Spring-Applied Nitrogen Rates for Wheat

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Objective

To evaluate the relationship between nitrogen rate and wheat yields.

Background

Cooperator:	OARDC Vegetable Farm	Fertilizer:	broadcast prior to planting
County:	Sandusky		150 lb/A 0-0-60
Nearest Town:	Fremont		150 lb/A 18-46-0
Drainage:	Systematically tiled	Planting Date:	October 3, 2001
Soil type:	Hoytville silty clay loam	Planting Rate:	130 lb/A
Tillage:	No-till	Row Width:	7.5-inch
Previous Crop:	Soybeans	Herbicides:	None
Variety:	Hopewell	Harvest Date:	July 15, 2002
Soil test:	pH 6.3, P 50 ppm, K 143 ppm		

Methods

Experimental design was a randomized complete block with seven treatments replicated four times. Treatments were seven nitrogen rates — 0, 20, 40, 60, 80, 100, and 120 pounds of nitrogen/ A. Urea was surface applied from a Gandy spreader for all treatments. All plots received 20 pounds of nitrogen from diammonium phosphate in fall 2001. A John Deere 1550 Drill was used at planting. Plots were 10 feet wide and 70 feet long. The center five feet was harvested for grain yield. A combine scale and a Dickey John tester estimated grain weight and moisture, respectively. Yield was adjusted to 14% moisture. 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 N Rate (lbs/A)	Yield (bu/A)	Harvest Moisture (%)	Spad Meter at Flowering	Heads (heads/ft^2)
0	48.8 a	11.3	34.9 a	55 a
20	54.2 a	11.7	36.9 ab	50 a
40	64.4 b	11.2	38.7 bc	56 a
60	67.7 bc	11.4	39.8 cd	57 a
80	73.3 c	11.5	42.0 de	66 b
100	80.5 d	11.5	43.1 e	69 b
120	83.5 d	11.4	43.6 e	66 b
LSD (0.05)	7.0	NS	2.4	8.0
F-test	29.6	<1	15.7	7.0

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

Discussion and Summary

Yields increased with increasing nitrogen rate until the 100-lb treatment. Spad meter values showed that nitrogen uptake increased with greater nitrogen rates until the 80 to 100 lb treatments. Treatments receiving less than 80 lb of nitrogen/ A had fewer heads, which may partially explain some of the lower grain yields with lower rates of nitrogen. Harvest moisture was not affected by nitrogen rate.

These results show that nitrogen rate may affect yields, nitrogen uptake, and head numbers. In general, yields increased until the 100-lb treatment. Nitrogen utilization is highly dependent upon the year. This study may explain what happened in 2002 but may not be a good predictor for future years. Nitrogen rate studies over many years and locations would be required before a general recommendation could be made.

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