Spring-Applied Nitrogen Sources for Wheat

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Objective

To evaluate the relationship between nitrogen source and wheat yields.

Background

Cooperator:	OARDC Northwestern Branch	Fertilizer:	Broadcast prior to planting
County:	Wood		100 lb/A 0-0-60
Nearest Town:	Hoytville		50 lb/A 0-46-0
Drainage:	Systematic Tile	Planting Date:	October 1, 2001
Soil type:	Hoytville clay	Planting Rate:	2.3 million seeds/A
Tillage:	No till	Row Width:	7.5-inch
Previous Crop:	Soybeans	Herbicides:	Stinger 4oz/A
Variety:	Hopewell	Harvest Date:	July 8, 2002
Soil test:	pH 6.3, P 45 ppm, K 177 ppm		

Methods

Experimental design was a randomized complete block with five treatments replicated four times. Treatments were three N sources (ammonium sulfate, urea, and urea-ammonium nitrate) and two checks. A Great Plains No-Till Drill was used for seeding. Thirty pounds of nitrogen was surface applied in the fall as urea-ammonium nitrate (28% N). In the spring, 70 lb/ A of nitrogen was surfaced applied by a Gandy spreader for ammonium sulfate and urea, and flat fan nozzles were used for urea-ammonium nitrate. One check received zero nitrogen in the spring, the other received 100 lb/ A of nitrogen applied as 28% N. Plots were 10 feet wide and 70 feet long. The center 11 rows were harvested for grain yield. A combine scale measured grain weight. Grain moisture was approximately 11%. Minolta Spad meter readings from 30 flag leaves were averaged at flowering for each plot to estimate nitrogen uptake. Head number was estimated by counting heads in a single row for three feet from three areas in each plot.

Results

Table 1. Wheat Grain Yield, Spad Meter Readings, and Head Counts.[a]

Spring Nitrogen Source	Yield (bu/A)	Spad Meter at Flowering	Heads (heads/ft^2)
Ammonium Sulfate	77.0 a	42.2 a	65 a
100 lb. N check	75.3 a	39.8 ab	64 a
Urea	68.0 b	39.8 ab	61 ab
28%	66.7 b	38.6 b	57 b
Zero N check	54.7 c	34.1 c	46 c
LSD (0.05)	5	3.1	6.5
F-test	29.8	8.7	13.1

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

Discussion and Summary

Grain yields for ammonium sulfate were approximately 10 bu/ A larger than the other two N sources and were similar to the 100 lb/ A N check that received 30 lb/ A more of N. Yields were similar for urea and 28%. Plants receiving ammonium sulfate had taken up significantly more N (meter value) and had more heads/ ft^2 than the 28% treatment. However, N uptake and number of heads were similar for ammonium sulfate and urea.

Nitrogen losses may account for the differences among N sources, particularly since the high N check was equal to ammonium sulfate. If N losses occurred, 28% would have been affected the most, then urea, and ammonium sulfate the least. Nitrogen losses were more likely because of the abnormally warmer fall and winter and the month of April. Sulfur may have also contributed some to the larger yield of ammonium sulfate, but could not be quantified in the parameters of this experiment. Approximately 70 lb of sulfur were applied in the ammonium sulfate treatments, more than most growers use in the area. In this study, ammonium sulfate as a nitrogen source would cost approximately $31 (44¢/ lb N) and the urea treatment would cost approximately $14.7 (21¢/ lb N). The cost of adding more N (as for the 100 lb 28% check) would be approximately $23 (23¢/ lb N). Economically, increasing the N rate for 28%, and probably urea, would have been more cost effective than ammonium sulfate.

Further research would be required to see if a blend of ammonium sulfate and urea would provide similar yields to ammonium sulfate alone, which would lower the cost of an ammonium sulfate program.

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