Project SENSE (Sensor-based In-season N Management)

Study ID: 200125201701
County: Nance
Soil Type: Ortello fine sandy loam 1-3% slope; Hord fine sandy loam 0-1% slope
Planting Date: 5/9/17
Harvest Date: 11/8/17
Population: 27,600
Hybrid: Pioneer 1498
Reps: 6
Previous Crop: Corn
Tillage: Reduced Tillage

Irrigation: Pivot; 24.6 lb N/ac from irrigation
Rainfall (in):

Soil Sample Results: Soil samples were taken in three locations within the research study area and do not correspond to specific treatments or replications.

ID	Soil pH 1:1	WDRF Buffer pH	Soluble Salts 1:1 mmho/cm	Excess Lime Rating	Organic Matter LOI %	Nitrate – N ppm N	Nitrate lb N/A	Mehlich P-III ppm P	Sulfate-S ppm S	Zn (ppm)	Ammonium Acetate (ppm)				CEC me/100g	% Base Saturation				
											K	Ca	Mg	Na		H	K	Ca	Mg	Na
1	6.9	7.2	0.31	NONE	2.2	19.8	48	62	13	7.49	473	1652	190	10	11.1	0	11	74	14	0
2	6.3	6.8	0.12	NONE	1.7	12	29	71	12	5.02	344	954	97	9	8.4	23	10	57	10	0
3	5.8	6.7	0.1	NONE	1.8	12	29	15	12	1.12	125	1045	128	13	10	33	3	52	11	1

Introduction: A high clearance applicator was equipped with Ag Leader® OptRx sensors. UAN fertilizer was applied with drop nozzles as the crop canopy was sensed. This study compares crop canopy sensor based in-season N application with the grower's standard N management.

Grower Nitrogen Treatment: The initial grower N rate was 45 lb N/acre applied on May 9, 2017. An additional application of 110 lb N/acre was made on June 7, 2017. Total N applied was 155 lb N/acre.

Project SENSE Nitrogen Treatment: For the SENSE treatment strips, 75 lb N/acre was applied as a base rate. Crop canopy sensing and application occurred on July 1, 2017, at the V11 growth stage. The normalized difference red edge (NDRE) index values captured using the crop canopy sensors are shown in *Figure 1*. Across all Project SENSE treatments, the average N rate applied in-season was 33 lb N/acre. Nitrogen application for the Project SENSE treatment strips is shown in *Figure 2*. The total N rate was 108 lb N/acre.

Results: Data were analyzed using the GLIMMIX procedure in SAS 9.4 (SAS Institute Inc., Cary, NC). Mean separation was performed with Fisher's LSD.

	Total N rate (lb/ac)	Yield (bu/acre)†	Partial Factor Productivity of N (lb grain/lb N)	lb N/ bu grain	Marginal Net Return‡ ($/ac)
Grower N Management	155	185 A*	67 B	0.84 A	520.01 A
Project SENSE N Management	108	187 A	97 A	0.58 B	543.24 A
P-Value	N/A	0.795	<0.0001	<0.0001	0.148

*Values with the same letter are not significantly different at a 95% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $3.15/bu corn and $0.41/lb nitrogen fertilizer.

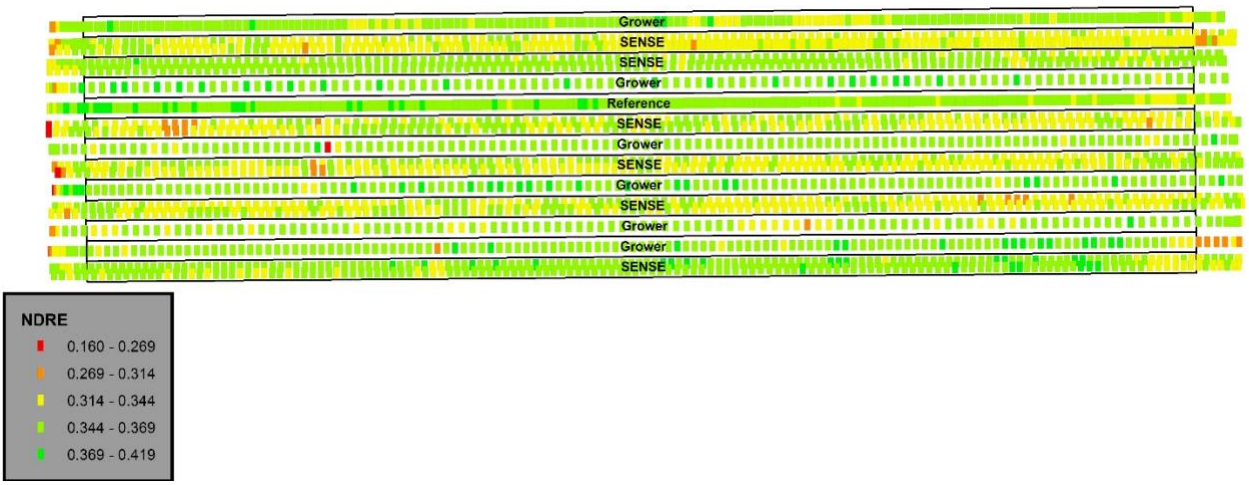

Figure 1. NDRE (normalized difference red edge) index obtained using crop canopy sensors mounted on a high clearance applicator for the plot area on July 1, 2017.

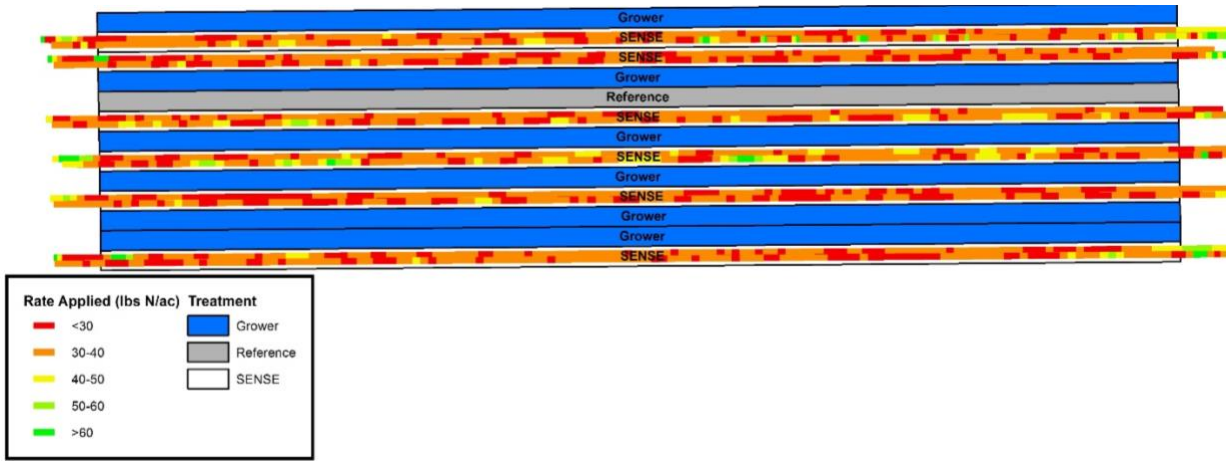

Figure 2. Nitrogen rate applied to Project SENSE N Management treatments based on NDRE captured with the crop canopy sensors and displayed in *Figure 1*.

Summary:

- Project SENSE N application was 47 lb N/acre lower than the grower's N application.
- There was no difference in yield between the Project SENSE N management and grower's N management.
- The Project SENSE N management resulted in higher N use efficiency than the grower's N management.
- There was no difference in marginal net return between the Project SENSE N management and grower's N management.

Sponsored by: University of Nebraska Lincoln; Nebraska Corn Board

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