

Evaluation of Nitrogen Rate and Sulfur Topdress in Wheat

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Objectives

The objective of this study is to evaluate the yield response of wheat to two different nitrogen topdress rates and the addition of sulfur in a spring topdress application. Farmers typically apply 90-100 pounds of nitrogen in a topdress application in the spring, and often don't consider previous nitrogen credits. This study will try to determine if a lower rate of topdress will provide the same yields, and if the addition of sulfur will help with nitrogen utilization.

Background

Cooperator:	Farm Focus, Inc.	planting; variable topdress
County:	Van Wert	(see Methods)
Soil Type:	Hoytville silty clay loam, Haskins loam	Herbicide: .75 pt/A MCPA Amine with POST (April 5) 28% UAN
Drainage:	Non-Systematic Tile	Insecticide: None applied
Previous Crop:	Soybeans	Variety: Roane
Tillage:	No-till	Row Width: 7.5 inch
Soil Test (2002):	pH 5.8, P 31 ppm, K 147 ppm	Planting Rate: 130 lb/A
Fertilizer:	300 lb/A 10-20-20 blend surface broadcast prior to	Planting Date: October 7, 2003 Harvest Date: June 30, 2004

Methods

This study is set up with two different nitrogen topdress rates with and without sulfur for a total of four treatments. The treatments are 60 lb/A nitrogen, 60 lb/A nitrogen with 20 lb/A sulfur, 90 lb/A nitrogen, and 90 lb/A nitrogen with 20 lb/A sulfur. The nitrogen only treatments were applied using 28% UAN liquid fertilizer. The treatments with sulfur had THIO-SUL[®] (26% sulfur, 2.87 lb sulfur/gal; 12% nitrogen, 1.32 lb nitrogen/gal) added at a rate of 7 gallons per acre, and the amounts of 28% UAN liquid fertilizer were adjusted to compensate for the nitrogen available in THIO-SUL[®]. All topdress applications were broadcast on April 5 using a Demco field sprayer equipped with floodjet nozzles operated to maintain pressures between 20-30 psi. Four replications of each treatment were set up in a randomized complete block design. The study was planted using a John Deere 750 no-till drill. Plot size was 28.75 feet wide by 1,380 feet long.

Harvest populations (June 30) were estimated by counting the number of wheat heads in a one foot section of row at 10 different locations in each individual plot. The average of the number of heads counted per one foot of row was converted to heads per square foot. The center 28 feet of each plot was harvested with a John Deere 6620 combine. Each harvested plot was weighed by a calibrated weigh wagon, and moisture was determined using a Dickey John calibrated moisture meter. Yields reported in this study have been adjusted to a 13.5% moisture standard.

Results

Table 1. Harvest population, moisture and yield means¹

Treatment	Harvest Population (heads/ft. ²)	Moisture (%)	Yield (bu/A)
90 lb/A nitrogen + 20 lb/A sulfur	78.7	13.7	98.3a
90 lb/A nitrogen	81.9	13.6	97.3a
60 lb/A nitrogen + 20 lb/A sulfur	85.6	13.5	96.2a
60 lb/A nitrogen	76.8	13.6	91.5b
LSD (0.05)	NS	NS	3.8
F-test	1.7	2.0	6.3
CV(%)	7.4	0.9	2.5

¹Means followed by the same letter in same column are not significantly different

NS = not significant

Summary

Results from this year's study indicates that the additional 30 lb/A nitrogen in the nitrogen only treatments significantly increased wheat yields. It has been suggested that sulfur added to the nitrogen application may increase the efficiency of nitrogen. Based on the yield differences from this trial, it would appear the sulfur did improve nitrogen efficiency at the lower rate of application, but had no effect on the higher rate of nitrogen application. If nitrogen was not a limiting factor for yield at the higher 90 lb/A application rate, then a difference in yield from the addition of sulfur at this higher rate would not be expected. This is if the sulfur is intended to improve nitrogen utilization, and is not supplementing the plant with sulfur from an existing sulfur deficiency.

From an economic standpoint, the cost for the additional 30 lb/A of nitrogen requires roughly a 3 bushel/A yield increase. Based on yield differences this year, the additional nitrogen provides a net return of about \$8.50/A. The addition of THIO-SUL[®] at the 20 lb/A rate would require an increase of roughly 3.4 bushels/A to cover the additional cost. Based on this trial's yield results, the increased yield from the addition of sulfur at the lower nitrogen rate provides a net return of about \$4.00/A, and at the higher nitrogen rate the cost is not offset. The above calculations are based on in season prices of \$0.32/lb for nitrogen, \$1.96/gal for THIO-SUL, and a wheat price of \$3.15/bushel (2004 wheat price at harvest). From a purely economic standpoint the additional 30 lb/A nitrogen cost less than the THIO-SUL and provided a better net return for this year's study.

This is the Third year for a wheat topdress nitrogen rate and sulfur study at Farm Focus. Previous year's results indicated a statistically significant difference in yield between the two nitrogen rates, which support this year's results between nitrogen rates. A significant difference in yield was realized by adding sulfur to the lower nitrogen rates in both the 2003 and 2004 tests, but not in 2002 when a lower rate of sulfur was tested. Reports from the 2002 and 2003 nitrogen and sulfur studies on wheat can be accessed on the Farm Focus website at: (<http://www.farmfocusshow.com/research.htm>).

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