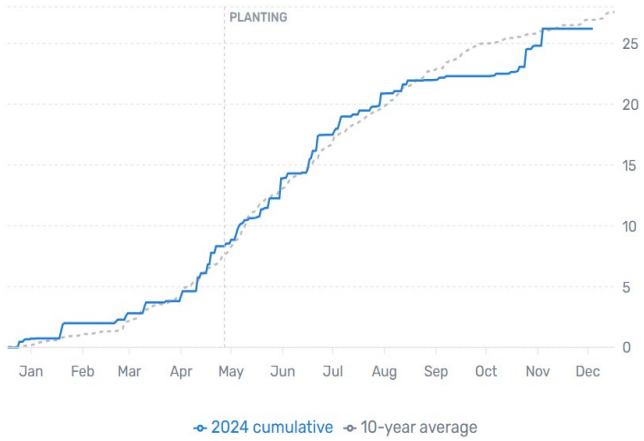
Evaluating Nitrogen Rates in Corn

Study ID: 1532159202401
County: Kearney
Soil Type: Holdrege silt loam, 0-1% slopes
Planting Date: 4/24/24
Harvest Date: 10/20/24
Population: Unknown
Row Spacing (in): 30”
Hybrid: Pioneer® 1170AM
Reps: 4
Previous Crop: Soybean
Tillage: No-till
Herbicides: ***Pre:*** 2.5 oz/ac Anthem Maxx®, 12 oz/ac dicamba, 20 oz/ac Roundup PowerMAX® 3, 1% v/v COC, and 17 lb/100lb AMS.
Post: 1.5 pt/ac Dual Magnum®, 12 oz/ac DiFlexx®, 3 oz/ac mesotrione, and 20 oz/ac Roundup PowerMAX® 3.
Foliar Insecticides: 3 oz/ac bifenthrin applied in-furrow

Fertilizer: 120 lb N/ac as anhydrous ammonia with inhibitor and 14 gal/ac 10-34-0 applied in the fall. 3 gal/ac 10-34-0 applied in-furrow at planting.
Irrigation: Pivot
Rainfall (in):



Introduction: This study evaluated the impact of different nitrogen rates at sidedress. The farmer’s typical sidedress rate is 23 gal/ac, resulting in a total of 220 lb N/ac.

1) Total rate of 149 lb N/ac

2) Total rate of 177 lb N/ac

3) Total rate of 204 lb N/ac

3) Total rate of 231 lb N/ac

Agronomical optimal N rate (AONR) and Economical Optimal N Rate (EONR) were calculated to find N rate values for the data.

Baseline Soil Samples 0-8” (October 2023):

pH	OM LOI %	Nitrate–N ppm N	Mehlich 3 ppm P	K ppm	Mg ppm	Na ppm
7.6	2.6	5.1	85	11.7	294	35
7.2	2.7	3.4	25	9.4	194	38
7.2	2.5	3.0	19	13.3	195	42
7.2	2.4	2.5	14	11.4	241	44
7.2	2.6	3.9	12	11.1	245	42
6.9	2.8	2.8	43	25.0	285	47

Results:

	Stand Counts (plants/acre)	Moisture (%)	Yield (bu/ac)†	PFP of N (lb grain/lb N)	lbs N/bu grain	Marginal Net Return‡ ($/ac)
149 lb N/ac	30,500 A*	12.2 A	252 AB	97.8 A	0.57 D	1,067 A
177 lb N/ac	28,375 A	12.3 A	248 B	81.4 B	0.69 C	1,040 A
204 lb N/ac	29,500 A	12.3 A	254 AB	73.6 C	0.76 B	1,055 A
231 lb N/ac	28,500 A	12.2 A	256 A	64.1 D	0.87 A	1,049 A
P-Value	0.08	0.55	0.06	<0.001	<0.001	0.26

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $4.35/bu corn, 149 lb N/ac cost of $68.54, 177 lb N/ac cost of $81.42, 204 lb N/ac cost of $93.84, and 231 lbs N/ac cost of $106.26.

Summary:

- There were no significant differences in stand count or marginal net return between treatments.
- There was a significant difference in yield, although applying 149, 204 or 231 lb N/ac yielded the same in this study.
- The calculated AONR (181 lb N/ac) and EONR (211 lb N/ac) were lower than the grower's standard treatment (220 lb N/ac).
- This study shows there is room to fine-tune the N rate to optimize productivity and potentially reduce the environmental impact of N in the agriculture system.