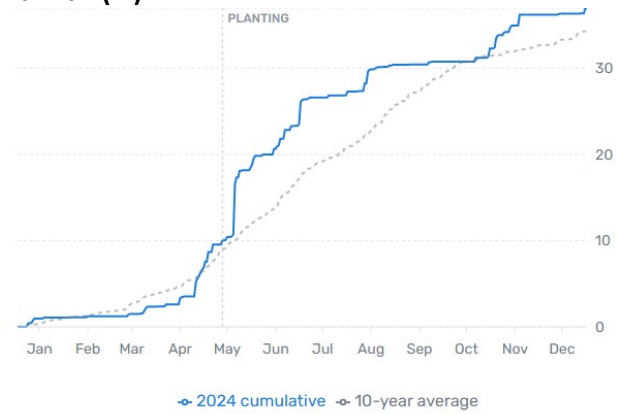
Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

Study ID: 1547-155-2024-01
County: Saunders
Soil Type: Yutan silty clay loam, Tomek silt loam, Pohocco-Pahuk complex
Planting Date: 5/12/24
Harvest Date: 10/21/24
Seeding Rate: 33,000
Row Spacing (in): 30
Hybrid: Pioneer® P1742Q, DEKALB® DKC70-27RIB, Channel® C217-01STXRIB
Reps: 3
Previous Crop: Corn
Tillage: Strip-Till
Herbicides: ***Pre:*** 3 oz/ac Balance® Flexx + 57.6 oz/ac Harness® Xtra + 6 oz/ac generic dicamba, 36 oz/ac Roundup PowerMAX®, and crop oil ***Post:*** 10 oz/ac DiFlexx®, 8 oz/ac atrazine, 2.5 oz/ac Anthem® Maxx, 3.5 oz/ac Callisto®, and 36 oz/ac Roundup PowerMAX®

Seed Treatment: My Yield® PRYME CRN
Foliar Insecticides: 6.6 oz/ac bifenthrin on 7/18
Foliar Fungicides: 8 oz/ac Adastrio® on 7/18
Irrigation: Pivot
Rainfall (in):

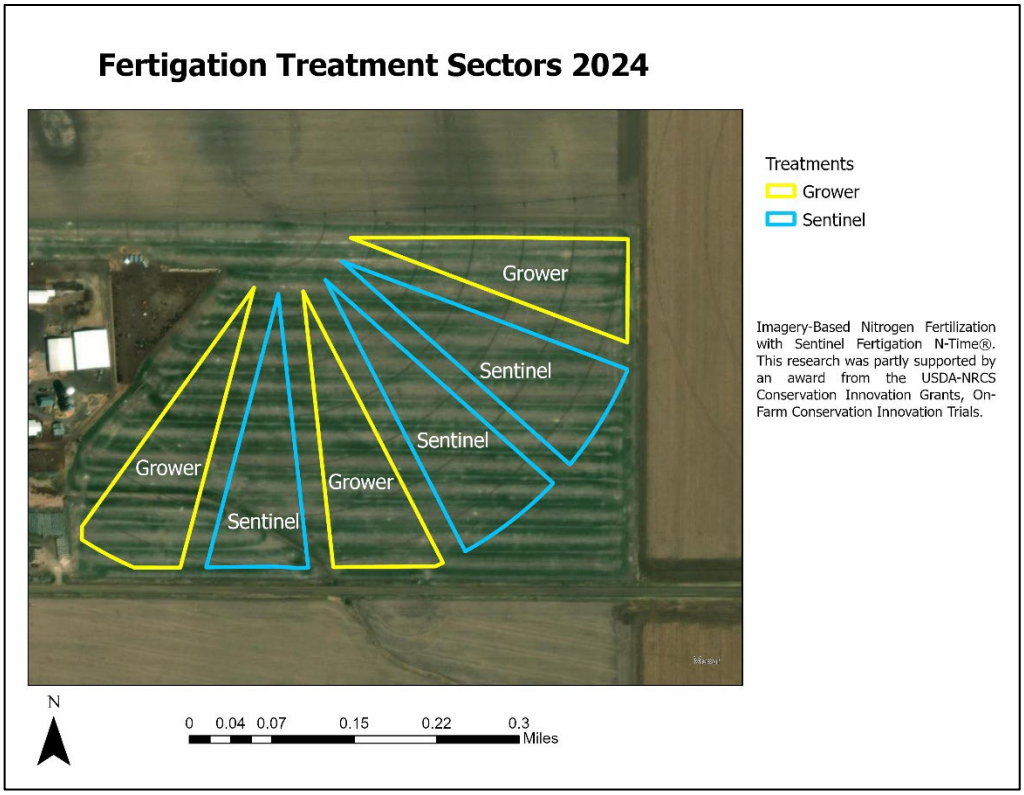


Post Season Average Soil Samples 0-8" (November 2024):

	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	7.2	3.8	13.0	35	14.3	397	2304	310	20	15.2
Grower	7.4	4.1	19.7	60	15.0	425	2395	326	22	15.9

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 June 6, 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 4.5 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 June 24, 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.

	6/6	6/24	7/5	Total N Applied
Treatment	----------*lb N/ac applied*----------			
Grower N Management	51.8 [a]	30[b]	30[b]	**111.8**
Sentinel Fertigation N-Time®	51.8 [a]	20[b]	20[b]	**91.8**

[a] Product used was 80% 32-0-0 + 20% ATS + Water + Boron + Molasses via indicator block Rx

[b] Product used was NitroMag®+32-0-0 UAN 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	111.8	16.4 A*	262 A	131.1 A	0.43 A	1,083 A
Sentinel Fertigation N-Time®	91.8	16.5 A	258 A	157.5 A	0.35 A	1,078 A
P-Value	N/A	0.706	0.794	0.372	0.652	0.938

*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.

Summary:

- There were no significant differences for moisture, yield, partial factor productivity, lbs N/bu grain, or marginal net return between treatments.
- The Sentinel Fertigation N-Time® management system called for a 20 lb N/ac reduction in N applications during the growing season.
- Note the very low NUE values for both the grower management and Sentinel Fertigation N-Time® management in this study.

This research was partly supported by an award from the USDA-NRCS Conservation Innovation Grants, On-Farm Conservation Innovation Trials, award number NR203A750013G014.