

Influence of a 'Late' Post-Anthesis Nitrogen on Spring Wheat Performance

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Objective Determine the effect of a late or delayed post-anthesis nitrogen fertilizer application on the potential to enhance grain protein in spring wheat. The primary objective of this trial was to determine wheat crop response to this wheat management strategy when the target application timing was delayed well beyond the optimum. Post-anthesis nitrogen fertilizer applications to enhance grain protein are intended to be applied just after wheat has completed anthesis. In this trial the wheat was generally in the early- to medium-dough stage of development.

Materials and Methods

- An application of liquid nitrogen (28-0-0) was applied to all spring wheat varieties on July 18. The applications were made at a nitrogen rate of 30 lbs/acre. Treatments were imposed by applying a total of 17.25 gallons of volume/acre (10 gallons 28%N + 7.25 gallons water). Treatments were applied using 80015 flat-fan tips during late afternoon. This study was planted on land that had a projected total of 140 lbs/acre of N based on 40 lbs soil test, 60 lbs N via NH₃ and 40 lbs N legume credit.
- Stage of development when treatments were applied:
 - Fallor at early- to medium-dough stage, very limited amount of liquid in kernel.
 - Prosper at early- to medium-dough stage, moderate amount of liquid in kernel.
 - Barlow at early- to medium-dough stage, minor amount of liquid in kernel.
 - Glenn at early- to medium-dough stage, minor amount of liquid in kernel.

Results and Discussion

Application of liquid nitrogen to wheat just after anthesis is complete has been shown to provide an increase in grain protein. The success of this strategy is believed to be dependent upon making the application early enough after anthesis to allow nitrogen uptake, metabolization and then transport of amino acids (protein) to the developing seeds. The liquid nitrogen fertilizer in this study was applied rather late, when wheat seed development was already at the early- to medium-dough stage. In spite of the late application timing in this trial, the grain protein content still increased a full point (1.0%). The increase in protein was consistent among the four varieties evaluated. Protein content of the variety 'Prosper' increased the most at 1.7 points of protein beyond the untreated check. Prosper was trailing in development compared to the other three varieties when the treatments were applied. At the time of application Prosper still had a 'moderate' amount of liquid in the kernels versus 'minor' amounts in the other varieties.

Table 1. Influence of post-anthesis nitrogen application on spring wheat protein content, grain yield and quality.

Management Factor	1000 KWT gram	Test Weight lb/bu	Grain Protein %	Grain Yield bu/ac
Untreated Check	28.7	58.6	13.8	53.3
Post-Anthesis Nitrogen	28.3	58.0	14.8	51.8
LSD 0.05	NS	NS	0.27	NS
LSD 0.01	NS	NS	0.37	NS
# Obs	16	16	16	16

Planting Date = May 1 ; Harvest Date = August 7 ; Previous Crop = Soybean

Table 2. Influence of post-anthesis nitrogen on yield and quality of four spring wheat varieties.

Variety	Management Factor	1000 KWT gram	Test Weight lb/bu	Grain Protein %	Grain Yield bu/ac
Faller	Untreated Check	26.8	55.4	13.3	46.6
Faller	Post-Anthesis Nitrogen	27.6	55.8	14.1	47.8
Prosper	Untreated Check	29.2	58.0	13.2	51.4
Prosper	Post-Anthesis Nitrogen	28.5	56.2	14.9	47.3
Barlow	Untreated Check	28.2	58.8	14.1	53.5
Barlow	Post-Anthesis Nitrogen	27.8	58.9	15.0	56.1
Glenn	Untreated Check	30.7	62.4	14.3	61.6
Glenn	Post-Anthesis Nitrogen	29.7	61.9	15.3	57.3
MEAN		28.5	58.3	14.3	52.6
C.V. (%)		3.4	1.7	2.6	6.7
LSD 0.05		NS	NS	NS	NS
LSD 0.01		NS	NS	NS	NS
# Obs		4	4	4	4

Planting Date = May 1 ; Harvest Date = August 7 ; Previous Crop = Soybean



Prosper (left) and Faller (right) spring wheat at foliar nitrogen treatment application.