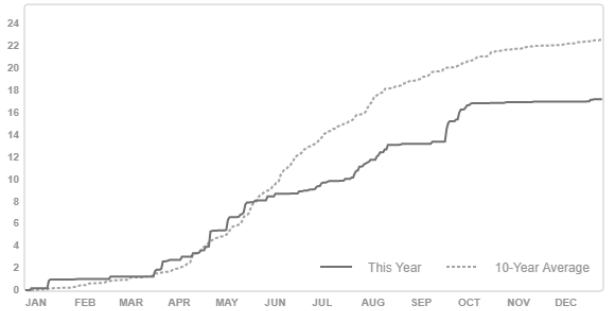
Fertigated Nitrogen Application on Soybean

Study ID: 741029201701
County: Chase
Soil Type: Jayem loamy fine sand 0-3% slope; Tassel-Duda loamy sand 0-3% slope; Haxtun loamy fine sand 0-3% slope; Ascalon fine sandy loam 1-3% slope
Harvest Date: 10/20/2017
Reps: 4
Previous Crop: Corn
Irrigation: Pivot

Rainfall (in):



Introduction: This study investigated the effects of applying nitrogen fertilizer to soybeans. A foliar application of 65 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 NO3-N and NH4-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 four replications so statistical analysis was not performed for these data.

Results:

Foliar Tissue Samples at R2 Growth Stage (6/26/2017):

	Nitrogen (%)	Phosphorus (%)	Potassium (%)	Sulfur (%)	Calcium (%)	Magnesium (%)	Iron (ppm)	Manganese (ppm)	Copper (ppm)	Boron (ppm)	Zinc (ppm)
Check	6.03 A*	0.53 A	2.43 A	0.37 A	1.31 A	0.34 A	144 A	112 A	9 A	64 A	80 A
Foliar N at R2	5.62 A	0.50 A	2.47 A	0.36 B	1.40 A	0.34 A	115 B	115 A	9 A	62 B	79 A
P-Value	0.218	0.330	0.800	0.014	0.442	1.0	0.051	0.828	0.885	0.076	0.452

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	4.93 A	0.38 A	1.88 B	0.32 B	1.84 A	0.24 A	102 A	183 B	9 A	81 A	116 A
Foliar N at R2	5.30 A	0.40 A	2.01 A	0.35 A	1.76 B	0.24 A	117 A	231 A	9 A	82 A	130 A
P-Value	0.162	0.363	0.054	0.031	0.089	0.893	0.275	0.053	0.919	0.778	0.409

	Yield (bu/acre)†	Moisture (%)	Residue Residual N (lb N/ac)	Oil (%)	Protein (%)	Marginal Net Return‡ ($/ac)
Check	64 A	9.5 A	29 A	21.7	34.4	573.32 A
Foliar N at R2	65 A	9.4 A	34 A	18.6	34.5	552.62 B
P-Value	0.467	0.837	0.249	N/A	N/A	0.060

*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.

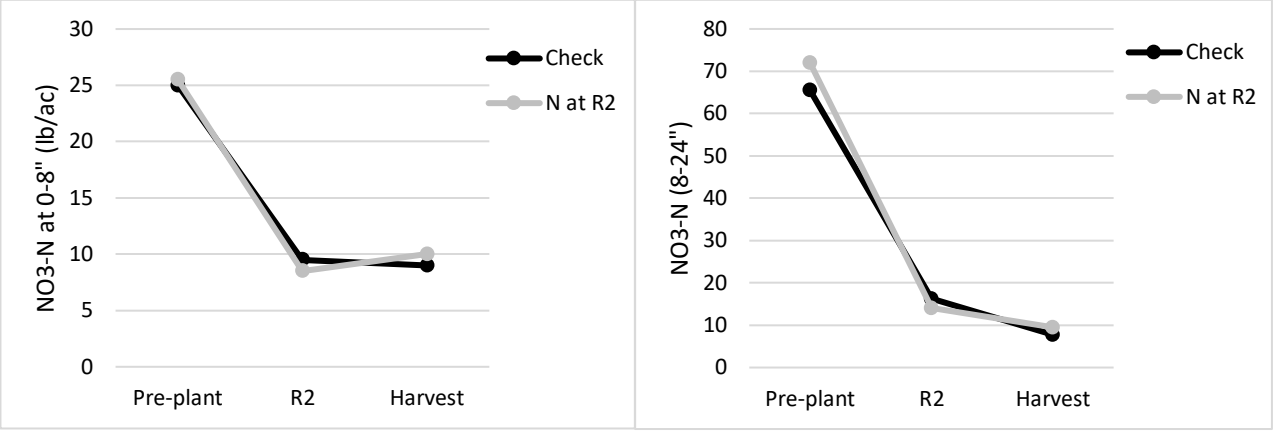


Figure 1. Pre-plant, R2, and Harvest soil NO_3-N concentrations at 0-8" and 8-24" depths.

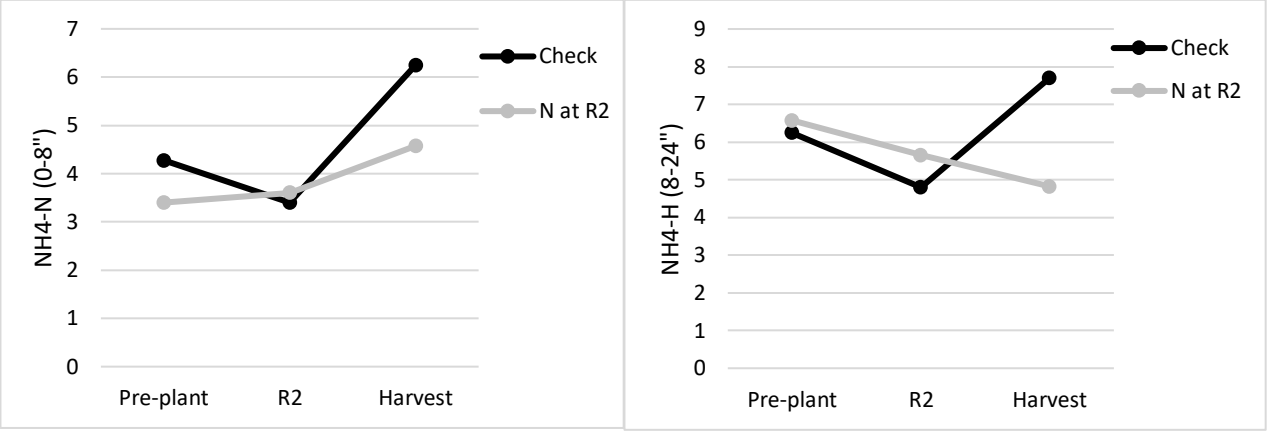


Figure 2. Pre-plant, R2, and Harvest soil NH_4-N concentrations at 0-8" and 8-24" depths.

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 iron and boron foliar tests at R2 and the potassium, sulfur, calcium, and manganese foliar tests at R5-R6.
- There was no significant difference in moisture content and yield of the harvested grain or the residual nitrogen content of the plant residue between the two treatments.
- The treatment of 65 lb N/ac at the R2 growth stage resulted in a significantly lower marginal net return.

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