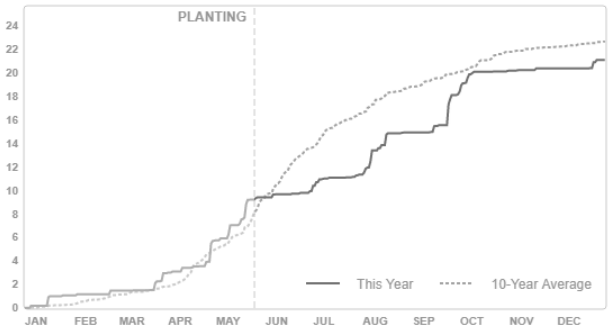
Fertigated Nitrogen Application on Soybean

Study ID: 736111201701
County: Lincoln
Soil Type: Holdrege fine sandy loam 0-3% slope; Anselmo fine sandy loam 1-3% slope; Hord silt loam 0-1% slope
Planting Date: 5/25/17
Harvest Date: 10/15/17
Population: 140,000
Row Spacing (in): 15
Variety: Channel 2402
Reps: 4
Previous Crop: Corn
Tillage: No-Till
Herbicides: ***Pre:*** 22 oz Glyphosate, .75 oz Aim® EC, 13 oz 2,4-D, 8 oz Authority® Assist, 1 gal/100 MSO on 5/11/17 ***Post:*** 40 oz Glyphosate, 10 oz Outlook®, 8 oz Clethodim, 1 gal/100 MSO on 6/29/17

Seed Treatment: Innoculant only
Foliar Insecticides: None
Foliar Fungicides: None
Fertilizer: 3 gal 10-34-0 at planting
Note: Light hail damage on the far east side, whole field average was 68
Irrigation: Pivot, Total: 13.5"
Rainfall (in):



Introduction: This study investigated the effects of applying nitrogen fertilizer to soybeans. A foliar application of 85 lb/ac 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 four replications so statistical analysis was not performed on 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	5.89 A*	0.47 A	2.70 A	0.35 A	1.12 A	0.39 A	110 A	108 A	7 A	43 A	49 A
Foliar N at R2	6.20 A	0.47 A	2.67 A	0.35 A	1.11 A	0.38 A	110 A	119 A	8 A	44 A	49 A
P-Value	0.225	1.0	0.772	0.861	0.771	0.565	0.981	0.278	0.283	0.787	0.970

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	5.79 A	0.35 A	1.80 A	0.36 A	1.55 A	0.26 A	98 A	225 A	7 A	45 A	51 B
Foliar N at R2	5.60 A	0.34 A	1.73 A	0.36 A	1.70 A	0.31 A	98 A	245 A	7 A	47 A	60 A
P-Value	0.226	0.520	0.160	0.824	0.340	0.126	0.916	0.454	0.910	0.270	0.055

	Yield (bu/acre)†	Moisture (%)	Residue Residual N (lb N/ac)	Oil (%)	Protein (%)	Marginal Net Return‡ ($/ac)
Check	73 A	11.9 A	38 A	19.7	36.1	646.35 A
Foliar N at R2	73 A	11.9 A	52 A	20.2	35.9	614.87 B
P-Value	0.815	0.964	0.352	---	---	0.082

*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.

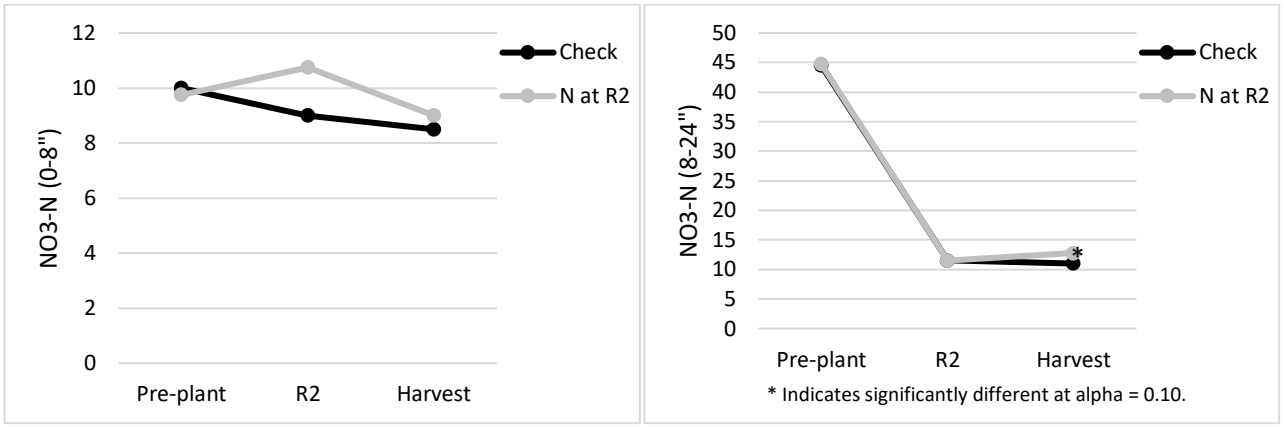


Figure 1. Pre-plant, R2, and Harvest soil NO_3-N concentrations at 0-8" and 8-24" depths.

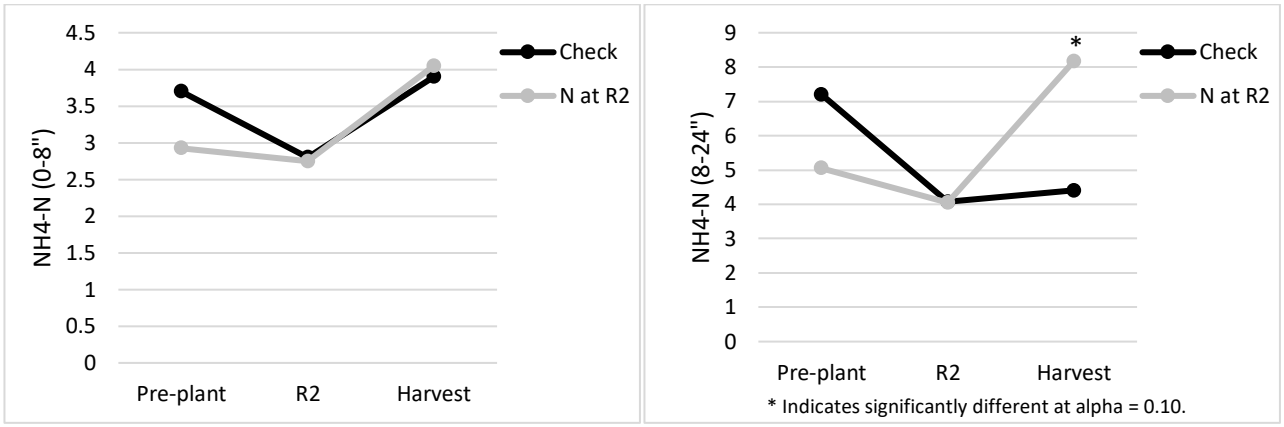


Figure 2. Pre-plant, R2, and Harvest soil NH_4-N concentrations at 0-8" and 8-24" depths.

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 zinc test at R5-R6.
- There was no significant difference in moisture content or yield of the harvested grain nor were there significant differences in the residual nitrogen content of the plant residue between the two treatments.
- The treatment of 85 lb N/ac at the R2 growth stage resulted in a significantly lower marginal net return due to increased cost of the N fertilizer and no yield increase.

Sponsored by: University of Nebraska Lincoln; Nebraska Corn Board

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