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

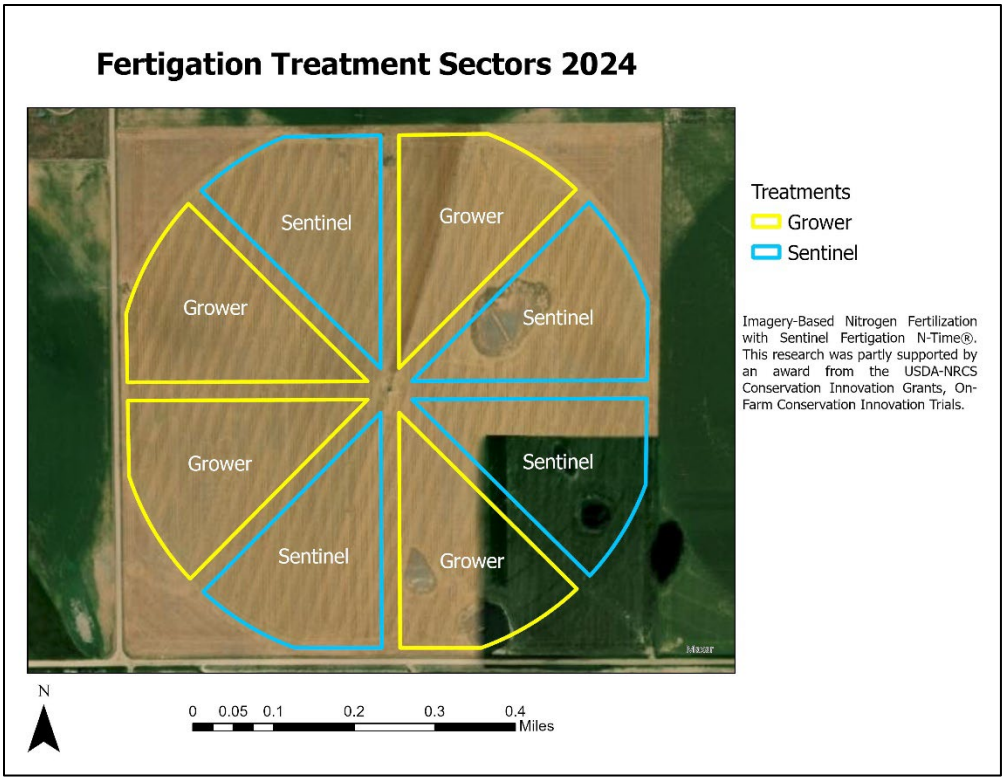
Study ID: 0130-113-2024-01
County: Logan
Soil Type: Hord silt loam, Holdrege-Hord silt loam
Planting Date: 5/11/24
Harvest Date: 10/15/24
Seeding Rate: 30,000
Row Spacing (in): 30
Hybrid: Hoegemeyer® 7434
Reps: 4
Previous Crop: Corn
Tillage: Strip-till
Herbicides: ***Pre:*** 24 oz/ac glyphosate + 16 oz/ac Armezon® PRO + 0.5 oz Armezon® + 32 oz/ac Atra 4L ***Post:*** 64 oz/ac Fulltime® + 6 oz/ac Clash®
Seed Treatment: Standard seed treatment
Foliar Insecticides: None
Foliar Fungicides: None
Irrigation: Pivot, Total: 7"
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	2.5	5	26.5	14.6	285	1338	144	16	10.2
Grower	6.3	2.4	6	24.5	10.2	231	1024	108	14	9.2

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 8, 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 four paired sectors of each treatment (each sector was about 16 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 June 8, 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 four replications triggered an application of 30 lb N/ac, a value of 7.5 lb N/ac is reported as the average treatment N application across reps.

	6/8	7/2	7/12	Total N Applied
Treatment	----------*lb N/ac applied*----------			
Grower N Management	39.04[a]	60.78[b]	-	**99.8**
Sentinel Fertigation N-Time®	38.9 [a]	39.03[b]	45[c]	**122.9**

[a] Product used was 40% Urea / 60% AMS via dry spread for indicator block Rx

[b] Product used was 90% 32-0-0/10% ATS + Moly via side dress

[c] Product used was 81% 32-0-0/9% ATS/9% Moly 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	99.8	15.5 A*	209.3 B	117.4 A	0.477 B	860 B
Sentinel Fertigation N-Time®	122.9	16.0 A	227.5 A	103.6 A	0.540 A	923¥ A
P-Value	N/A	0.363	0.00887	0.0285	0.0329	0.0129

*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 $0.50 lb/N.
¥MNR average for Sentinel sectors was reduced by $5/ac to account for additional pivot pass requested for this application.

Summary:

- There were no significant differences for moisture or partial factor productivity.
- There were significant differences for yield, lbs N/bu grain, and marginal net return.
- The Sentinel Fertigation N-Time® management system called for 23.1 lb N/ac more compared to the grower N management, resulting in a yield increase of 18.2 bu/ac.
- Sentinel Fertigation N-Time® increased N use efficiency by 11.7%.
- There was a significant difference in marginal net return, with Sentinel Fertigation N-Time® yielding an additional $63/ac.

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