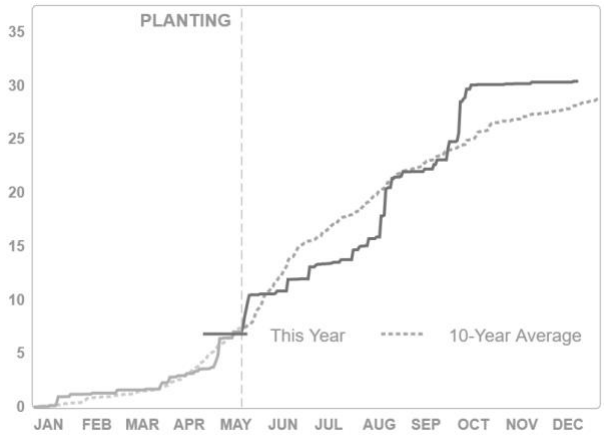
Project SENSE (Sensor-based In-season N Management)

Study ID: 202125201701
County: Nance
Soil Type: Hord very fine sandy loam 1-3% slope; Detroit silt loam 0-1% slope; Loretto-Thurman complex 3-6% slopes; Gibbon silt loam occasionally flooded
Planting Date: 5/15/17
Harvest Date: 11/8/17
Population: 29,300
Hybrid: CRM (days) 114
Reps: 6
Previous Crop: Soybean
Tillage: Reduced Tillage

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	6.8	7.2	0.09	NONE	2.8	6.6	16	17	11	2.79	408	1472	163	12	9.8	0	11	74	14	1
2	6	6.7	0.08	NONE	2.3	6.5	16	17	13	1.79	421	1279	130	9	12.1	29	9	53	9	0
3	5.5	6.6	0.07	NONE	1.8	7.2	17	30	11	1.81	242	877	108	11	10.5	43	6	42	9	0

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 50 lb N/acre on May 15, 2017. An additional application of 135 lb N/acre was made in mid-June. Total N applied was 185 lb N/acre.

Project SENSE Nitrogen Treatment: For the SENSE treatment strips, 50 lb N/acre was applied on May 15, 2017. Crop canopy sensing and application occurred on July 6, 2017, at the V13 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 125 lb N/acre. Nitrogen application for the Project SENSE treatment strips is shown in *Figure 2*. The total N rate was 175 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	185	224 A*	68 B	0.83 A	629.00 A
Project SENSE N Management	175	226 A	73 A	0.78 B	640.91 A
P-Value	N/A	0.392	0.026	0.017	0.208

*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.

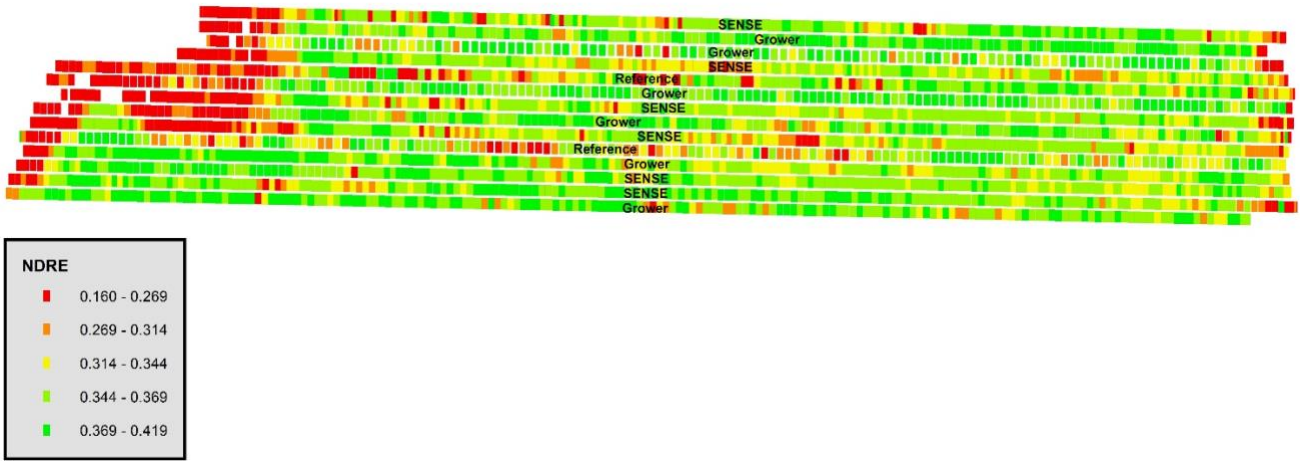


Figure 1. NDRE (normalized difference red edge) index obtained using crop canopy sensors mounted on a high clearance applicator for the plot area on July 6, 2017.

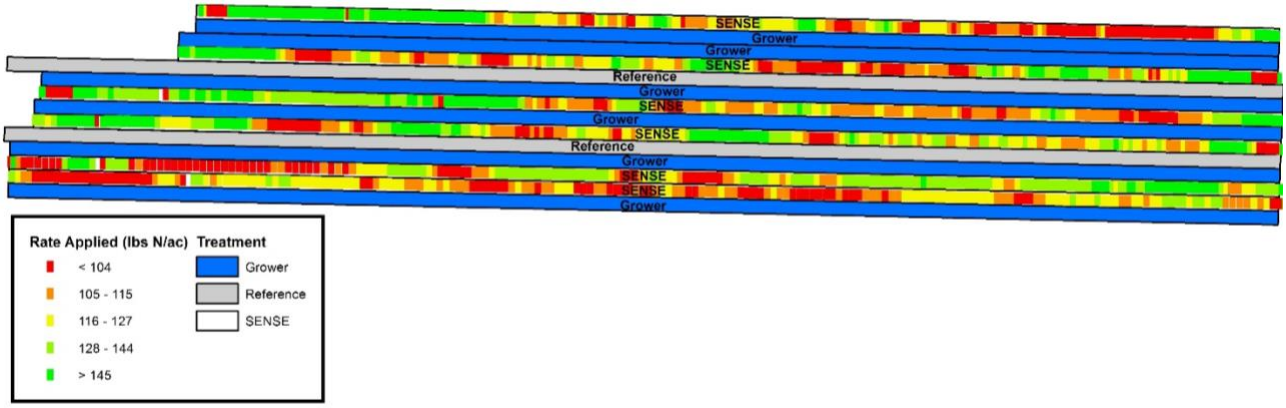


Figure 2. Nitrogen rate applied to Project SENSE N Management treatments based on NDRE captured with the crop canopy sensors and displayed in *Figure 1*.

Summary:

- Project SENSE N application was 10 lb N/acre lower than the grower's N application.
- There was no difference in yield between the grower's N management and the Project SENSE N management.
- Project SENSE N management resulted in higher N use efficiency than the grower's N application.
- There were no significant differences 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