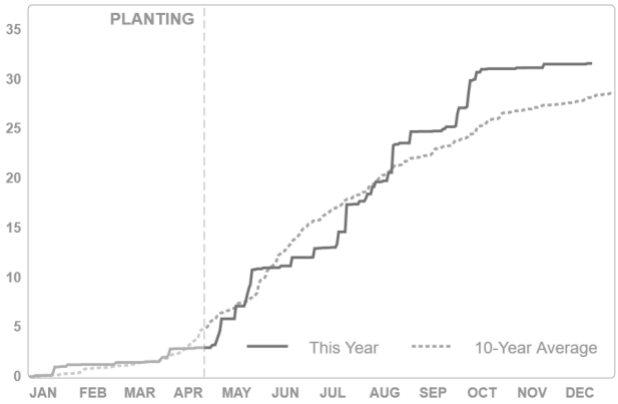
Project SENSE (Sensor-based In-season N Management)

Study ID: 205079201701
County: Hall
Soil Type: Hord silt loam 0-1% slope; Hord silt loam 1-3% slope
Planting Date: 4/20/17
Harvest Date: 10/25/17
Population: 31,600
Hybrid: CRM (days) 120
Reps: 6
Previous Crop: Corn
Tillage: No-Till

Irrigation: Pivot; 20 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	7.1	7.2	0.12	NONE	2.2	9.5	23	46	11	3.38	301	2047	223	19	13	0	6	79	14	1
2	7.2	7.2	0.15	NONE	2.4	13.2	32	33	10	3.39	323	2520	275	27	15.8	0	5	80	14	1
3	7.3	7.2	0.14	NONE	1.9	8.6	21	23	9	3.57	221	2252	235	31	13.9	0	4	81	14	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 16 lb N/acre applied on March 28, 2017. An additional application of 46 lb N/acre was made on April 18, 2017. During the growing season, 160 lb N/acre was applied on June 14, 2017. Total N applied was 222 lb N/acre.

Project SENSE Nitrogen Treatment: For the SENSE treatment strips, 16 lb N/acre was applied on March 28, 2017, and 46 lb N/acre was made on April 18, 2017. Crop canopy sensing and application occurred on June 27, 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 100 lb N/acre. Nitrogen application for the Project SENSE treatment strips is shown in *Figure 2*. The total N rate was 162 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	222	225 A*	57 B	0.99 A	616.72 A
Project SENSE N Management	162	221 A	78 A	0.73 B	630.30 A
P-Value	N/A	0.120	0.004	0.001	0.058

*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.

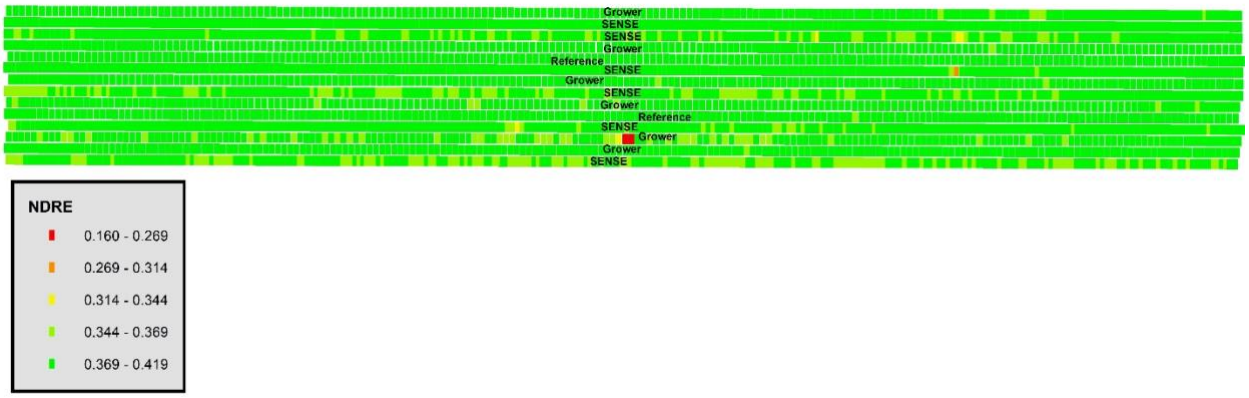


Figure 1. NDRE (normalized difference red edge) index obtained using crop canopy sensors mounted on a high clearance applicator for the plot area on June 27, 2017.

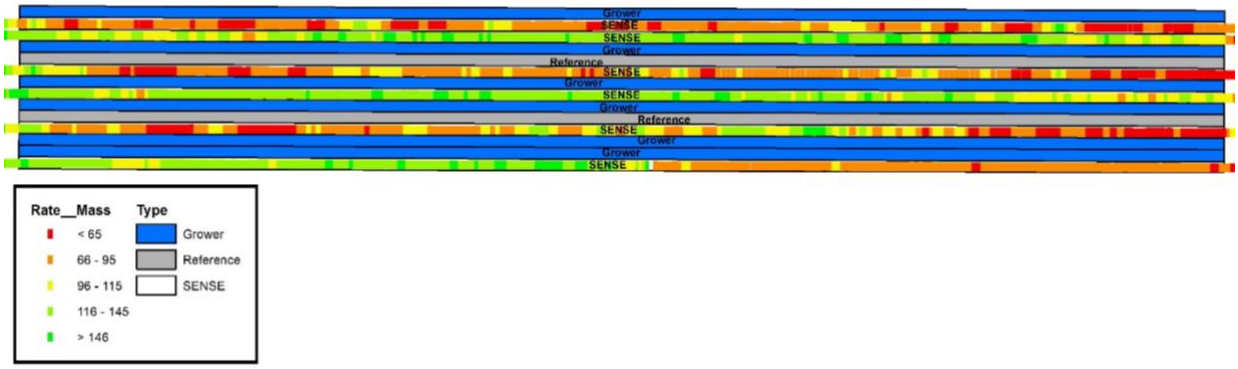


Figure 2. Nitrogen rate applied to Project SENSE N Management treatments based on NDRE captured with the crop canopy sensors and displayed in *Figure 1*.

Summary:

- Project SENSE N application was 60 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.

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