

# Long-Term Tillage and Crop Rotation Trial

Mark Licht—assistant professor, Department of Agronomy

Cody Schneider—farm co-manager

## Objective

Evaluate the long-term effects of tillage systems and crop rotations on grain yields and soil health.

## Material and Methods

### Crop Year—2021

Soil Type	Mahaska, Nira
Previous Crop	Varied by crop rotation
Hybrid/Variety	Corn—Pioneer 1108Q; Soybean—Mershman Osage 2025E
Planting Date	Corn—May 6, 2021; Soybean—May 3, 2021
Row Spacing	30 in.
Seeding Rate	Corn at 36,000 seeds per acre; soybean at 150,000 seeds per acre
Tillage	Fall ST, CP, DR and MP—October 15, 2020 Spring soil finisher (except NT and ST)—April 28, 2021
Fertilizer	No fertilizer applied in the fall of 2020; 22-104-120 applied April 3, 2020 and 0-0-220 applied on November 19, 2019 to all plots
Nitrogen	UAN at 240 lb. N/acre for corn following corn and second-year corn—April 20, 2021; an additional 50 lb. N/acre as UAN was applied June 2, 2021 due to excess rainfall
Harvest Date	Corn—October 21, 2021; soybean—October 5, 2021
Experimental Design	Randomized complete block design
Replications	Four
Treatments	No-tillage (NT), strip-tillage (ST), chisel plow (CP), deep rip (DR), moldboard plow (MP)

## Results

Tillage System	Continuous Corn Rotation	Corn-Corn-Soybean Rotation	Corn-Soybean Rotation
	corn yield (bushels/acre)		soybean yield (bushels/acre)
No-tillage	153.0	174.3	65.5
Strip-tillage	145.0	168.0	66.3
Chisel plow	146.9	177.2	64.1
Deep rip	155.9	177.2	69.0
Moldboard plow	169.4	184.1	59.9
	P = 0.6638	P = 0.4665	P = 0.6977

## Key Takeaways

- In 2022, tillage systems did not statistically affect corn or soybean yields in any of the crop rotations. This could be a result of extreme yield variability due to excess rainfall, ponding and extended periods of saturated soils.
- For both the continuous corn and the corn-corn-soybean rotations, there was a trend for higher corn yields associated with more intensive tillage systems.
- A continuous corn yield drag of 22.1 bushels/acre (12.5%) was observed compared with the second-year corn yields from the corn-corn-soybean rotation.