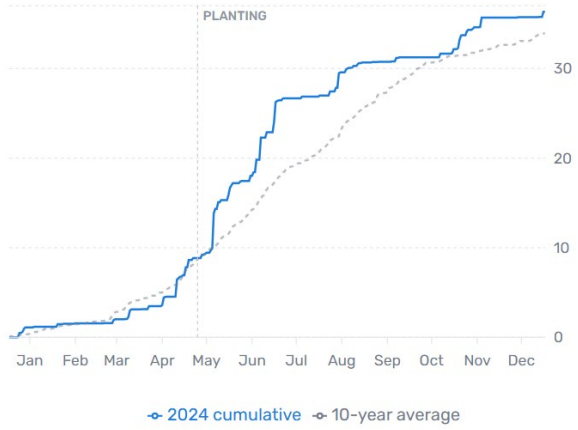
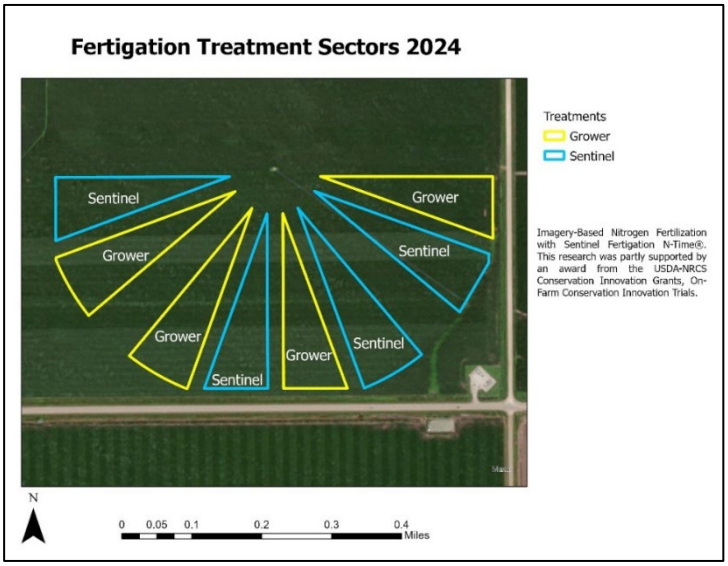
Imagery-Based Nitrogen Fertilization with Sentinel Fertigation N-Time®

Study ID:
County: Butler
Soil Type: Muir Silt loam
Planting Date: 5/9/24
Harvest Date: 10/24/24
Seeding Rate: 34,000
Row Spacing (in): 30
Hybrid: Dekalb® DKC6289
Reps: 4
Previous Crop: Soybeans
Tillage: Ridge till/Strip till
Herbicides: ***Pre:*** Harness Extra® Balance flex®
Foliar Insecticides: none
Foliar Fungicides: Veltyma®
Fertilizer: Varied
Irrigation: 6”

Irrigation well nitrate (ppm): 10.4”
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 7/11/23 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 four paired sectors of each treatment (each sector was about 4 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 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 7/29/24 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.

	7/11	7/29			Total N Applied
Treatment	----------*lb N/ac applied*----------				
Grower N Management	100 [a]	30[b]	23.2[c]	- -	**153.2**
Sentinel Fertigation N-Time®	100 [a]	30[b]	-	- -	**130**

[a] Product used unknown

[b] Product used was 90% 32 / 10% Thio via Indicator block establishment

[c] Product used was 90% 32 / 10% Thio 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	153.2	13.8 A*	240.5 A	88 B	0.64 A	970 A
Sentinel Fertigation N-Time®	130	13.8 A	237 A	102 A	0.55 B	966 A
P-Value	N/A	0.87	0.37	<0.0001	<0.0001	0.81

*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: The Sentinel Fertigation N-Time® management system reduced total N applications by 23.2 lb N/ac compared to Grower N Management, resulting in no significant difference in yield or marginal net return. Sentinel Fertigation N-Time® increased Partial Factor Productivity (PFP) by 15.9% and reduced nitrogen use per bushes by 14.1% compared to Grower N Management. Resulting in significant diffrence in NUE and PFP.

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