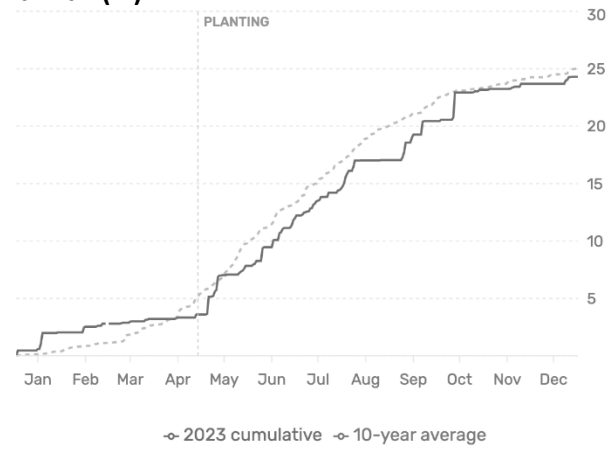
Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

Study ID: 0709047202305
County: Dawson
Soil Type: Cozad silt loam; Cozad silty clay loam; Hall silt loam; Rusco silt loam
Planting Date: 5/2/23
Harvest Date: 11/3/23
Seeding Rate: 33,000
Row Spacing (in): 30
Hybrid: Channel® 210-46STXRIB
Reps: 5
Previous Crop: Wheat
Tillage: Strip-till
Herbicides: ***Pre:*** 1.25 qt/ac Harness Xtra® 5.6, 22 oz/ac Roundup PowerMAX® 3, 8 oz/ac dicamba, and 12.8 oz/ac Padlock®Plus on 5/4/23 ***Post:*** 1.5 qt/ac Harness Xtra®, 22 oz/ac Roundup PowerMAX® 3, 3 oz/ac mesotrione, 3 oz/ac Stinger®, and 5 oz/ac Status® on 6/5/23
Seed Treatment: None
Foliar Insecticides: None
Foliar Fungicides: None
Fertilizer: 25 gal/ac 32% UAN, 5 gal/ac 12-0-0-26S, 12 gal/ac 10-34-0, and 0.25 gal/ac zinc on 4/25/23, LiftOff® 3 gal/ac (8-27-4-1.2S-0.19Zn) on 5/2/23
Irrigation: Pivot, Total: 9"
Rainfall (in):

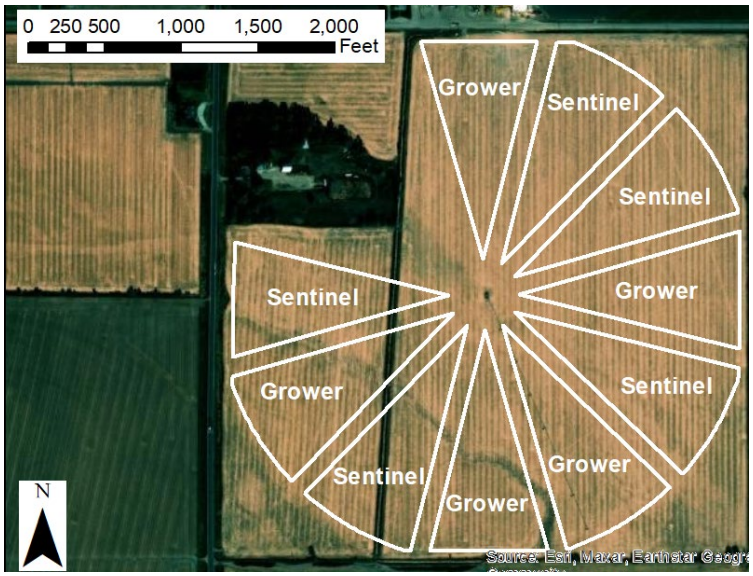


Baseline Soil Samples 0-6" (April 2023):

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
7.2	6.5	13.2	8	51.7	529	2127	373	73	15.4
5.4	3.5	25.8	20	77.2	411	1332	352	108	14.3
6.3	4.4	14.2	20	50.5	550	2193	388	78	16.7

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 4/24/23 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 five paired sectors of each treatment (each sector was about 13 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 5/1/23 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.

	4/24	5/1	7/5	7/14	7/31	Total N Applied
Treatment	----------*lb N/ac applied*----------					
Grower N Management	109 [a]	35[b]	29[c]	29 [c]	33 [c]	**219.7**
Sentinel Fertigation N-Time®	109 [a]	35[b]	-	-	-	**205.7**

[a] Product used was 23-10-0-3 S + Zn via ground rig

[b] Product used was 32-0-0 UAN via burndown ground rig

[c] Product used was 90% 32% UAN/10% thiosulfate

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	235	14.9 A*	251 A	60 B	0.94 A	1,109 A
Sentinel Fertigation N-Time®	144	15.0 A	249 A	97 A	0.58 B	1,154 A
P-Value	N/A	0.702	0.702	<0.0001	0.0002	0.196

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

Summary: The Sentinel Fertigation N-Time® management system called for no additional N applications during the growing season, which resulted in a 91 lb N/ac reduction with no difference in yield. Sentinel fertigation N-Time® increased N use efficiency by 61%. There was no significant difference in marginal net return.

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