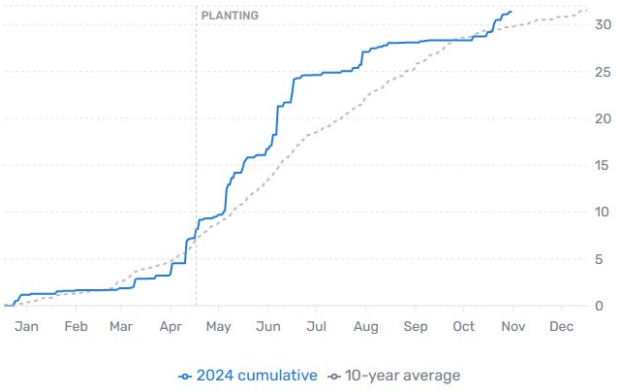
Evaluating Nitrogen Rates in Corn

Study ID: 0085141202403
County: Platte
Soil Type: Grigston silt loam
Planting Date: 5/01/24
Harvest Date: 9/27/24
Population: 35,000
Row Spacing (in): 30”
Hybrid: DEKBALB® DKC103-07
Reps: 5
Previous Crop: Corn
Tillage: Ridge-Till
Herbicides: ***Pre:*** PRE: 2 qt/ac Degree Xtra® + 3 oz Balance Flex® + 6 oz Sterling Blue + 28 oz Roundup PowerMAX®
Seed Treatment: Acceleron®
Foliar Insecticides: None
Foliar Fungicides: None

Fertilizer: Pre plant: 55 lb N/ac (3-18-24) Planting: 5 gal (6-24-6-1ZN) with 16 oz of micronutrients in furrow + 8 gal 32% + 2 gal ATS dribbled on top of furrow
Irrigation: Gravity
Rainfall (in):



Introduction: This study evaluated the impact of reduced N rates applied at sidedress. Prior to in-season N application, all treatments received 55 lb N/ac as urea (March 18) and 30 lb N/ac at planting (June 6). The total N applied before sidedress was 85 lb N/ac. Three treatments were established with the sidedress application on May 27.

Soil samples were collected at 0-1' and 1-2' and soil N and organic matter content were assessed. Total N credit was used to calculate the total N applied using the UNL N recommendation calculator. The numbers are given in the tables below.

Figure 1: Soil test results and N credits

Soil OM | OM N Credit	Irrigation Water N Credit	Soil N Credit	Soybean N Credit	Total N Credit	Yield Goal	UNL N Requirement
% | N lbs/ac	N lbs/ac	N lbs/ac	N lbs/ac	N lbs/ac	bu/ac	N lbs/ac
3.1 | 111.7	3	15	40	169.6	275	365

Figure 2: UNL suggested N and treatment application rates

UNL suggested N application	Applied N pre plant	Applied N at planting	Required N at sidedress application	Treatment 1	Treatment 2	Treatment 3
N lbs/ac	N lbs/ac	N lbs/ac	N lbs/ac	N lb/ac	bu/ac	N lb/ac
195.4	55	30	110.4	145	165	185

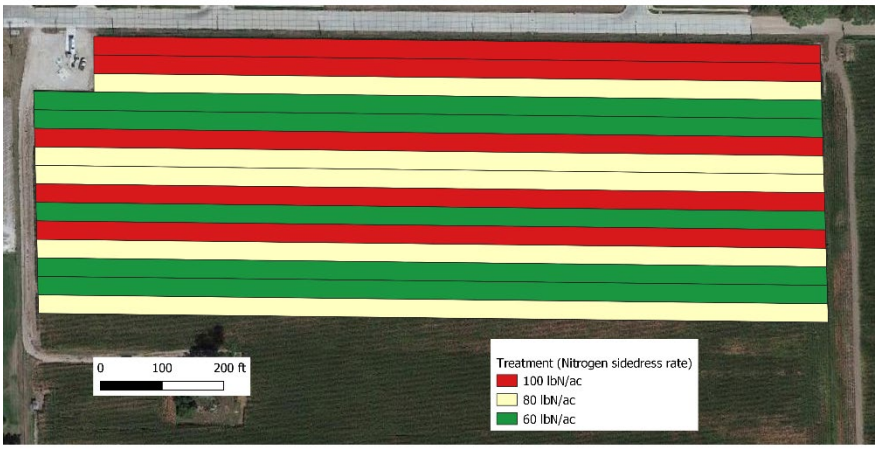


Figure 3: Project Design and Treatment Layout

Results:

Treatment	Moisture (%)	Yield (bu/ac)†	Partial factor productivity lb grain/lb N	lb N/bu	Marginal Net Return‡ ($/ac)
145 lbs N (60 lb N/ac)	19.1 A*	270 A	88.5 A	0.63 C	1,143 A
165 lbs N (80 lb N/ac)	19.3 A	269 A	77.5 B	0.72 B	1,128 A
185 lbs N (100 lb N/ac)	19.1 A	270 A	69.6 C	0.80 A	1,125 A
P-value:	0.60	0.88	<0.001	<0.001	0.39

*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, $30.6/ac 60 lb N/ac sidedress, $40.8/ac 80 lb N/ac sidedress, $51.0/ac 100 lb N/ac sidedress.

Summary:

- There were no significant differences for moisture, yield, or marginal net return between the treatments. Applying 145, 165, or 185 lb N /ac produced the same yield.
- Each unit of N applied in the first treatment produced more grain compared with each unit of treatment 2 and 3. The requirement of N per bushel of corn was reduced from 0.68 to 0.54 compared treatment 3 and 1 respectively.
- The findings also suggest that using the lowest amount of N lb/ac (145 lb) was appropriate for this field during 2024. Further testing should be conducted to determine the optimal N rate over years.