Nitrogen Management Systems Using Urea-Ammonium Nitrate (28%) for Corn

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Objective

Producers sometimes broadcast urea-ammonium nitrate (28% N solution) with herbicides to reduce application costs (weed 'n' feed program). This practice may lead to unacceptable N losses from volatilization and denitrification. Sidedress N programs may reduce this loss potential and provide more N to the crop, but require another trip. The objective of this study was to compare grain yields between broadcast and sidedress applications of urea-ammonium nitrate.

Background

Cooperator:	OARDC, Northwestern Branch	Planting Date:	May 29, 2002
		Seeding Rate:	30,000 seeds/A
County:	Wood	Row Width:	30-inch
Nearest Town:	Hoytville	Herbicides:	
Drainage:	Tiled	PRE:	2.4 qt/A Harness Xtra
Soil type:	Hoytville clay		1 pt/A Atrazine
Tillage:	Conventional till		26 oz./A Roundup Ultramax + AMS
Previous Crop:	Soybeans	POST:	2 pt/A Basagran
Variety:	Pioneer 34B24	Harvest Date:	October 28, 2002
Fertilizer:	160 lb/A Nitrogen		
Soil test:	pH 6.5; P 104ppm; K 208ppm		

Methods

Experimental design was a randomized complete block with three treatments replicated four times. Treatments were as follows:

1. Urea-ammonium nitrate (160 lb N/A) surface applied at planting (broadcast N management system).
2. Urea (20 lb N/A) banded from fertilizer boxes at planting, two inches below and to the side of the seed; followed by urea-ammonium nitrate (140 lb N/ A) coultered-injected between rows at growth stage V6 (sidedress N management system).
3. Zero nitrogen check — to estimate yield from soil residual nitrogen.

Plots were 10 feet wide and 70 feet long and consisted of four rows. The center two rows were harvested for grain. A combine scale and sensor estimated grain weight and moisture, respectively. Yield was adjusted to 15% moisture. At silking, 10 ear leaves were collected and sent to Spectrum Analytical Lab for nitrogen content. Harvest population was estimated by counting plants per 17.4 feet of row from each harvest row.

Results

Table 1. Average Corn Grain Yield and Other Agronomic Traits in Response to UAN Management Systems.[a]

Application Method	Grain Yield (bu/A)	Harvest Moisture (%)	Harvest Population (plants/A)	Tissue Nitrogen (%)
Broadcast	111.1 a	22.4	25,750	2.6
Injected	106.5 a	21.4	26,000	2.5
Zero N check	87.8 b	20.5	26,875	2.3
LSD (0.05)	14.7	NS	NS	NS
F-test	8.46	<1	<1	2.81

[a] Means followed by the same letter within a column are not significantly different.

Discussion and Summary

Grain yields were similar between a broadcast application of urea-ammonium nitrate at planting and a sidedress application at growth stage V6. Differences may have not been detected because of an abnormally hot and very dry summer, which greatly reduced yields at this site. Normally, yields would be expected between 175 to 200 bu/ A.

Tissue nitrogen was below the nitrogen suffiency range (2.9 - 3.5%) for all treatments. Possible restricted root growth and/ or lack of soil water movement may have prevented nitrogen uptake by the plants. The lack of differences between the zero check and other treatments for nitrogen uptake would be further evidence of limited nitrogen availability. Root development may have been restricted from early cool, wet conditions followed by hot, dry conditions, which would have reduced nitrogen uptake.

No conclusion from this study should be made about nitrogen application methods for urea-ammonium nitrate. Other factors were more limiting than nitrogen, and masked any differences that may have occurred between application methods.

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