Spring Nitrogen Application Times for Wheat

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Objective

To evaluate the effects that spring nitrogen application timing may have on wheat yields.

Background

Cooperator:	OARDC Northwestern Branch Branch	Soil test:	pH 6.3, P 45 ppm, K 177 ppm
County:	Wood	Fertilizer:	100 lbs/A 0-0-60
Nearest Town:	Hoytville		50 lbs/A 0-46-0
Drainage:	Tiled	Planting Date:	October 1, 2001
Soil type:	Hoytville clay	Planting Rate:	160 lb/A
Tillage:	No till	Row Width:	7.5-inch
Previous Crop:	Soybeans	Herbicides:	4 oz. Stinger
Variety:	Hopewell	Harvest Date:	July 8, 2002

Methods

Experimental design was a randomized complete block with four treatments replicated four times. Treatments were four nitrogen application times — late February, first greenup, initial stem elongation, and late stem elongation. A Great Plains No-Till Drill was used for seeding. In the fall, 30 pounds of nitrogen was surface applied as ureaammonium nitrate (28%). Seventy pounds of nitrogen (urea) was surfaced applied by a Gandy spreader in the spring for each treatment. Plots were 10 feet wide and 70 feet long. The center 11 rows were harvested for grain yield. A combine scale estimated grain weight. Grain moisture was approximately 11%. At flowering, measurements from 30 flag leaves were averaged for each plot by a Minolta Spad meter to estimate nitrogen uptake. Head number was estimated by counting spikes in three-foot sections from three areas in each plot.

Results

Table 1. Wheat Grain Yield, Spad Meter Readings, and Head Number Response to Application Time of Spring Nitrogen.[a]

Timing of Application	Yield (bu/A)	Spad Meter at Flowering	Heads (spikes/ft^2)
Early stem elongation	82.8 a	44.8 b	66 a
Late February	73.3 b	41.0 c	66 a
Greenup	68.1 c	39.8 c	61 b
Late stem elongation	62.6 d	48.0 a	57 b
LSD (0.05)	3.6	3	4.3
F-test	58.7	15.9	10.3

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

Discussion and Summary

Time of spring nitrogen had a significant effect on grain yield. Yields were the largest for applications at initial stem elongation and the smallest for late stem elongation. Spad meter values were higher for initial stem elongation than late February and greenup, suggesting nitrogen loss from these earlier applications. Even though the late stem elongation time had the highest meter values, it was too late to be utilized by the crop as evident by the fewer number of heads. Yields for greenup treatment would not have been expected to be lower than the late February application. The lower meter value and fewer heads than the late February application would suggest possible nitrogen loss, but the type of loss is beyond the scope of this experiment.

April weather conditions were conducive for nitrogen loss in 2002 (wetter and warmer than normal). Late February and greenup applications may have been early enough that ammonium-nitrogen had converted to nitrate-nitrogen and was lost during the wet and warm April. In other years, yields probably would not be as different among these application times. Late February may be as good as greenup for nitrogen applications. Nitrogen applications after initial stem elongation may be too late for adequate utilization by the crop.

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