

# Evaluating Adapt-N and Sensor-based In-season N Management on Irrigated Corn

**Study ID:** 1231079202201

**County:** Lincoln

**Soil Type:** Hersh fine sandy loam 3-6% slopes; Hersh-Valentine soils 6-11% slopes; Anselmo fine sandy loam 1-3% slope; Hord fine sandy loam 1-3% slope

**Planting Date:** 5/16/22

**Harvest Date:** 10/24/22, 10/31/22, 11/1/22

**Seeding Rate:** 31,500

**Row Spacing (in):** 30

**Hybrid:** Pioneer® P0622AM®

**Reps:** 4

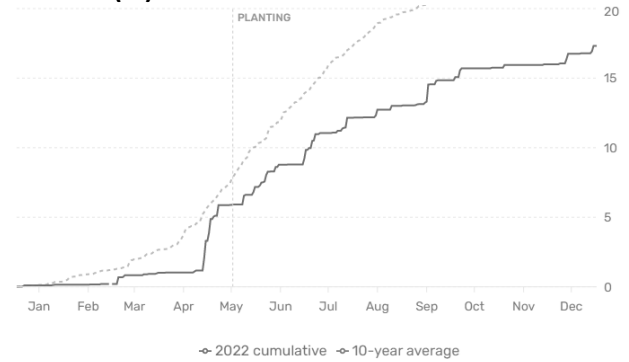
**Previous Crop:** Corn

**Tillage:** Unknown

**Seed Treatment:** AML

**Irrigation:** Pivot, Total: 14.57"

**Rainfall (in):**



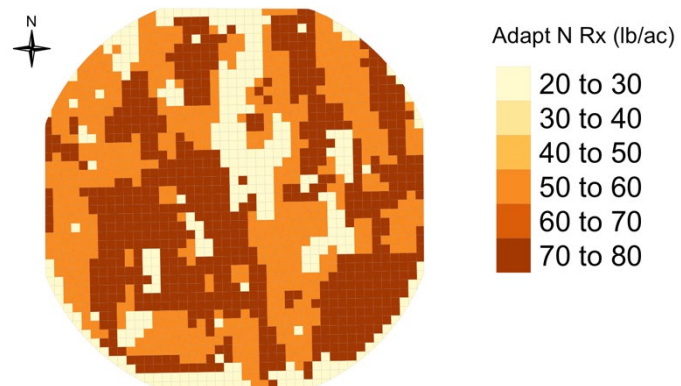
## Baseline Soil Samples, 0-6" (5/17/2022):

	OM LOI		Melich-III	Nitrate – N	Bray P1	Sulfate-S	-----Melich III-----				CEC	Sand	Silt	Clay	
	pH	BpH	%	P ppm	ppm N	ppm	ppm S	K	Ca	Mg	Na	me/100g	(%)	(%)	(%)
Zone 1	6.3	6.8	0.9	42	6.5	32	12	118	755	110	17	5.7	94	5	1
Zone 2	5.8	6.7	2.2	36	8.8	27	11	348	1348	204	18	11.6	68	21	11
Zone 3	6.1	6.8	1.5	64	7.2	49	9	146	794	108	13	6.2	90	9	1
Zone 4	5.4	6.7	1.4	100	4.4	76	11	148	699	59	14	6.2	84	15	1
Zone 5	5.6	6.8	1.1	140	6.2	106	17	153	640	49	18	5.4	96	3	1

**Introduction:** Nitrogen fertilizer is a significant input in corn systems. Additionally, N losses through leaching, volatilization, and denitrification pose environmental concerns and reduce profit. There are a number of digital agriculture tools available to provide site-specific, variable-rate, in-season N recommendations. This study evaluated two tools: 1) a crop canopy sensor-based N recommendation using the Trimble® GreenSeeker®; and 2) a crop model-based N tool, Adapt-N by Yara North America Inc. The tools were compared to the grower’s traditional N management.

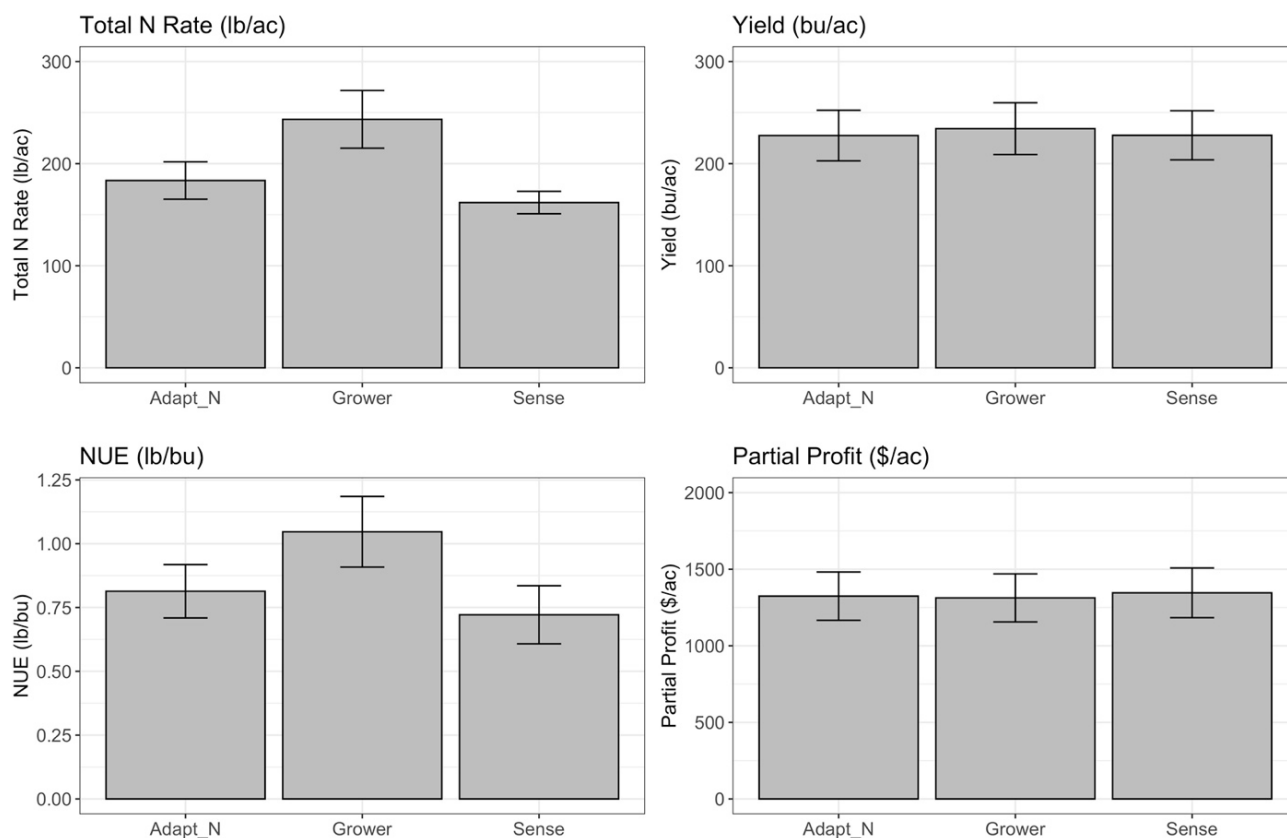
All treatments received the following applications: 1) 1 ton/ac chicken litter (23.3 lb N/ac) applied in fall. 2) 40 lb N/ac as 32% UAN applied with planter on 5/16/22. 3) 20 lb N/ac as 32% UAN fertigated on 6/17/22. 4) 30 lb N/ac as 32% UAN on 6/28/22. 5) 7 lb N/ac thiosulfate fertigated on 7/26/22.

On July 15, 2022, a 32% UAN and molasses blend was applied via Y-drop. The grower’s average rate applied 121 lb N/ac, sensor treatment received an average of 42 lb N/ac, and Adapt-N average rate was 63 lb N/ac (Figure 1).



**Figure 1.** Adapt-N model variable-rate prescription.

## Results and Summary:



**Figure 2.** Total N rate, yield, nitrogen use efficiency (NUE), and partial profit for Adapt-N, grower's traditional management, and sensor-based N management.

	Total N rate (lb/ac)	Yield (bu/ac) <sup>†</sup>	Nitrogen Efficiency (lb N/bu grain)	Partial Profit <sup>‡</sup> (\$/ac)
Grower N Management	241 A	232 A	1.10 A	1301 B
Sense N Management	162 B	228 A	0.72 C	1349 A
Adapt-N Management	183 C	226 A	0.82 B	1318 AB
P-Value	<0.001	0.12	<0.001	0.04

\*Values with the same letter are not significantly different at a 90% confidence level.

<sup>†</sup>Yield values are from cleaned yield monitor data. Bushels per acre corrected to 15.5% moisture.

<sup>‡</sup>Marginal net return based on \$6.57/bu corn and \$0.93/lb N fertilizer.

- The total N rate for the grower's traditional management was higher than OptRx<sup>®</sup> sensor-based N management and Adapt-N recommendation (Figure 2). The OptRx<sup>®</sup> sensor-based N and Adapt-N model used significantly less N (79 and 58 lb N/ac, respectively) than the grower's traditional management.
- Yield was not statistically different between the three treatments evaluated (Figure 2).
- Profitability was \$48/ac higher for the OptRx<sup>®</sup> sensor-based N management compared to the grower's traditional management.
- The Adapt-N and sensor-based N management resulted in improved nitrogen use efficiency compared to the grower's traditional management. Nitrogen use efficiency was good for both sensor- and model-based N management, with all approaches averaging below the traditional 1.2 lb of N per bushel of grain assumed for yield-based N recommendations.

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