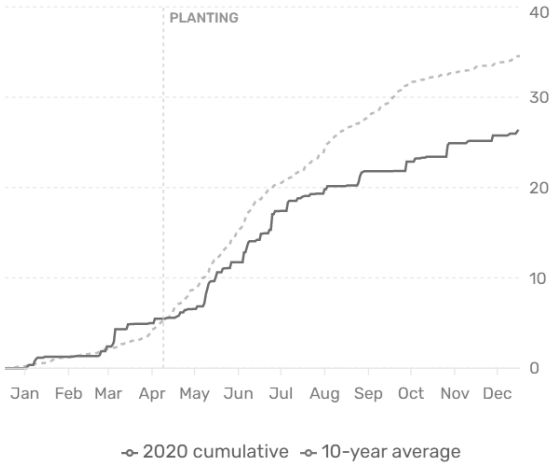
Project SENSE (Sensor-based In-season N Management) on Irrigated Corn

Study ID: 0621023202001
County: Butler
Soil Type: Brocksburg sandy loam 0-2% slope; Gibbon silty clay loam; Ovina loamy fine sand
Planting Date: 4/23/20
Harvest Date: 10/9/20
Seeding Rate: 33,000
Row Spacing (in): 30
Hybrid: Pioneer® P1366Q
Reps: 6
Previous Crop: Corn
Tillage: Ridge-Till
Herbicides: ***Pre:*** 24 oz TripleFLEX® II, 3 oz/ac Balance® Flexx, and 6 oz/ac Sterling Blue® ***Post:*** 1.3 qt/ac Resicore®, 1 qt/ac atrazine, and 32 oz/ac Roundup®
Seed Treatment: Lumivia™ 250 and Lumialza™

Foliar Insecticides: None
Foliar Fungicides: None
Irrigation: Pivot
Rainfall (in):



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 grower rate was 226 lb N/ac, applied as 100 lb/ac 11-52-0 in February 2020 (contributing 11 lb/ac N), 15 gal/ac 32% UAN with pre-emerge herbicide (contributing 53 lb/ac N), 5 gal/ac 10-34-0 in-furrow (contributing 5 lb/ac N), 7 gal/ac 8-20-5-5S-0.5Zn at planting (contributing 6 lb/ac N), 100 lb/ac 21-0-0-24 AMS (contributing 21 lb/ac N), and 40 gal/ac 32% UAN (contributing 130 lb/ac N).

Project SENSE Nitrogen Treatment: For the SENSE treatment strips, the base rate (prior to in-season sensing) was established with 100 lb/ac 11-52-0 in February 2020 (contributing 11 lb/ac N), 15 gal/ac 32% UAN with pre-emerge herbicide (contributing 53 lb/ac N), 5 gal/ac 10-34-0 in-furrow (contributing 5 lb/ac N), 7 gal/ac 8-20-5-5S-0.5Zn at planting (contributing 6 lb/ac N), and 100 lb/ac 21-0-0-24 AMS (contributing 21 lb/ac N), for a total base rate of 96 lb/ac N. Crop canopy sensing and application occurred on June 26, 2020, at the V12 growth stage. Across all Project SENSE treatments, the average N rate applied based on the in-season sensing was 59 lb N/ac. The average total N rate was 156 lb N/ac. The field received 0.13" of rain on June 28, 2020, and 0.64" of rain on June 30, 2020.

Results:

	Total N rate (lb/ac)	Yield (bu/ac)†	Partial Factor Productivity of N (lb grain/lb N)	lbs N/bu grain	Marginal Net Return‡ ($/ac)
Grower	226 A*	227 A	56 B	1.00 A	714.10 A
Project SENSE	156 B	201 B	73 A	0.77 B	649.47 B
P-Value	<0.0001	<0.0001	<0.0001	<0.0001	0.0001

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $3.51/bu corn and $0.41/lb N.

Summary:

- The Project SENSE management N rate was 70 lb/ac lower than the grower's N management.
- Yield for the Project SENSE N management was 26 bu/ac lower than the grower's N management.
- Project SENSE had better nitrogen use efficiency; Project SENSE N management used 0.22 lb/ac less N to produce a bushel of grain than the grower's method.
- Marginal net return was $64.63/ac lower for the Project SENSE N management than the grower's N management.

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In Partnership with: Nebraska Corn Board; Nebraska Soybean Checkoff; Nebraska Corn Growers Association; Nebraska Dry Bean Commission