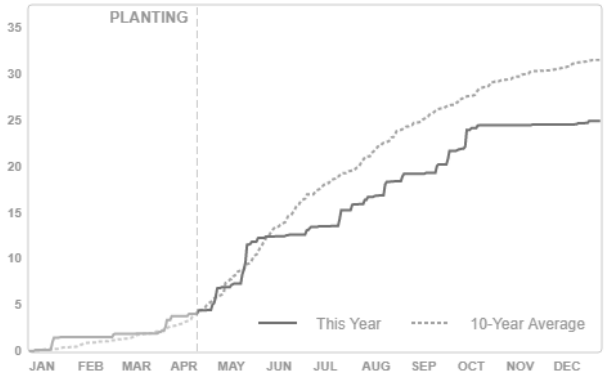
Project SENSE (Sensor-based In-season N Management)

Study ID: 716169201701
County: Thayer
Soil Type: Crete silt loam 0-1% slope; Hastings silty clay loam 3-7% slopes; Geary silty clay loam 11-30% slopes
Planting Date: 4/18/17
Harvest Date: 10/20/17
Population: 33,300
Hybrid: DKC 60-69
Reps: 6
Previous Crop: Soybean
Tillage: No-Till

Irrigation: Pivot
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	6.5	6.8	0.44	NONE	3.5	22.7	54	34	18	7.53	473	3390	428	34	23.7	8	5	71	15	1
2	6.5	6.8	0.26	NONE	4.7	12.9	31	46	15	9.1	480	2198	237	21	16.2	12	8	67	12	1
3	6.5	6.7	0.28	NONE	4	11.4	27	43	15	11.64	434	3074	407	36	22.8	12	5	67	15	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 N application was 85 lb N/ac applied on March 24, 2017. An additional 6 lb N/ace was applied at planting on April 18, 2017. On June 6, 2017, 120 lb N/acre was applied. Total N applied was 211 lb N/acre.

Project SENSE Nitrogen Treatment: For the SENSE treatment strips, 85 lb N/acre was applied on March 24, 2017, and 6 lb N/acre was applied at planting. Crop canopy sensing and application occurred on June 26, 2017, at the V10 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 161 lb N/acre. Nitrogen application for the Project SENSE treatment strips is shown in *Figure 2*. The total N rate was 252 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	211	253 A*	67 A	0.84 B	709.95 A
Project SENSE N Management	252	251 A	56 B	1.01 A	686.38 B
P-Value	N/A	0.060	0.0006	0.001	0.001

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

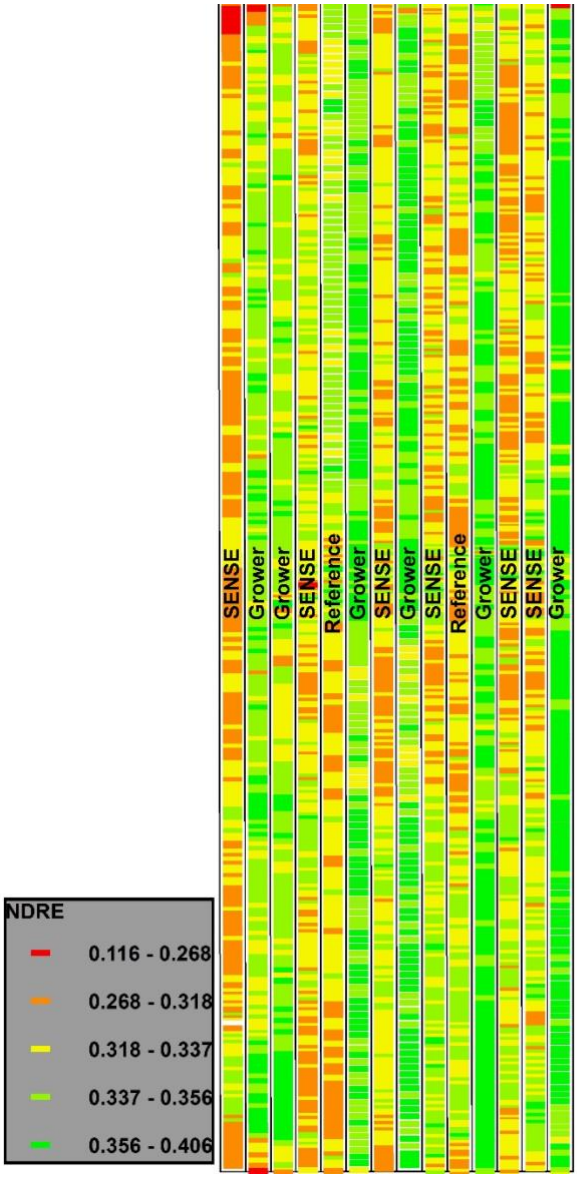


Figure 1. NDRE (normalized difference red edge) index obtained using crop canopy sensors mounted on a high clearance applicator for the plot area on June 26, 2017.

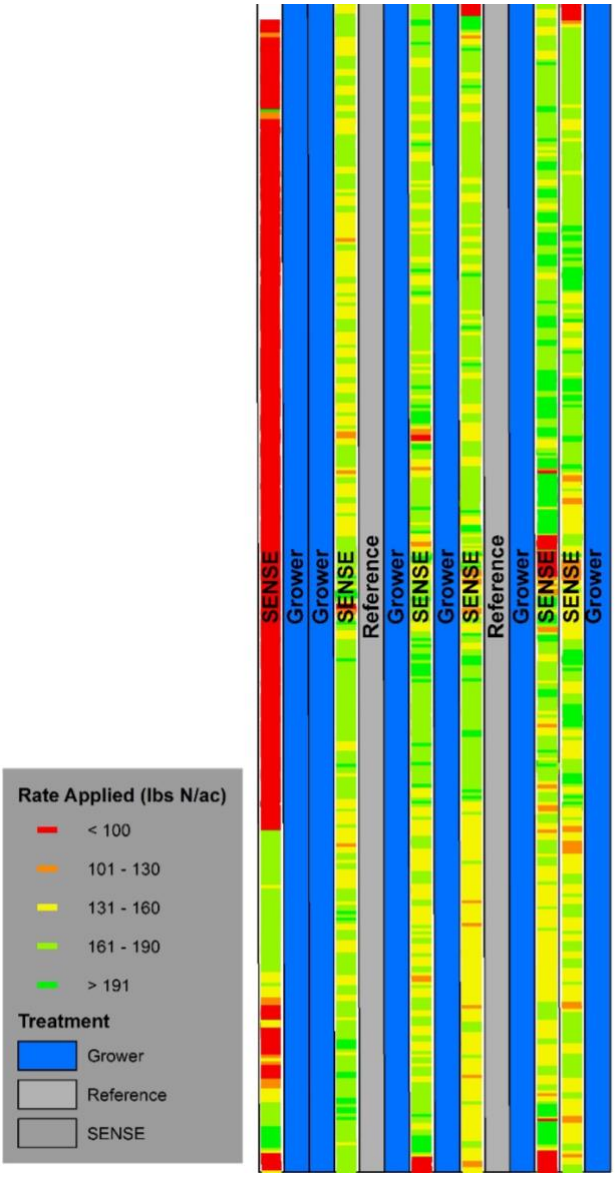


Figure 2. Nitrogen rate applied to Project SENSE N Management treatments based on NDRE captured with the crop canopy sensors and displayed in *Figure 1*.

Summary:

- Project SENSE N application was 41 lb N/acre higher than the grower's N application.
- There was no difference in yield between the Project SENSE N management and grower's N management.
- The grower's N management resulted in higher N use efficiency than the Project SENSE N management.
- The grower's N management resulted in a $24/acre higher 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