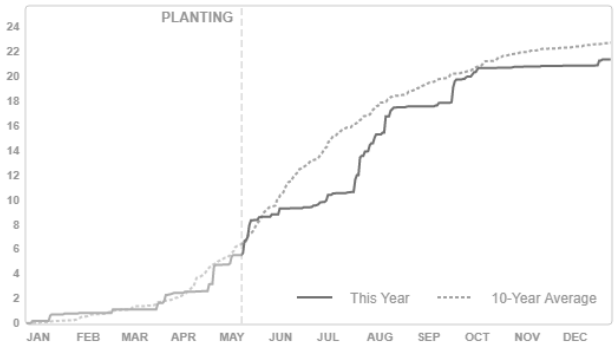
Fertigated Nitrogen Application on Soybeans

Study ID: 735135201701
County: Perkins
Soil Type: Keith silt loam 1-3% slope; Satanta very fine sandy loam 3-6% slopes; Satanta very fine sandy loam 1-3% slope; Jayem fine sandy loam 3-6% slopes
Planting Date: 5/15/17
Harvest Date: 10/20/17
Population: 175,000
Row Spacing (in): 30
Variety: Pioneer 22T41
Reps: 3
Previous Crop: Corn
Tillage: Vertical-Till
Herbicides: ***Pre:*** 32 oz Glyphosate + 16 oz WeedMaster® on 3/21/17 ***Post:*** 32 oz Glyphosate + 1.5 oz Zidua(R) + 2.5 pt Sequence(R) on 5/24/17

Seed Treatment: Innoculant only
Foliar Insecticides: None
Foliar Fungicides: None
Fertilizer: 2 gal of 9-24-3 on 5/15/17
Irrigation: Pivot, Total: 10.5"
Rainfall (in):



Introduction: This study investigated the effects of applying nitrogen fertilizer to soybeans. A foliar application of 70 lb N/acre of nitrogen was made through pivot irrigation water at the R2 growth stage. The plot layout consisted of alternating pie-shaped sections, some of which received N through the pivot and some which were left as untreated checks. Surface and sub-surface soil samples for each treatment and replication were taken prior to planting as well as at the R2 growth stage and at harvest to investigate the change in both NO_3-N and NH_4-N soil concentrations throughout the growing season *(Figure 1, Figure 2)*. Plant tissue samples were taken at the R2 and R5-R6 growth stages to monitor nutrient content within the plants. Plant residue was analyzed for residual nitrogen content. Harvested grain was sampled for protein and oil content for two of three replications so statistical analysis was not performed for these data.

Results:

Foliar Tissue Samples at R2 Growth Stage (6/29/2017):

	Nitrogen (%)	Phosphorus (%)	Potassium (%)	Sulfur (%)	Calcium (%)	Magnesium (%)	Iron (ppm)	Manganese (ppm)	Copper (ppm)	Boron (ppm)	Zinc (ppm)
Check	6.38 A	0.47 A	2.38 A	0.33 A	1.03 A	0.30 A	82 A	69 A	6.97 A	45 A	31 A
Foliar N at R2	6.27 A*	0.52 A	2.64 A	0.35 A	1.13 A	0.32 A	86 A	86 A	7.33 A	48 A	32 A
P-Value	0.628	0.339	0.532	0.300	0.423	0.368	0.383	0.285	0.811	0.525	0.642

Foliar Tissue Samples at R5-R6 Growth Stage (8/25/2017):

	Nitrogen (%)	Phosphorus (%)	Potassium (%)	Sulfur (%)	Calcium (%)	Magnesium (%)	Iron (ppm)	Manganese (ppm)	Copper (ppm)	Boron (ppm)	Zinc (ppm)
Check	5.06 A	0.37 A	2.01 A	0.34 A	1.67 B	0.21 A	86 A	112 A	6.80 A	47 A	32 A
Foliar N at R2	5.05 A	0.42 A	2.05 A	0.34 A	1.92 A	0.23 A	88 A	148 A	6.30 A	45 A	31 A
P-Value	0.673	0.494	0.444	0.184	0.047	0.184	0.499	0.248	0.650	0.621	0.711

	Yield (bu/acre)†	Moisture (%)	Residue Residual N (lb N/ac)	Oil (%)	Protein (%)	Marginal Net Return‡ ($/ac)
Check	73 B	11.9 A	39 A	19.87	34.4	646.03 A
Foliar N at R2	77 A	11.7 A	47 A	20.35	34.5	656.89 A
P-Value	0.0497	0.8102	0.383	---	---	0.3635

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $8.90/bu soybean and $0.41/lb Nitrogen cost.

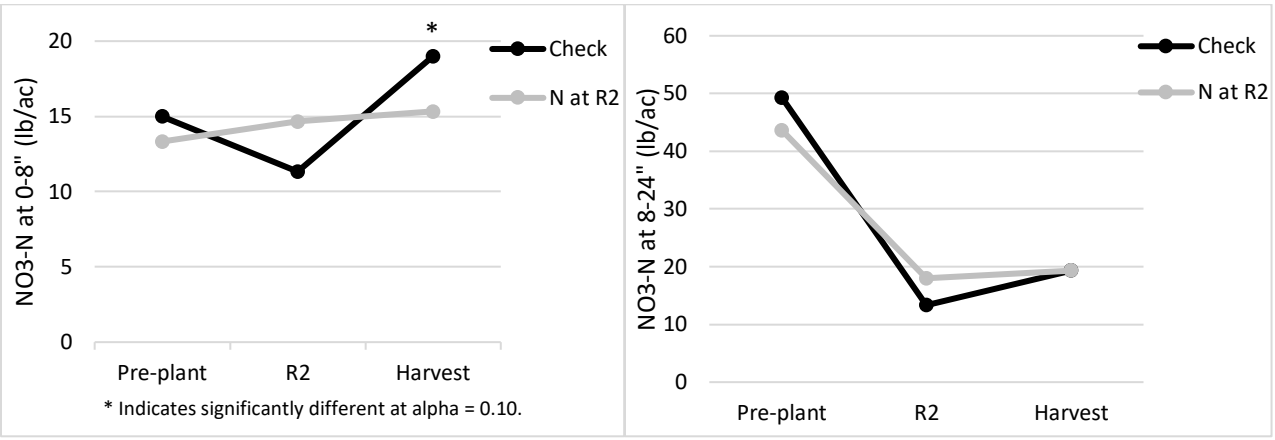


Figure 1. Pre-plant, R2, and Harvest soil NO_3-N concentrations at 0-8" and 8-24" depths.

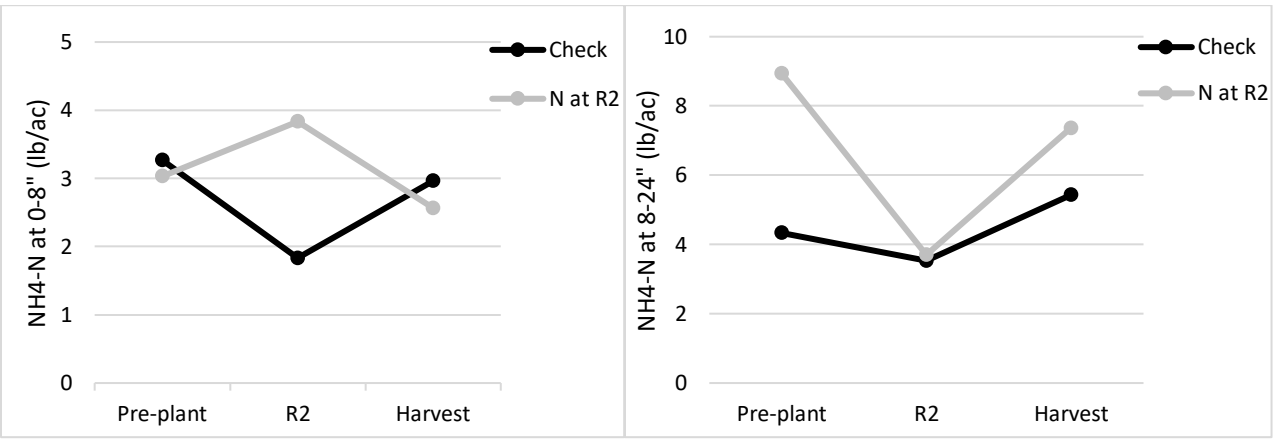


Figure 2. Pre-plant, R2, and Harvest soil NH_4-N concentrations at 0-8" and 8-24" depths.

Summary:

- No significant differences were noted in the foliar tissue samples at either the R2 or R5-R6 growth stages with the exception of the calcium foliar test at R5-R6.
- There was no significant difference in moisture content of the harvested grain or the residual nitrogen content of the plant residue between the two treatments.
- The treatment of 70 lb N/ac at the R2 growth stage resulted in a significantly higher yield. There was no significant difference in marginal net return.

Sponsored by: University of Nebraska Lincoln; Nebraska Corn Board

In Partnership with: Nebraska Soybean Checkoff; Nebraska Corn Growers Association; Nebraska Dry Bean Commission