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WHEAT GRAIN YIELD RESPONSE TO NITROGEN RATES WITH AND WITHOUT A FUNGICIDE

L. R. Nelson, V. A. Haby, Steve Ward, and James Davis

SUMMARY

In this study two wheat varieties, Bradford and McNair 1003 were subjected to four spring nitrogen fertilizer rates with and without a fungicide. Results indicated that in the absence of any significant leaf diseases, McNair 1003 produced about a 4 bu/ac higher grain yield than did Bradford. The fungicide Tilt did not increase grain yields in this study. Higher grain yields were produced from the 80 and 120 lb N/ac rates. The mean yield increase due to late winter applied N when increasing N from 0 to 40, and from 40 to 80 lb/ac was 9 and 4 bu/ac, respectively. These results indicated that with 60 lbs N/ac fall applied, somewhere between 40 and 80 lbs of N applied in late winter would be most efficient for producing grain yields.

OBJECTIVES

The objectives of this experiment were to determine the level of N fertilization which would produce highest grain yields and to determine whether a fungicide would allow wheat to more efficiently utilize high N levels while controlling diseases.

PROCEDURES

This field study was planted at Overton in 1983-84 and 1984-85 in a fairly wet, sawtown fine sandy loam. Preplant fertilizer application each year was 60 lbs N/ac, 100 lbs P_2O_5 /ac, 104 lbs K_2O /ac, 44 lbs S/ac, and 22 lbs Mg/ac. Whole plot treatments were varieties (Bradford and McNair 1003). Subplots were fungicide treatments (with and without Tilt). Tilt was applied as a single application on April 13, 1984 and on April 12, 1985 when the wheat had just headed. The chemical was applied at 118 ml product in 20 gallons of water per acre. Sub-subplot treatments were spring applied N rates (0, 40, 80, and 120 lbs N/ac). Nitrogen was applied as urea on March 1, 1984 and on February 27, 1985. The size of the N plots was 8 X 15 feet. Seeding rate was 80 lbs/ac and planting dates were October 20 and 29 in 1983 and 1984, respectively. Wheat was planted in 12 rows

with 8 inch row spacing, 15 ft in length. Before harvest, plots were trimmed to 12 ft in length. The center six rows were harvested to measure grain yield. Data were collected on plant height, lodging, disease severity levels, grain yield and weight.

RESULTS

Grain yields in this study (Table 1) were good in 1984 and low in 1985. The low yields in 1985 were thought to be caused by a root disease complex which probably resulted from continuous wheat being grown the preceeding 4 years. Yield between varieties was not significantly different, although McNair 1003 produced about 4 bu/ac higher yield than did Bradford for the 2 year mean. Tilt is a systemic fungicide which normally controls leaf rust, powdery mildew and Septoria diseases. None of these diseases caused any damage in this study. Therefore, no yield increases were associated with the application of Tilt.

Higher N rates did increase grain yields both years (Table 1). In 1984, the yields from 40, 80 and 120 lbs N treated wheat were higher than the 0 treatment, but were not significantly different from each other. The 60 lbs of fall applied N probably resulted in some N carryover into the spring. A variety X N rate interaction was detected in 1984. Data indicated that McNair 1003 produced a higher yield (63 bu/ac) at 120 lbs N, than did Bradford (54 bu/ac). In 1985, the wheat fertilized with 80 and 120 lbs N/ac produced the higher yields. These data indicated that 80 lbs of N/ac was sufficient on Bradford. The increase in yield between 0 and 40 and 40 and 80 lbs N/ac was 9 and 4 bu/ac, respectively for the 2 year mean.

Test weights were near normal (60 lbs/bu) in 1984, but were very low in 1985. This was probably caused by a combination of dry weather and the root disease complex in 1985. The only significant difference observed was the Tilt treated wheat which produced a slightly higher test weight in 1985. Plant heights were different for varieties (Table 2) with Bradford being about 5 inches taller than McNair 1003. The added N resulted in slightly taller plants in 1985. Taller plants are usually more susceptible to lodging which occurred in 1985. The 120 lb N/ac rate resulted in 19% lodging compared to only 7% for the 80 lb N treated wheat. The Tilt treatment apparently resulted in less

lodging. This indicates there may have been less disease pressure with tilt, which resulted in longer lived plants. The Tilt treated plants were also slightly shorter (1 inch) than were the non-treated wheat plants.

Results from this study indicated that with either of these varieties, a fungicide would not increase yields unless disease pressure was higher than observed during these two years. Results also indicated that a late winter application of between 40 and 80 lbs of actual N/ac will be sufficient to produce good wheat grain yields.

TABLE 1. GRAIN YIELD (bu/ac) AND TEST WEIGHTS OF 2 VARIETIES, TILT TREATED VERSUS NONTREATED, AND FOUR N LEVELS AT OVERTON, TEXAS

Variety	Yield bu/ac		Test Weights in lbs		
	1984	1985	Mean	1984	1985
Bradford McNair 1003	54.8a*	26.9a	40.9	59.1a	50.3a
	56.0a	34.4a	45.2	58.5a	46.7a
Fungicide (Tilt)					
Treated Not treated	54.4a	32.4a	43.4	58.4a	49.4a
	56.5a	29.0a	42.7	59.3a	47.6b
Spring applied N rate					
0 lbs/ac 40 lbs/ac 80 lbs/ac 120 lbs/ac	50.7b	17.3c	34.0	59.0a	47.2a
	55.8a	30.4b	43.1	58.3a	48.8a
	57.0a	37.3a	47.2	59.0a	48.1a
	58.1a	37.6a	47.8	58.7a	49.9a

*Means within a treatment and within a column followed by the same letter are not significantly different at the 0.05 level of probability.

TABLE 2. PLANT HEIGHT (INCHES) AND % LODGING OF 2 VARIETIES, TILT TREATED VERSUS NONTREATED WHEAT, AND 4 N LEVELS AT OVERTON, TEXAS

Variety	Plant height			Lodging		
	1984	1985	Mean	1984	1985	Mean
	-----inches-----			-----%		
Bradford	39.a*	35.a	37.	1a	18b	9
McNair 1003	33.b	31.b	32	0a	2a	1
Fungicide (Tilt)						
Treated	36b	33a	34	1a	7a	4
Nontreated	37a	33a	35	1a	13b	7
Spring applied N rate/acre						
0 lbs	37a	28c	32.	0a	4a	2
40 lbs	37a	33.b	35	0a	9a	4
80 lbs	36a	34ab	35	0a	7a	4
120 lbs	36a	36a	36	1a	19b	10

*Means within a treatment and within a column followed by the same letter are not significantly different at the 0.05 level of probability.