

Evaluation of Foliar UAN and Timing on Grain Yield and Nitrogen Concentration in Wheat (*Triticum aestivum* L.)

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Introduction

- Nitrogen (N) fertilizer is the most costly input for wheat farmers in the Great Plains.
- Use of Normalized Difference Vegetation (NDVI) can help farmers with mid-season N fertilization
- Understanding when N can impact yield and protein could assist producers when monitoring their crop.

Objective and Hypothesis

- To evaluate grain yield and grain protein response to low rates of foliar N at two growth stages.
- Increasing foliar N rates at Feekes 4 can increase yield.
- Foliar N at Feekes 10 can increase grain protein.

Materials and Methods

- Four locations: Stillwater, Hennessey, Lake Carl Blackwell (LCB), and Lahoma, OK, 2014-2015, dryland conditions.
- Wheat cultivar, 'IBA' sown at 78 kg ha⁻¹.
- Randomized complete block design with 3 replications.
- Foliar N rates: 14, 28, and 40 kg N ha⁻¹ at Feekes 4 and 14 kg N ha⁻¹ at Feekes 10.
- Foliar N, urea ammonium nitrate (UAN) (28-0-0) applied with water (1:1).
- Using a pressurized sprayer and offset boom, foliar UAN was applied at Feekes 4, using flat fan drop nozzles. At Feekes 10 nozzles were connected directly to the boom.
- NDVI sensor readings were collected before each application and throughout the growing season.
- Total N concentration in the grain was determined using a dry combustion analyzer (LECO).
- Treatment responses evaluated using SAS software, GLM and single-degree-of-freedom contrasts.

Results

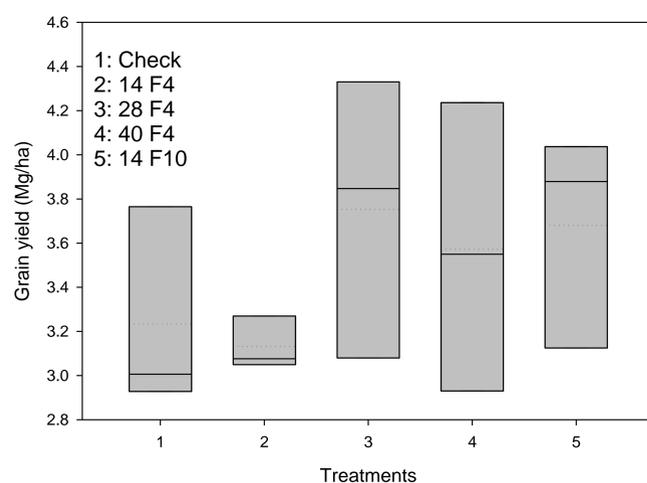


Figure 1. Application of 28 kg N ha⁻¹ at Feekes 4 increased grain yield by 16% when compared to the check plot (PR>F, 0.10). Also, application of 14 kg N ha⁻¹ at Feekes 10 increased grain yield by 13.9% when compared to the check plot and 17.5% when compared to the same rate of N at Feekes 4 (PR>F, 0.05), at Lake Carl Blackwell (LCB). (not observed in the other 3 sites)

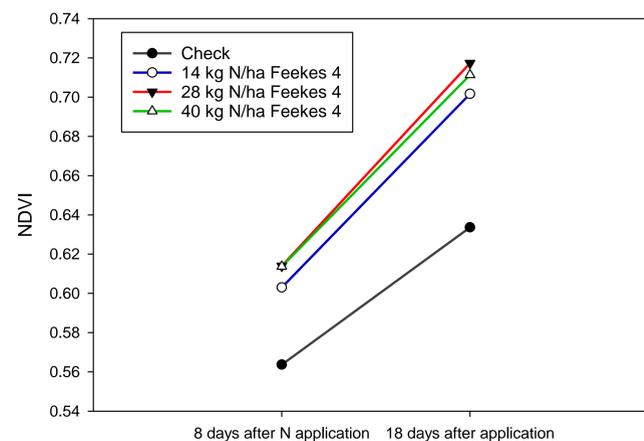


Figure 2. Eight days following the application of foliar N, NDVI was higher where N was applied. Similarly, NDVI was also higher, eighteen days following the foliar N application (PR>F, 1%). Finding measurable differences within eight days was important. LCB, 2015



Figure 3. Pressurized offset boom used to apply foliar N. Picture was taken at Feekes growth stage 10.

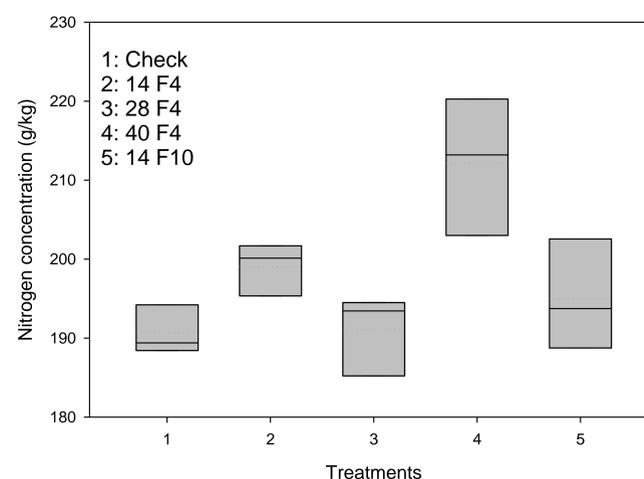


Figure 4. Application of 40 kg N ha⁻¹ at Feekes 4 increased grain nitrogen concentration from 190.7 to 212.2 g at Stillwater. This was not noted at the other sites.

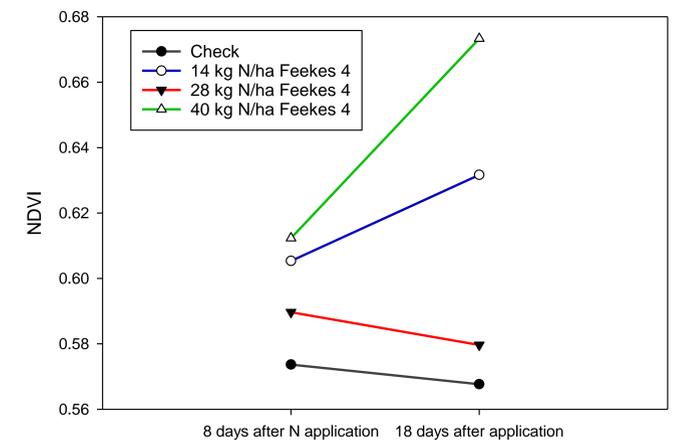


Figure 5. Eight days following the application of foliar N, NDVI was higher where N was applied. Similarly, NDVI was also higher, eighteen days following the foliar N application (PR>F, 1%). Stillwater, 2015

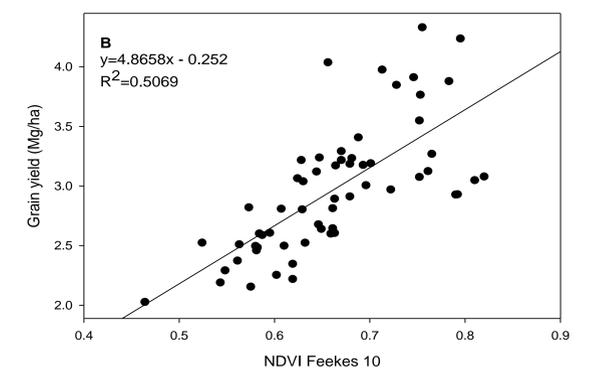
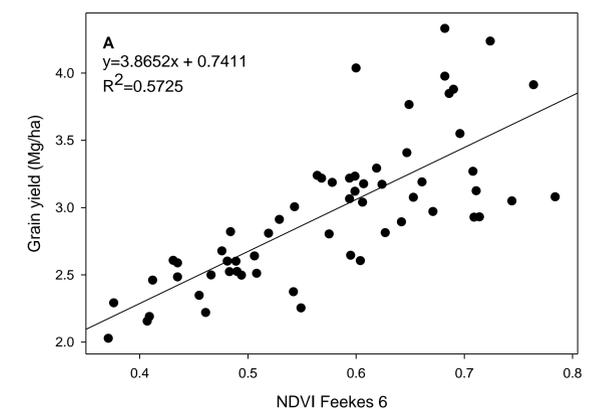


Figure 6. Correlation between NDVI and wheat grain yield, **A** Feekes 6 and **B** Feekes 10.

Conclusions

- 18 days after application differences in yield and protein could be partitioned using NDVI sensor readings
- Mid-season NDVI values, especially at Feekes 6, were correlated with grain yield