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

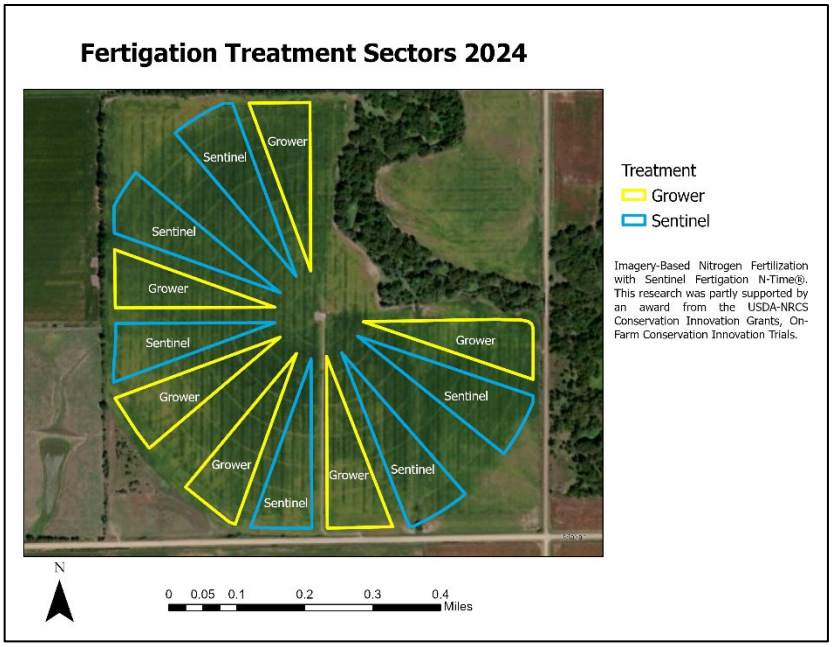
Study ID: 1348-187-2024-02
County: Seward
Soil Type: Hastings silt loam; Hall silt loam, Hord silt loam, Hobbs silt loam
Planting Date: 4/24/24
Harvest Date: 10/23/24
Seeding Rate: 31,800
Row Spacing (in): 30
Hybrid: Channel® 217-01STX
Reps: 6
Previous Crop: Corn
Tillage: Strip-till
Herbicides: ***Pre:*** 2 qt/ac Harness Xtra® 5.6 + 3.75 oz/ac Explorer® 3 + 30 oz/ac glyphosate on 4/26/24 ***Post:*** Liberty® + Explorer® + Fulltech® on 5/30/24
Seed Treatment: None
Foliar Insecticides: None
Foliar Fungicides: 13.7 oz/ac Trivapro®, 6.4 oz/ac Bifen® 2AG Gold on 7/16/24
Fertilizer: 150 lb/ac MESZ and 58 lb N/ac as urea on 4/4/24. 17 lb N/ac on 4/26/24
Irrigation: Pivot, Total: 6.2"
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	7.1	3.4	11.2	19	6.8	234	1570	186	22	10.1
Grower	7.0	3.4	14	36	8.3	278	1812	226	25	11.7

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 June 10, 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 7 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 4, 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.

	4/4		6/10	6/20	7/15	8/2	Total N Applied
Treatment							
Grower N Management	89.9 [a]	15	66[b]	-	40 [c]	26 [c]	**236.9**
Sentinel Fertigation N-Time®	91.3 [a]	15	61.06[b]	21.66b	10c	6.7c	**205.7**

[a] Product used was Urea/MESZ blend via strip-till

[b] Product used was 32-0-0 UAN via slice establishment

[c] Product used was 90% 32-0-0 UAN/10% ATS

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	219.7	12.0 A*	247.9 A	62.3 A	0.886 A	969 A
Sentinel Fertigation N-Time®	205.7	11.9 A	254.9 A	69.4 A	0.807 A	1006 A
P-Value	N/A	0.792	0.546	0.0986	0.109	0.421

*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	30,750 A	14.58 A	7.44 A	89.39 A
Sentinel Fertigation N-Time ®	30,583 A	13.33 A	7.85 A	89.36 A
P-Value	0.862	0.85	0.314	0.866

Summary:

- There were no significant differences for moisture, yield, partial factor productivity, lbs N/bu grain, or marginal net return between the treatments.
- The Sentinel Fertigation N-Time® management system called for 14 lb N/ac additional N applications during the growing season, which resulted in no difference in yield.
- The June 10 application for indicator block establishment applied more than targeted due to a calibration error with the pump.
- The grower had planned on applying a second application of N for all of his sectors in August, but ran out of fertilizer before all sectors recieved applications.

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