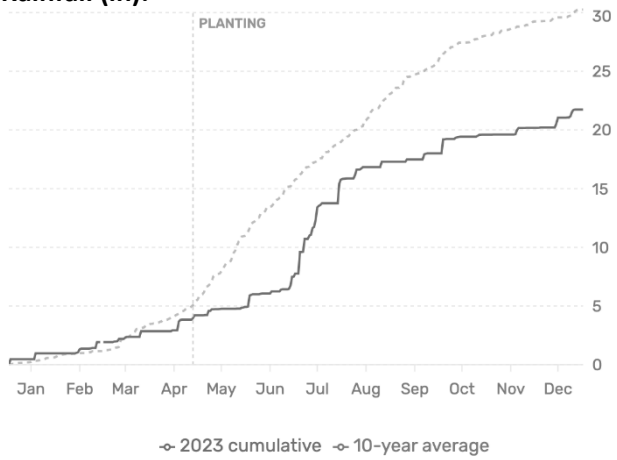
Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

Study ID: 0811185202301
County: York
Soil Type: Hastings silt loam
Planting Date: 4/27/23
Harvest Date: 10/10/23
Seeding Rate: 34,000
Row Spacing (in): 30
Hybrid: Pioneer® P1170AM
Reps: 5
Previous Crop: Soybean
Tillage: No-Till
Herbicides: ***Pre:*** 1.5pt/ac atrazine, 2 qt/ac Lexar®, 24 oz/ac glyphosate, and 1 pt/ac Class Act® on 5/1/23
Seed Treatment: Ipconazole, Ethaboxam, L-2012R, Lumiva®, Lumisure®, Lumialza®
Foliar Insecticides: 6.4 oz/ac Brigade® 2EC and 4 oz/ac Mustang® MAX on 7/22/23
Foliar Fungicides: 13.7 oz/ac Trivapro® on 7/22/23
Note: 3-14% green snap in field
Irrigation: Pivot, Total: 13.8"
Rainfall (in):

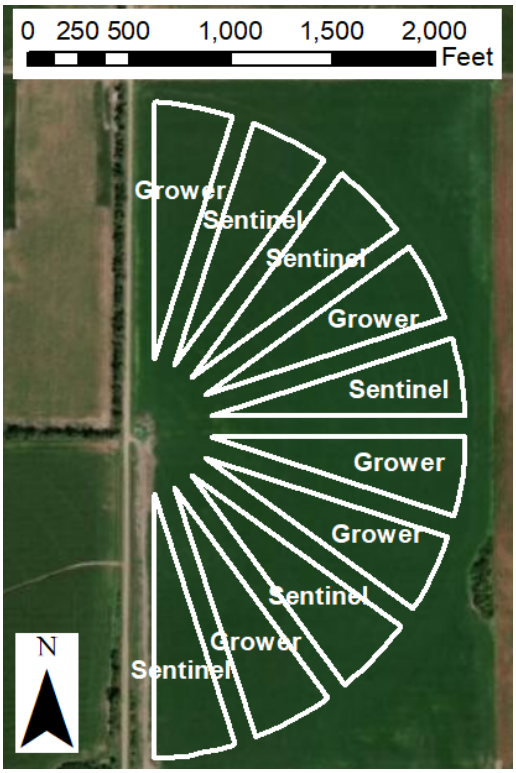


Baseline Soil Samples 0-6" (May 2023):

pH	OM LOI %	Nitrate–N ppm N	M3–P ppm P	Sulfate–S ppm S	K ppm	Ca ppm	Mg ppm	Na ppm	CEC me/100g
6.4	4	54.2	32	9.3	282	1877	250	35	13.3
6.1	3.9	60.4	59	8.1	296	1731	329	36	13.4
5.6	3.3	64.4	48	10.1	211	1537	201	40	12.7

Introduction: Corn nitrogen (N) management may be improved by using sensors or imagery to detect and respond to corn N needs during the growing season. Sentinel Fertigation's N-Time® application analyzes multispectral images to deliver fertigation scheduling recommendations. Indicator blocks (small blocks established during the base N applications) with higher (+60 lb N/ac) and lower (-30 lb N/ac) rates were applied in the field on April 5, 2023 to monitor and determine when fertigation was needed.

If an N application was recommended by N-Time® the N (lb N/ac) applied via fertigation (typically 30 or 60 lb N/ac) is noted in the application table below. Note that different Sentinel sectors of the pivot may receive different recommendations throughout the growing season. This study compared the grower's standard N management to the Sentinel Fertigation N-Time® N management, with four paired sectors of each treatment (each sector was about 6 acres, buffered 60 feet internally to reduce sprinkler package overlap between sectors); the field trial layout is shown at right.



Application Table: Nitrogen applied throughout the 2023 growing season is included in the table below. N applications (in lb N/ac) are noted by date, along with products applied at those instances. Sentinel N-Time® began monitoring and directing N fertigation applications following the April 5, 2023 N application; N-Time® directed N applications are shaded in gray to the right of the double vertical lines in the table below.

	4/5	6/29	7/10	7/24	Total N Applied
Treatment	----------*lb N/ac applied*----------				
Grower N Management	120 [a]	16[b]	33 [b]	19 [b]	**188**
Sentinel Fertigation N-Time®	120 [a]	-	-	-	**120**

[a] Product used was NH3 for indicator block establishment

[b] Product used was 30-0-0-3 S

Results:

	Total N rate (lb/ac)	Moisture (%)	Yield (bu/ac)†	Partial Factor Productivity of N (lb grain/lb N)	lbs N/bu grain	Marginal Net Return‡ ($/ac)
Grower N Management	188	15.5 A*	260 A	77 B	0.73 A	1,179 A
Sentinel Fertigation N-Time®	120	15.6 A	259 A	121 A	0.47 B	1,217 A
P-Value	N/A	0.385	0.837	<0.0001	<0.0001	0.161

	Stand Count (plants/ac)	Stalk Rot (%)	Green snap (%)	Total Digestible Nutrients (TDN) (%)	Crude Protein (%)
Grower N Management	32,000 A*	15.5 A	0	88.2 A	9.02 A
Sentinel Fertigation N-Time®	32,600 A	15 A	0	88.4 A	9.04 A
P-Value	0.578	0.924	N/A	0.45	0.871

*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 $5/bu corn and $0.63/lb N.

Summary: The Sentinel Fertigation N-Time® management did not recommend any additional nitrogen applications beyond the initial NH_3 base rate, which resulted in a 68 lb N/ac reduction in N fertilizer compared to the grower's traditional N management. With no yield difference, this resulted in a 57% increase in N use efficiency. There was no significant difference in marginal net return. There was also no significant difference in stand counts, stalk rot, total digestible nutrients, or crude protein based on samples taken during the growing season.

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