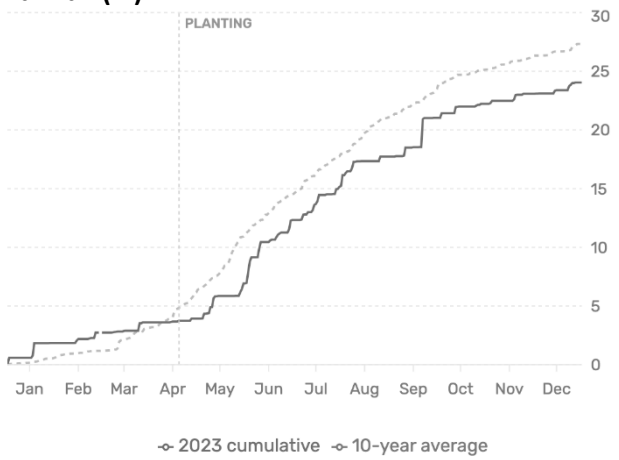
Evaluating Adapt-N In-Season N Management on Irrigated Corn

Study ID: 1121019202302
County: Buffalo
Soil Type: Hord silt loam; Hall silt loam
Planting Date: 4/19/23
Harvest Date: 10/27-28/23
Seeding Rate: 35,000 seeds/acre
Row Spacing (in): 30
Hybrid: Dekalb® 63-91 VT2PRIB
Reps: 8
Previous Crop: Soybean
Tillage: Strip-till (center section of the field strip till only, east and west edges ridged for gravity irrigation)
Herbicides: ***Pre:*** 2 qt/ac Fultime®, 3 oz/ac Explorer®, 1 pt/ac MSO, and 8.5 lb AMS/100 gal
Post: 2 qt/ac Degree Xtra®, 2 oz/ac mesotrione, 1% COC, and 1% UAN
Seed Treatment: Standard Channel® seed treatment

Foliar Insecticides: None
Foliar Fungicides: 10 oz/ac Propaz chemigated at R1
Irrigation: Pivot
Rainfall (in):



Soil Samples 0-6" (Nitrate: 4/20/2023)

	pH	BpH	OM LOI %	Melich III P - ppm	Nitrate – N ppm N	Sulfate -S ppm S	-------Melich III------- K	Ca	Mg	Na	CEC me/100g	Sand (%)	Silt (%)	Clay (%)
Zone 1	6.8	7.2	3.1	64	41.4	4.5	575	2205	306	25	15.2	27	52	21
Zone 2	6.9	7.2	3.6	63	26.4	5.4	509	2087	277	25	14.2	27	50	23
Zone 3	6.9	7.2	3.0	55	19.9	6.9	498	2108	296	27	14.4	29	52	19

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 several digital agriculture tools available to provide site-specific, variable-rate, in-season N recommendations. This study utilized Adapt-N from Yara International, a crop model-based N tool for in-season N application and compared it to the grower's typical N management (Figure 1). The whole field received a variable-rate application of 10-34-0 through strip till, 4 gal/ac 10-34-0 applied in-furrow at planting, and 12 gal/ac 28% UAN dribbled at planting for a total of 41 lb N/ac. On May 27, 32% UAN was injected via coulter rig. The grower's average rate was 71 lb N/ac and the Adapt-N average rate was 122 lb N/ac. Nitrogen rate blocks were also established at rates ranging from 41 to 166 lb N/ac for use in determining the economically optimum N rate (EONR).

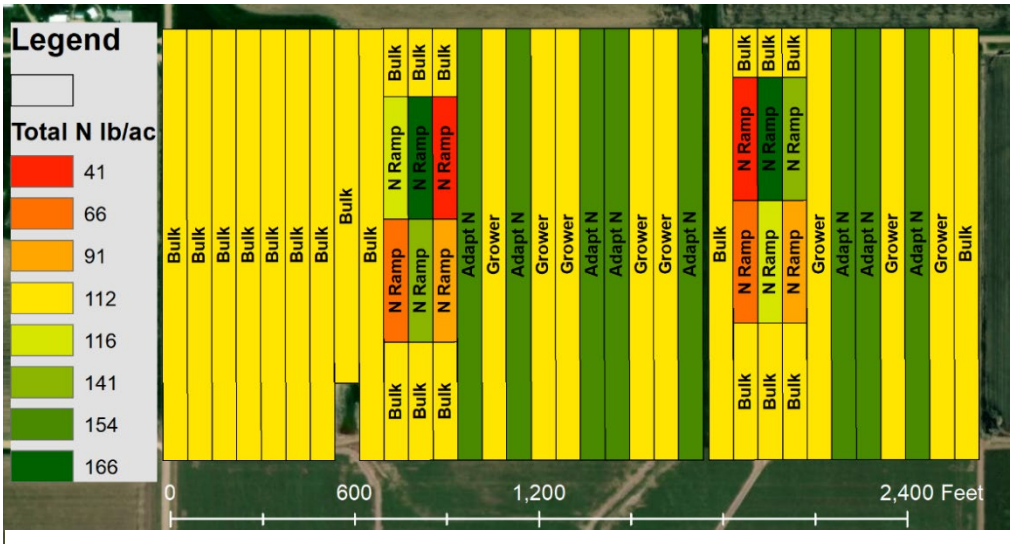


Figure 1. Treatment layout with Grower, Adapt-N, and N rate blocks (N Ramp.)

Results:

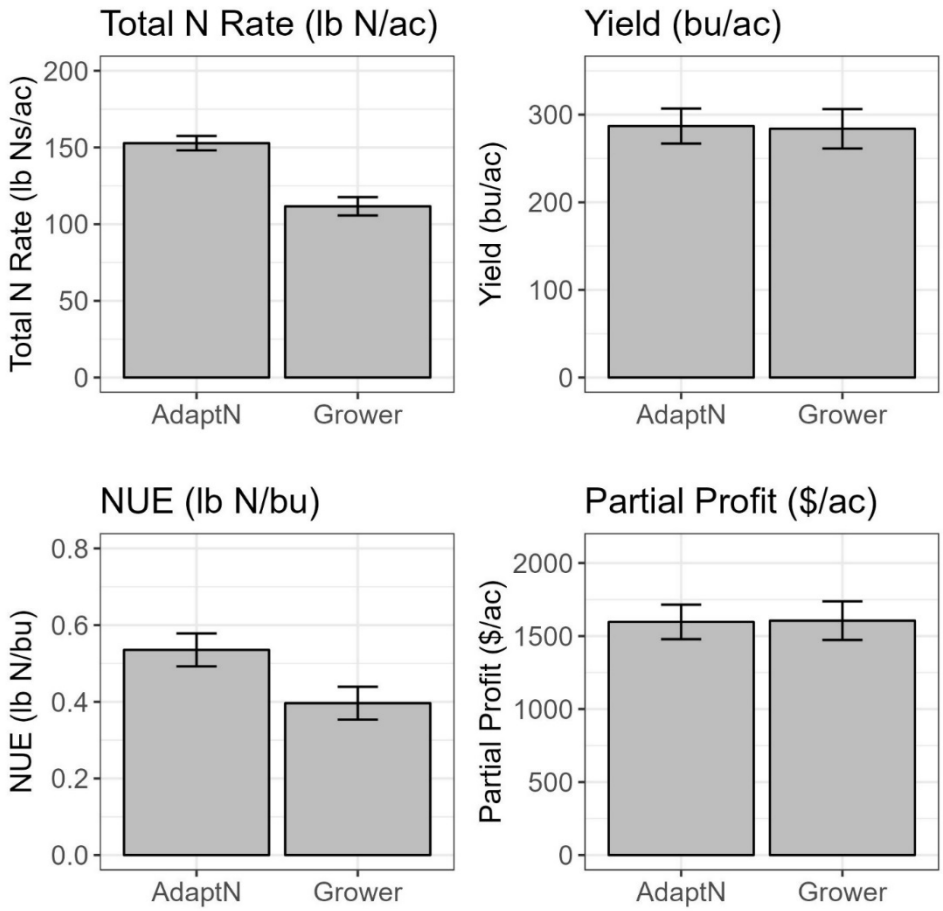


Figure 2. Total N rate, yield, nitrogen use efficiency (NUE), and partial profit for Adapt-N model and the grower's traditional management.

	Total N rate (lb/ac)	Yield (bu/ac)†	Nitrogen Efficiency (lb N/bu grain)	Marginal Net Return‡ ($/ac)
Grower N Management	112 B	284 A	0.393 B	1,604 A
Adapt-N Management	153 A*	287 A	0.533 A	1,598 A
P-Value	<0.0001	0.315	<0.0001	0.773

*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 corrected to 15.5% moisture.
‡Marginal net return based on $5.91/bu corn and $0.65/lb N.

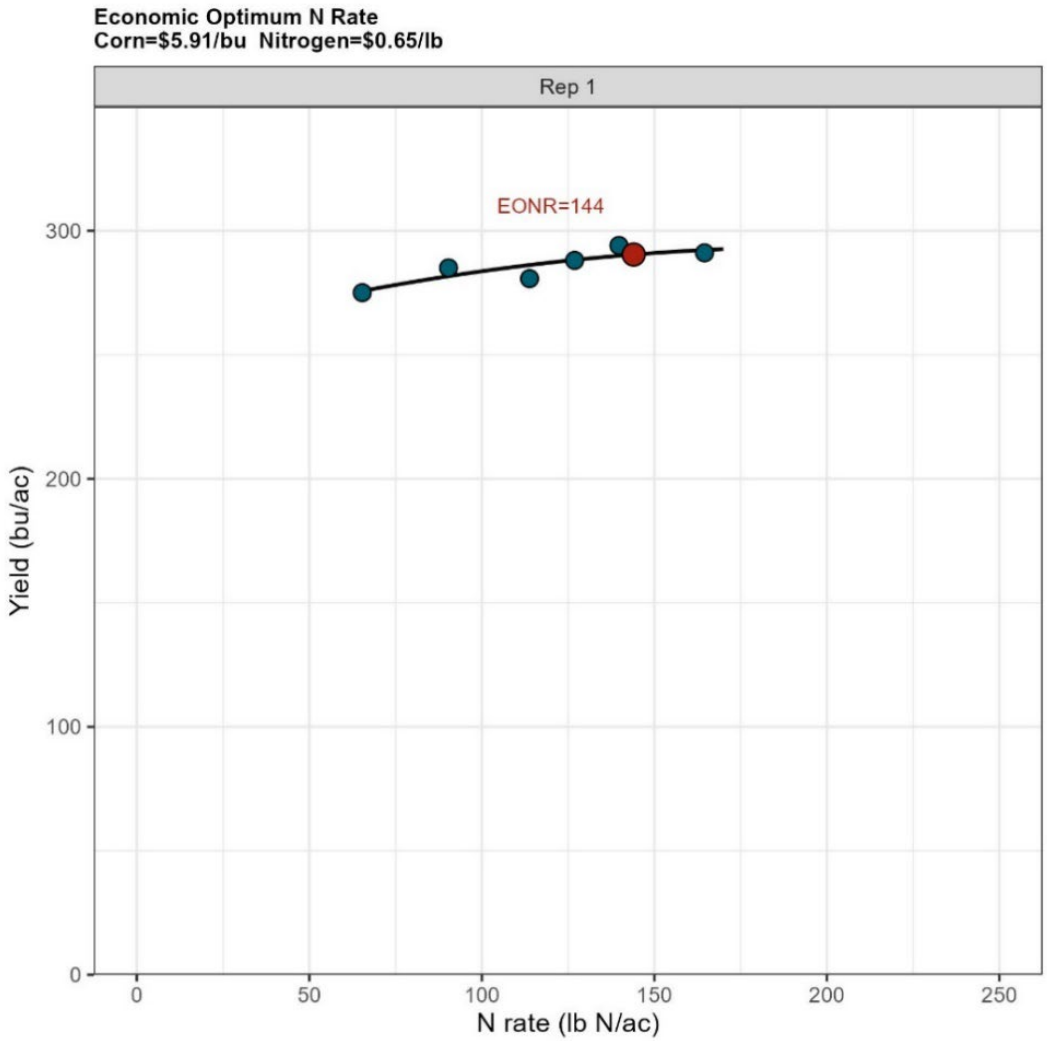


Figure 3. Economically optimum nitrogen rate for Rep 1 calculated using $5.91/bu corn and $0.65/lb N.

Summary:

- The total N rate for the Adapt-N management was 41 lb/ac higher than the grower's traditional management and did not result in a yield increase.
- There was no difference in marginal net return between the grower's traditional management and the Adapt-N management.
- The EONR for one replication was 144 lb N/ac, which was greater than the grower's typical N management. EONR was not able to be calculated for the second replication due to variability in the yield response.
- For reference, the University of Nebraska-Lincoln N recommendation for corn for this field was 163 lb N/ac with a 280 bu/ac yield goal. This was 19 lb N/ac higher than the rate that was found to maximize yields in this study.

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