

Factsheet: Investigating the effects of nitrogen rates, timing and fungicide applications interactions on wheat



Objective:

The objective of this trial was to demonstrate the effects of nitrogen (N) timing and rate on fungicide efficacy in spring wheat.

Methodology:

This trial was conducted at Scott SK in 2021. Phosphorus (P), potassium (K) and sulphur (S) were side banded at seeding and were non limiting based off of soil samples. Total N applied ranged from 30 lbs/ac to 230 lbs/ac. N was side banded at seeding and/or foliar was applied 3 days prior to seeding. N applied at seeding was untreated urea (46-0-0) and the pre seed application was applied as a dribble band foliar application with ammonium nitrate (UAN 28-0-0). A fungicide application of Prosaro was applied at 75% head emergence to 50% heads in flower.

Key findings:

- The 2021 growing season was hot and dry at Scott. The mean temperature over the four-month growing season was well above normal, with a substantial amount of the precipitation in the latter half of August.
- Plant densities were not significantly affected by fertilizer timing, total nitrogen or the presence or absence of fungicide. Generally, plant densities were higher with a low to moderate N rate over a high rate. High rates applied at seeding caused a slight reduction in establishment versus a foliar pre-seed application.
- Fusarium head blight was detected across all treatments but at a relatively low level. The highest disease ratings were found in the highest rate (230 lb N/ac) and the lowest rate (0 lb N/ac). There were no clear trends on nitrogen rates or timing of fungicide application on the effect of disease.
- It was found that the yield had small changes based on the nitrogen rate or timing, but was insignificant. There was a bit of an increase from 30 to 180 lb N/ac. This showed how the addition of nitrogen during a drought is essential for wheat development because the plant will maintain higher photosynthetic activities.
- The largest impact on yield was the fungicide application. It was found that yields were 3.4 bu/ac higher without a fungicide application. Fungicide applied under drought conditions can lead to toxicity in the

plant causing tissue death and stunted growth.

- Hot and dry conditions during the growing season made it difficult to see the interaction between nitrogen rate, timing and fungicide, but it did show the detrimental effect of a tebuconazole fungicide in drought conditions as it increased toxicity in the plant, and the importance of nitrogen.

Table 1. Overall individual treatment means of spring wheat yield with fixed effects of fertilizer timing, rate and fungicide application in Scott, 2021.

Treatment #	Foliar pre-seed (lb N/ ac)	Side-banded (lb N/ ac)	Total Nitrogen (lb N/ ac)	Fungicide (Y/N)	Yield (bu/ac)
1	0	0	0	N	36.6
2	0	30	30	N	40.2
3	0	80	80	N	41.4
4	30	100	130	N	38.0
5	80	100	180	N	41.7
6	130	100	230	N	37.6
7	0	0	0	Y	38.0
8	0	30	30	Y	37.4
9	0	80	80	Y	34.9
10	30	100	130	Y	37.8
11	80	100	180	Y	33.9
12	130	100	230	Y	32.7