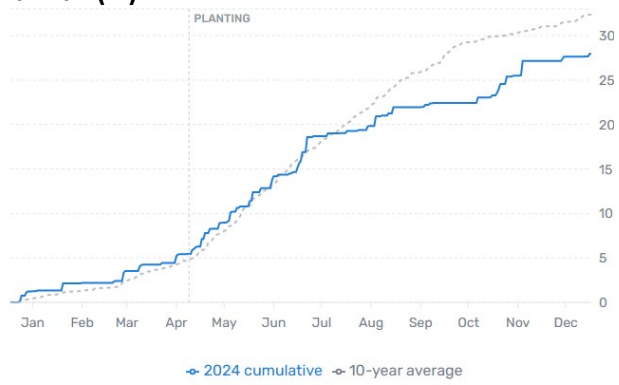
Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

Study ID: 0811-185-2024-01
County: York
Soil Type: Hastings silty clay loam, Hastings silt loam
Planting Date: 4/23/24
Harvest Date: 10/12/24
Seeding Rate: 34,000
Row Spacing (in): 30
Hybrid: Pioneer® 1170AM
Reps: 6
Previous Crop: Soybeans
Tillage: No-Till
Herbicides: ***Pre:*** 2 qt/ac Lexar® + 1.5 pt/ac atrazine + 1 oz/ac Anthem Maxx® + 24 oz/ac glyphosate
Post: 2 qts/ac Acuron + 1 pt/ac atrazine + 8 oz/ac DiFlexx® + 24 oz/ac glyphosate
Seed Treatment: None
Foliar Insecticides: 3.2 oz/ac Firestone® + 6.4 oz Brigade® on 7/18/24
Foliar Fungicides: 13.7 oz/ac Trivapro® on 7/18/24
Fertilizer: 120 lb N/ac on 4/2/24
Note: up to 6% greensnap end of June
Irrigation: Pivot
Rainfall (in):

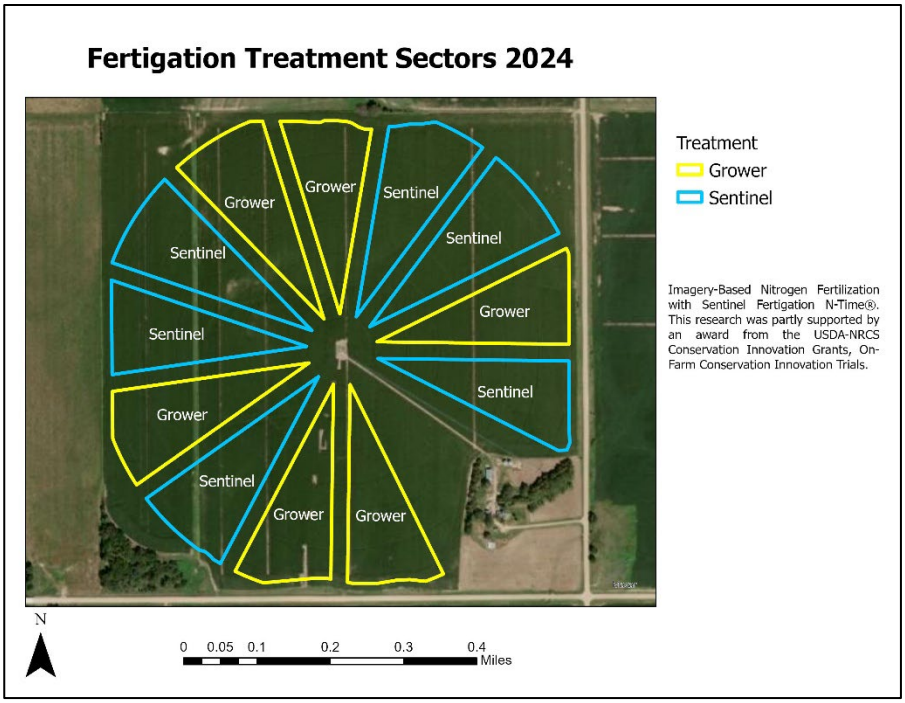


Post Season Average Soil Samples 0-8" (November 2024):

	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
Sentinel	6.6	3.2	9.4	21	10.6	175	1650	235	20	12.7
Grower	6.5	3.4	9.6	26	11.7	281	1926	310	23	14.9

Introduction: Corn nitrogen 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) nitrogen rates were applied in the field on April 1, 2024, 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 six paired sectors of each treatment (each sector was about 9.5 acres, buffered 60 feet internally to reduce sprinkler package overlap between sectors); the field trial layout is shown below.



Application Table: Nitrogen applied throughout the 2024 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 1, 2024, N application. N-Time® directed N applications are shaded in gray to the right of the double vertical lines in the table below.

N was applied using 32% UAN unless otherwise noted. Gray-shaded area to the right of the striped line indicates where Sentinel Fertigation N-Time® dictated N rates. The applied values were averaged across all reps; therefore, if only one out of six replications triggered an application of 30 lb N/ac, a value of 5 lb N/ac is reported as the average treatment N application across reps.

	4/1	6/13	6/25	7/27		Total N Applied
Treatment	----------*lb N/ac applied*----------					
Grower N Management	117 [a]	-	35 [b]	20 [b]		**172**
Sentinel Fertigation N-Time®	117 [a]	10 [b]	-	20 [b]	-	**147**

[a] Product used was anhydrous ammonia via indicator block Rx

[b] Product used was 90% 32-0-0 + 10% ATS via fertigation

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	172	13.6 A*	264 A	86 B	0.65 A	1,063 A
Sentinel Fertigation N-Time®	147	13.5 A	261 A	99 A	0.56 B	1,062 A
P-Value	N/A	0.318	0.483	0.00255	0.0018	0.927

*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 were corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn and $0.5 lb/N.

	Stand Counts	Stalk Rot (%)	Crude Protein Dry Basis	Ruminant Total Digestible Nutrients (TDN) (%)
Grower N Management	33,500 A*	10.0 A	7.825 A	89.01 A
Sentinel Fertigation N-Time ®	32,333 A	5.83 A	7.49 A	88.72 A
P-Value	0.519	0.329	0.334	0.331

Summary:

- There were no significant differences in moisture, yield, or marginal net return between treatments.
- The Sentinel Fertigation N-Time® management system called for a 25 lb N/ac reduction in N applications during the growing season.
- There were significant differences in partial factor productivity and lbs N/bu grain. Sentinel Fertigation N-Time® increased Partial Factor Productivity (PFP) by 15% and improved nitrogen use efficiency (NUE) by 13.8% compared to the grower N management.
- Up to 6% greensnap was found in the field at the end of June.

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