ac)	Total Dry Matter Yield** (ton/ac)	Total Dry Matter N Uptake (lb/ac)	Fall Residual NO ₃ -N (ppm)			
Liquid Fertilizer Source	N Rate (lb/ac)				0-2ft		2-4ft	
---	0 check	201 abc	12.3 ab	275.2 abc	1.7 c	0.3 b		
100% UAN, 28%N	42	193 bc	11.0 b	200.9 c	2.2 c	0.3 b		
	84	213 abc	11.8 ab	259.9 abc	1.8 c	0.2 b		
	127	215 abc	12.2 ab	258.2 abc	2.5 c	0.3 b		
	211	229 a	12.5 ab	304.8 ab	9.7 b	4.7 a		
50/50 - UAN/methylene urea	42	196 bc	11.8 ab	231.3 bc	1.4 c	0.3 b		
	84	205 abc	11.8 ab	228.0 bc	1.2 c	0.1 b		
	127	217 abc	12.0 ab	250.7 abc	2.0 c	0.3 b		
	211	232 a	12.3 ab	277.3 abc	10.3 b	2.8 ab		
	253	232 a	12.9 a	323.7 a	16.6 a	5.4 a		
70/30 - UAN/methylene urea	42	190 c	10.9 b	220.8 c	2.2 c	0.3 b		
	84	201 abc	12.4 ab	261.9 abc	2.2 c	0.5 b		
	127	221 abc	11.5 ab	253.9 abc	4.1 c	1.1 b		
	211	224 ab	12.5 ab	315.4 a	9.7 b	4.2 a		

Values with the same letter are not significantly different at P=0.05
** includes stover, cobs, & grain (based on calculated population)

Discussion:

Initial soil test values for this site were typical of nutrient levels for producer fields in the area, with phosphorus, potassium and zinc levels adequate to support optimal yield without fertilization. Soil residual nitrate-N levels were moderate, and the University of Nebraska N recommendation for an expected yield of 200 bu/acre corn was 150 lb N/acre. For unknown reasons, there was little response to N fertilizer at this site in 2006, with the unfertilized

treatment yielding 200 bu/acre. It is likely that climatic conditions resulted in substantial N mineralization from soil organic matter.

Average plant population at V4 was 28,637 plants per acre. Rainfall during the Apr. 1 through Oct. 1, 2006 growing season totaled 17.35 inches (90% of normal). This was supplemented with 6.19 inches of sprinkler irrigation in 6 events. The dry, warm weather conditions were favorable for high irrigated yields. The only environmental stress in 2006 was an outbreak of southern rust in August. Although this study was not severely affected, this foliar disease accelerated crop maturity and led to an influx of stalk rot by harvest.

We observed a positive response to the slow release formulation in 2005, with increased yield and N use efficiency at lower rates. In 2006, we found no difference in yield, N use efficiency or chlorophyll level between UAN and the slow release formulation. Since soil organic matter and initial residual nitrate-N at the site were moderate, the high yield achieved and substantial N uptake without fertilization was surprising. The only N source effect documented was a slight increase in residual nitrate-N after harvest with increasing proportion of slow release N.