

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

Study ID: 021125201701

County: Nance

Soil Type: Loretto-Thurman complex 1-3% slope;
Thurman loamy fine sand 2-6% slopes; Thurman
loamy fine sand 2-6% slopes, eroded

Planting Date: 5/6/17

Harvest Date: 11/5/17

Population: 27,600

Hybrid: CRM (days) 112

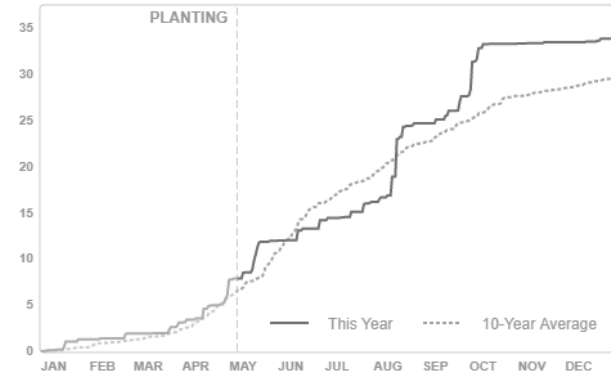
Reps: 6

Previous Crop: Soybean

Tillage: No-Till

Irrigation: Pivot; 27 N lb/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
3	6.4	6.8	0.07	NONE	1.2	11.5	28	30	9	2.66	218	884	82	6	7.2	21	8	61	10	0
14	5.6	6.7	0.1	NONE	1	10.2	25	65	8	2	183	515	69	5	6.8	47	7	38	8	0
22	6.6	7.2	0.09	NONE	1.5	8.8	21	31	7	2.62	225	1051	105	7	6.7	0	9	78	13	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 70 lb N/acre on May 9, 2017. An additional application of 75 lb N/acre was made on June 10, 2017. Total N applied was 145 lb N/acre.

Project SENSE Nitrogen Treatment: For the SENSE treatment strips, 70 lb N/acre was applied on May 9, 2017. Crop canopy sensing and application occurred on June 28, 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 119 lb N/acre. Nitrogen application for the Project SENSE treatment strips is shown in *Figure 2*. The total N rate was 189 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	145	216 B*	84 A	0.67 B	622.29 B
Project SENSE N Management	189	227 A	67 B	0.84 A	637.02 A
P-Value	N/A	0.0003	0.0001	0.0004	0.012

*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.

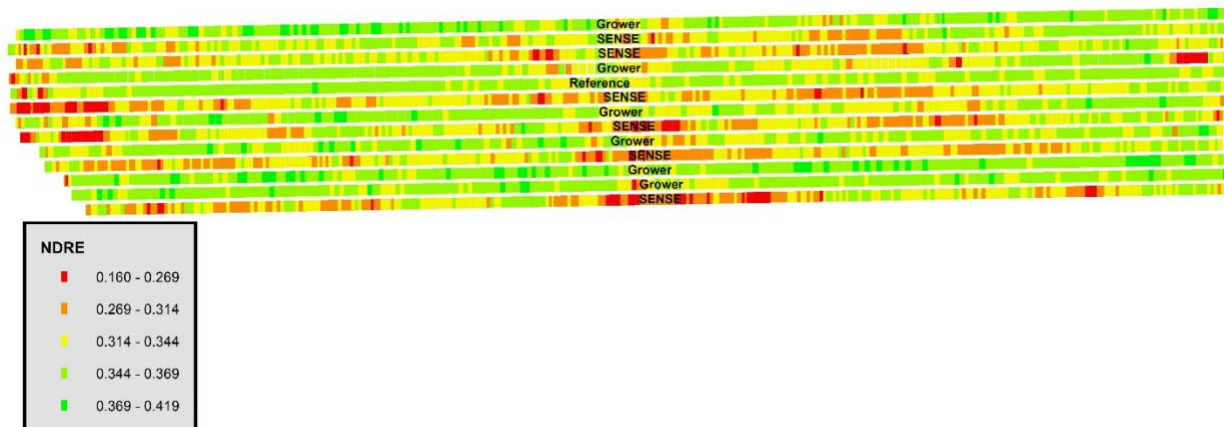


Figure 1. NDRE (normalized difference red edge) index obtained using crop canopy sensors mounted on a high clearance applicator for the plot area on June 28, 2017.

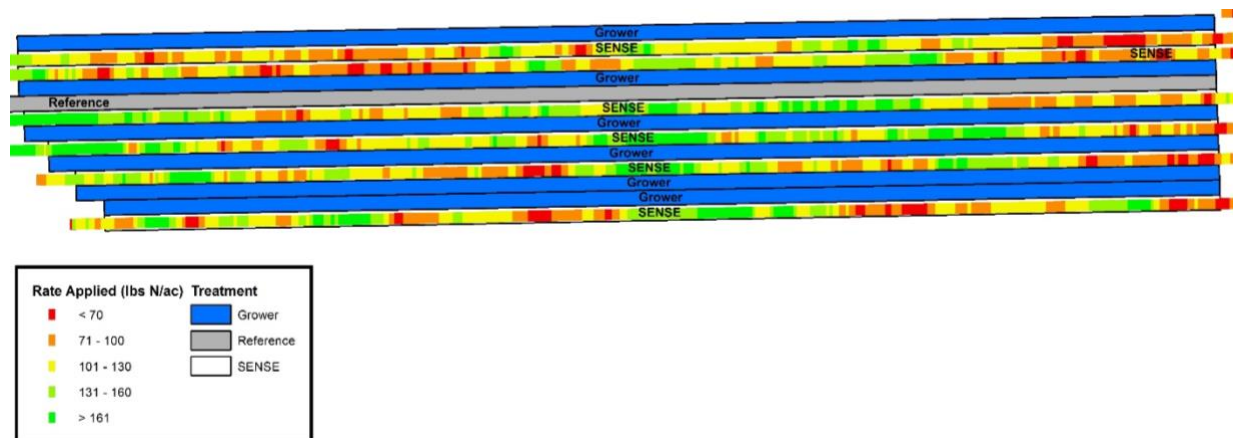


Figure 2. Nitrogen rate applied to Project SENSE N Management treatments based on NDRE captured with the crop canopy sensors and displayed in *Figure 1*.

Summary:

- Project SENSE N application was 44 lb N/acre higher than the grower's N application.
- The Project SENSE N management resulted in a 10.5 bu/acre yield increase compared with the grower's N management.
- The grower's N management resulted in higher N use efficiency than the Project SENSE N management.
- The Project SENSE N management resulted in a \$15/acre higher marginal net return than the grower's N management.

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