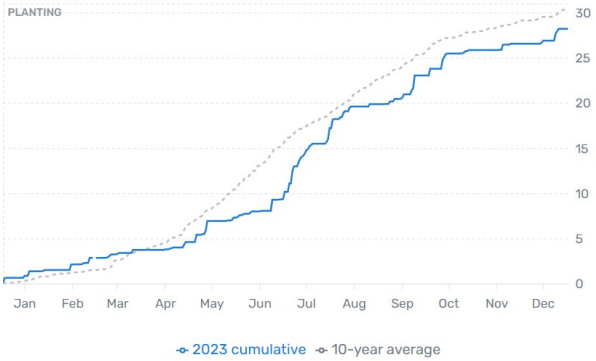
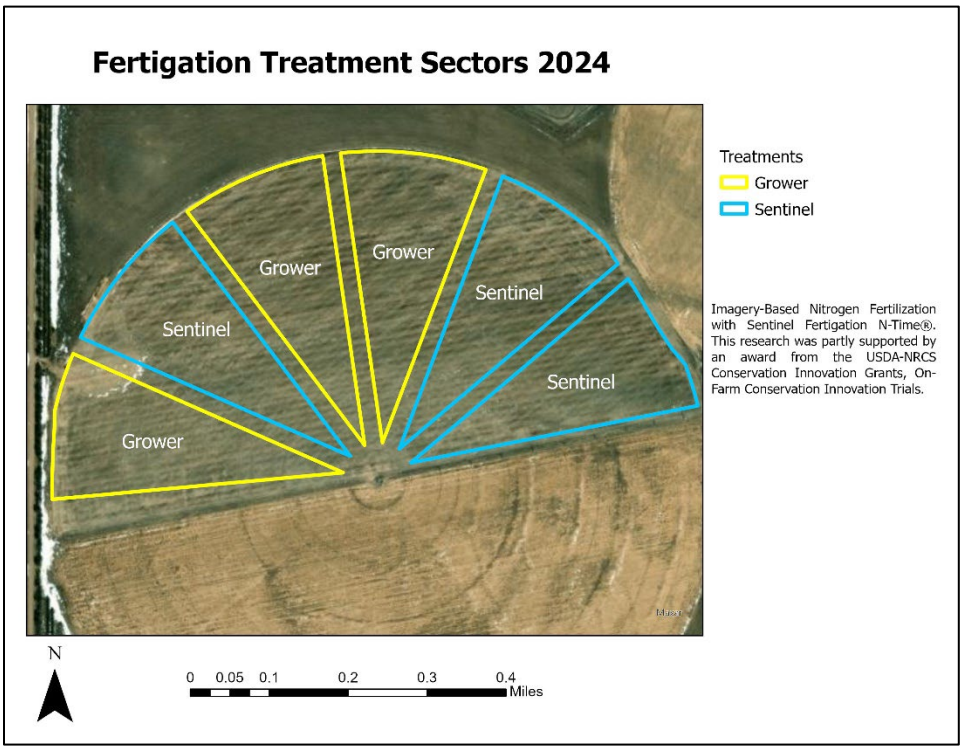
Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

Study ID: 1555105202401
County: Kimball
Soil Type: Sandy loam
Planting Date: 4/30/24
Harvest Date: 10/11/24
Seeding Rate: 32,600
Row Spacing (in): 30”
Hybrid: Channel® 192-10STX, 186-02STX, Beck’s® 4362SX
Reps: 3
Previous Crop: Corn
Tillage: No-till
Herbicides: ***Pre:*** 24 oz/ac RT3® + 4 oz mesotrione + 3 oz FBN Even® L ***Post:*** 8 oz/ac DiFlexx® + 2 oz/ac FBN Even® L + 64 oz/ac Statera® Green Acre + 8 oz/ac boron + 8 oz/ac React® Mn + 28 oz/ac glyphosate applied 6/17/24
Seed Treatment: 80/20 graphite

Foliar Insecticides: None
Foliar Fungicides: None
Fertilizer: 1 oz/ac molasses, 160 oz/ac Hydra-hume, and 3.5 gal/ac in furrow compost tea on 4/30/24
Irrigation: Pivot, 9”
Rainfall (in):



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 May 7, 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 three paired sectors of each treatment (each sector was about 12 acres, buffered 60 feet internally to reduce sprinkler package overlap between sectors); the field trial layout is shown above.

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 July 12, 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 three replications triggered an application of 30 lb N/ac, a value of 10 lb N/ac is reported as the average treatment N application across reps.

	5/7	7/12	7/18	7/29	8/19	Total N Applied
Treatment	----------*lb N/ac applied*----------					
Grower N Management	45.2[a]	50[b]	30[b]	25[b]	-	**150.2**
Sentinel Fertigation N-Time®	45.2 [a]	60[b]	44[b]	13.3[b]	20[b]	**182.5**

[a] Product used was 27-0-0-5+Mol+Hume via indicator block establishment application

[b] Product used was 28-0-0-5 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	150.2	13.0 A*	144.4 A	53.8 B	1.04 A	553 A
Sentinel Fertigation N-Time®	183	13.5 A	149.1 A	45.7 A	1.23 B	557 A
P-Value	N/A	0.312	0.344	0.01	0.01	0.842

*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.

Summary:

- There were no significant differences in moisture, yield, or marginal net return.
- The Sentinel Fertigation N-Time® management system applied 32.8 lb N/ac more nitrogen during the growing season.
- There were significant differences in partial factor productivity and lbs N/bu of grain.
- Sentinel Fertigation N-Time® reduced Partial Factor Productivity (PFP) by 15.1% and nitrogen use efficiency (NUE) by 15.4% compared to Grower N Management.

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