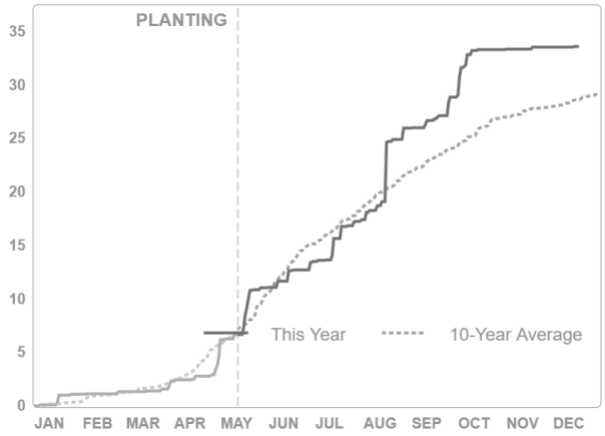
Project SENSE (Sensor-based In-season N Management)

Study ID: 073081201703
County: Hamilton
Soil Type: Hastings silt loam 0-1% slope; Hastings silt loam 1-3% slope; Hastings silty clay loam 3-7% slopes, eroded
Planting Date: 5/12/17
Harvest Date: 10/30/17
Population: 33,600
Hybrid: CRM (days) 113
Reps: 5
Previous Crop: Corn
Tillage: Reduced Tillage

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	5.7	6.5	0.11	NONE	3.3	7.2	17	31	15	1.61	286	1751	222	18	16.8	32	4	52	11	0
2	6	6.7	0.13	NONE	3.3	5.5	13	14	19	1.96	391	2069	354	19	17.4	17	6	60	17	0
3	5.7	6.6	0.18	NONE	3.2	7.4	18	28	16	1.84	325	1764	256	16	16.2	27	5	55	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 162 lb N/acre applied on June 7, 2017. An additional application of 48 lb N/acre was made on July 5, 2017. Total N applied was 210 lb N/acre.

Project SENSE Nitrogen Treatment: For the SENSE treatment strips, 81 lb N/acre was applied June 7, 2017. Crop canopy sensing and application occurred on July 5, 2017, at 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 52 lb N/acre. Nitrogen application for the Project SENSE treatment strips is shown in *Figure 2*. The total N rate was 133 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	210	256 A*	68 B	0.82 A	719.93 B
Project SENSE N Management	133	253 B	107 A	0.53 B	742.43 A
P-Value	N/A	0.011	0.0001	<0.0001	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.

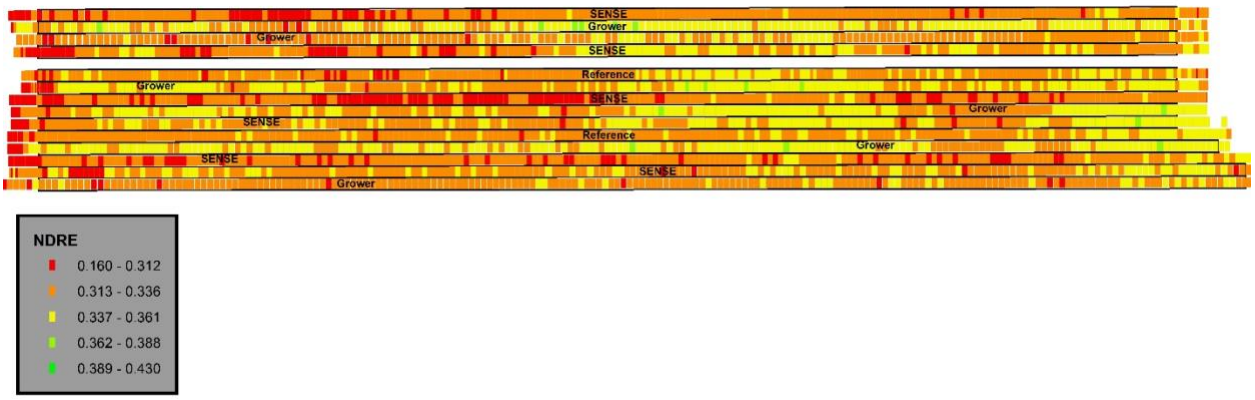


Figure 1. NDRE (normalized difference red edge) index obtained using crop canopy sensors mounted on a high clearance applicator for the plot area on July 5, 2017.

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 77 lb N/acre lower than the grower's N application.
- The grower's N management resulted in a 3 bu/acre yield increase compared with the Project SENSE N management.
- Project SENSE N management resulted in higher N use efficiency than the grower's N application.
- The Project SENSE N management resulted in $22.50/acre higher marginal net return than the grower's N management.

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