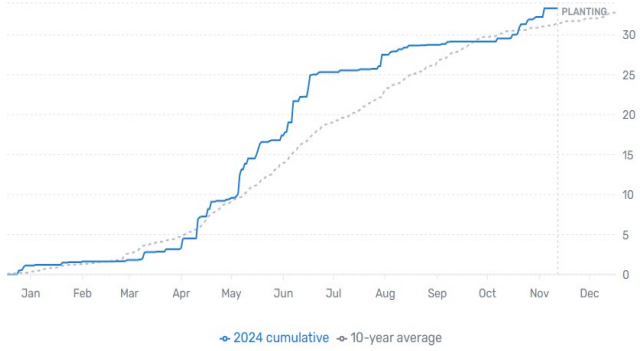
Replacement of Sprinkler Package of a Center Pivot

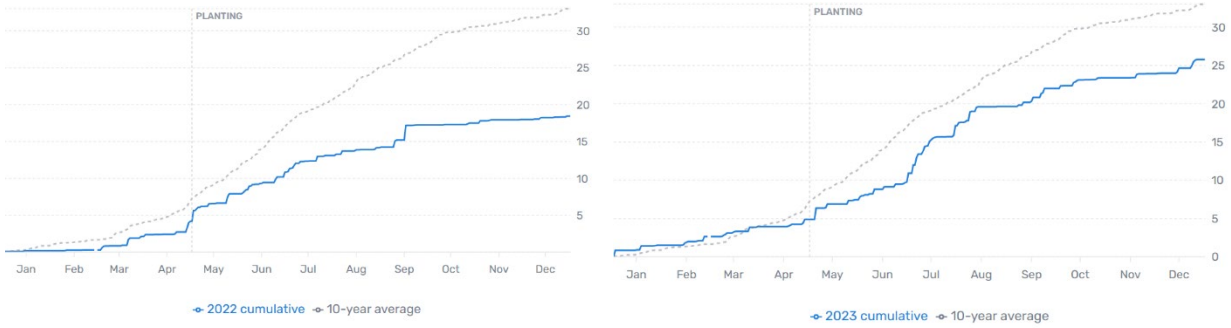
Study ID: 0085141202404
County: Platte
Soil Type: Boel loamy fine sand; 0-2% slopes
Planting Date: 5/13/24
Harvest Date: 9/27/24
Population: 34,000
Row Spacing (in): 30
Hybrid: DEKALB® DKC 63-90, 108-64
Reps: 4
Previous Crop: Soybean
Tillage: No-till
Herbicides: ***Pre:*** 64 oz/ac Degree Xtra® + 3 oz/ac Balance Flex® + 6 oz/ac Sterling Blue®+ 28 oz/ac Roundup PowerMAX® ***Post:*** 24 oz/ac glyphosate + 12 oz/ac DiFlexx®. 43 oz/ac Liberty®
Seed Treatment: Acceleron®
Foliar Insecticides: None
Foliar Fungicides: Delaro® 4 oz/ac
Fertilizer: Preplant: 225 lb Poly4; Planting: 5 gal (6-24-6-1ZN) with 1 pt of micronutrients in furrow, 8 gal of 32%-0-0 + 2 gal ATS dribbled on top; Sidedress: 30 gal 90/10 mix of 32% UAN and ATS
Note: Cereal rye was planted following the previous harvest on 10/20/23 at 50 lb/ac and was chemically terminated before 2024 planting
Irrigation: Pivot
Rainfall (2024) (in):



Introduction: This study evaluated the impact of a sprinkler package replacement on the third pivot span on crop yield. In this particular center pivot, the grower noticed lower than expected yield values when looking at the yield monitor data for the past two years. The issues were mainly found in spans 1-3, with the last two spans (4 and 5) presenting no issues.

All the sprinklers on the third span were replaced on July 24 just before the first irrigation on the same date. All pivot plugs were replaced with a set of Komet Precision Regulator Komet KPR-X® at 10 psi and a Komet KPT-Peak® Precision Twister Sprinkler. Yield averages from the past two growing seasons (2022 and 2023) were compared with the 2024 growing season for the treatments assigned below:
Treatment 1 (Check) – Span 1-2, original sprinklers, bad spot (red)
Treatment 2 – Span 3, new sprinklers replaced in 2024 (yellow)
Treatment 3 – Span 4-5, original sprinklers, good spot (green)

Figure 1: Project Design and Layout



Figures 2: Rainfall amounts in 2022 (left) and 2023 (right).

Results:

	2022 yield (Corn)(bu/ac)	2022 Marginal Net Return ‡ ($/ac)	2023 yield (soybean) (bu/ac)	2023 Marginal Net Return ‡ ($/ac)	2024 yield (Corn)(bu /ac)	2024 Marginal Net Return ‡ ($/ac)
Treatment 3 (span 4-5)	228 A*	999 A	83 A	912 A	241 A	1,407 A
Treatment 2 (span 3)	183 C	799 C	75 B	828 B	239 A	1,036 A
Treatment 1 (span 1-2)	195 B	849 B	76 B	839 B	237 A	1,030 A
P-Value:	<0.001	<0.001	0.003	0.003	0.52	0.51

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture for corn, and 13% for soybeans.
‡Marginal net return based on $4.30/bu corn (uniform price all years), $11/bu soybeans (uniform price all years).

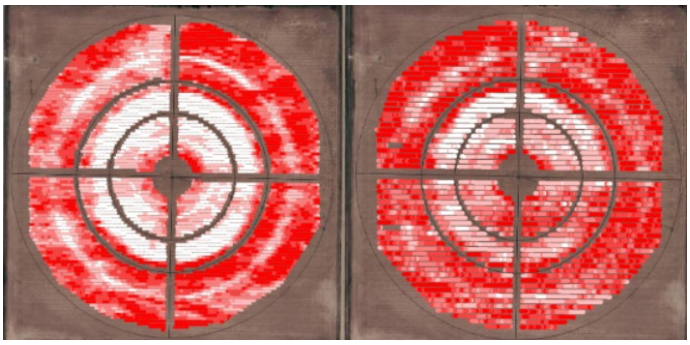


Figure 3: Yield map in 2022 (Year 1, corn) and 2023 (Year 2, soybeans).

Summary:

- For the 2022 and 2023 growing seasons, yield and net marginal net return were statistically lower from spans 1-2 (treatment 1 - check) and span 3 (treatment 2) in comparison with spans 4-5 (treatment 3). The average loss from spans 1-3 considering both growing seasons was $126.90/ac compared with span 4-5.
- In 2024, although new sprinklers on span 3 resulted in similar yield and net return compared with spans 4-5 (good spots with original sprinklers), spans number 1-2 equipped with original sprinklers also resulted in similar values.
- This field is near the Platte River with a light-textured soil type and it experienced abundant spring and early summer rainfall. This resulted in a high-water table during the entire 2024 growing season and, unfortunately, masked the results.
- The same study will be conducted in 2025 with the objective of identifying the potential yield gain when replacing the sprinkler package of center pivots.