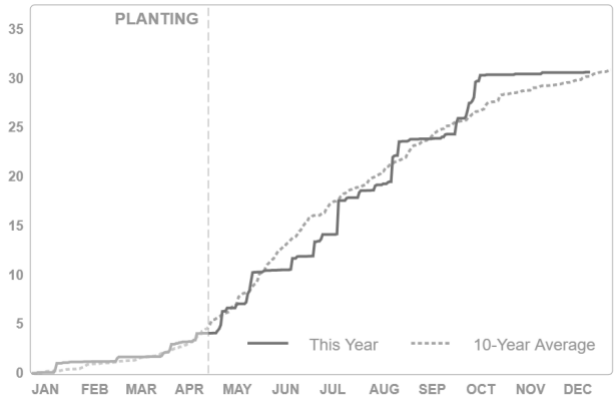
Project SENSE (Sensor-based In-season N management)

Study ID: 618185201701
County: York
Soil Type: Hastings silt loam 0-1% slope; Fillmore silt loam frequently ponded
Planting Date: 4/22/17
Harvest Date: 10/21/17
Population: 32,600
Hybrid: CRM (days) 112
Reps: 5
Previous Crop: Corn
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	5.8	6.5	0.21	NONE	3.3	25.7	62	28	14	2.01	310	2079	369	16	19.6	27	4	53	16	0
2	6	6.6	0.21	NONE	3.4	31.9	77	25	14	1.68	336	1911	276	18	16.7	23	5	57	14	0
3	5.8	6.4	0.15	NONE	3.6	21	50	28	14	4.55	310	1416	179	14	15.7	40	5	45	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 70 lb N/acre applied near the time of planting. A variable rate application averaging 140 lb N/acre was applied in late June. The toal N rate was 210 lb N/acre.

Project SENSE Nitrogen Treatment: For the SENSE treatment strips, 70 lb N/acre was applied near the time of planting. Crop canopy sensing and application occurred on July 5, 2017, at the V16 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 146 lb N/acre. Nitrogen application for the Project SENSE treatment strips is shown in *Figure 2*. The total N rate was 216 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	247 A*	66 A	0.85 A	691.53 A
Project SENSE N Management	216	248 A	64 A	0.88 A	691.15 A
P-Value	N/A	0.817	0.115	0.125	0.972

*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.

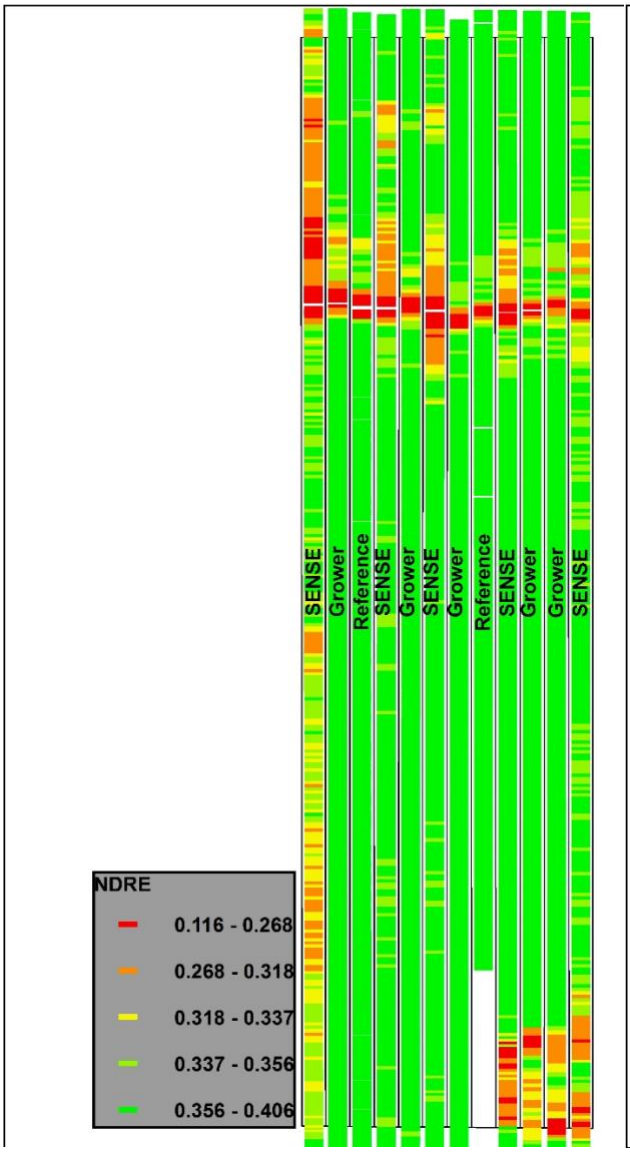


Figure 1. NDRE (normalized difference red edge) index obtained using crop canopy sensors mounted on a high clearance applicator for the plot area on July 5, 2017.

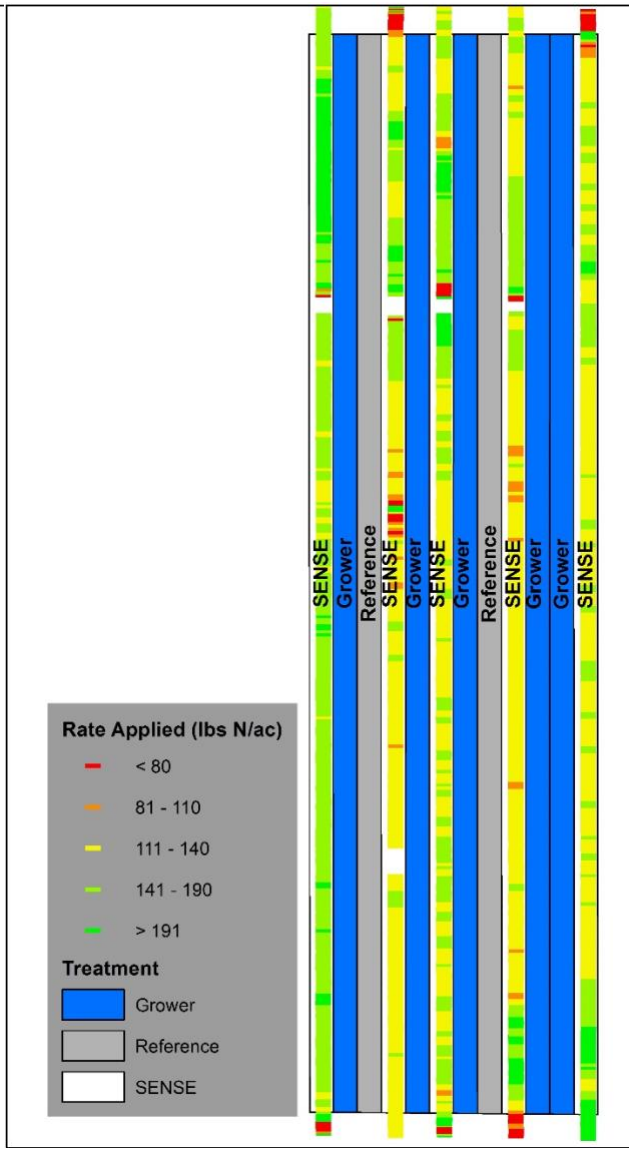


Figure 2. Nitrogen rate applied to Project SENSE N Management treatments based on NDRE captured with the crop canopy sensors and displayed in *Figure 1*.

Summary:

- Project SENSE N application was 7 lb N/acre higher than the grower's N application.
- There was no yield difference between the Project SENSE N management and the grower's N management.
- There was no difference in N use efficiency between the Project SENSE N management and the grower's N management.
- There was no difference in marginal net return between the Project SENSE N management and the grower's N management.

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