

Long-Term Tillage and Crop Rotation Trial

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Objective

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

Materials and Methods

Site-Year 1: Southwest Research Farm, Lewis | Crop Year–2021

Soil type	Marshall, Exira
Previous crop	varied by crop rotation
Hybrid/variety	corn–P0592AM; soybean–P29T37E
Planting date	corn–April 28; soybean–May 11
Row spacing	30 in.
Seeding rate	corn at 35,077 seeds/acre; soybean at 161,355 seeds/acre
Tillage	fall ST, CP, DR and MP November 3, 2020; spring lightly disced and then field cultivated, CC and SC, April 8, 2021. CCS field cultivated April 1, 2021. All plots except NT and ST.
Fertilizer	5 lbs. P ₂ O ₅ /acre and 28 lbs. K ₂ O/acre on all plots March 4, 2020
Nitrogen	All corn plots received 200 lbs. N/acre as 32% UAN solution
Harvest date	soybean–October 9, 2021; corn–October 18, 2021
Experimental design	randomized complete block design
Replications	4
Treatments	no-tillage (NT), strip-tillage (ST), chisel plow (CP), deep rip (DR), moldboard plow (MP)

Site-Year 2: Southwest Research Farm, Lewis | Crop Year–2022

Soil type	Marshall, Exira
Previous crop	varied by crop rotation
Hybrid/variety	corn–Stine 9752-32; soybean–Stine 3131
Planting date	corn–April 25, 2022; soybean–April 28, 2022
Row spacing	30 in.
Seeding rate	corn at 35,077 seeds/acre; soybean at 161,355 seeds/acre
Tillage	fall ST, CP, DR and MP November 8, 2021; spring lightly disced and then field cultivated, CC and SC, April 6, 2022. All plots except NT and ST.
Fertilizer	92 lbs./ha of potash and 158 lbs./ha of MAP on all plots on December 8, 2021.
Nitrogen	all corn plots received 140 lbs. N/acre as 32% UAN solution on December 8, 2021.
Harvest date	soybean:–October 1, 2022; corn–October 10, 2022
Experimental design	randomized complete block design
Replications	4
Treatments	No-tillage (NT), strip-tillage (ST), chisel plow (CP), deep rip (DR), moldboard plow (MP)

Results

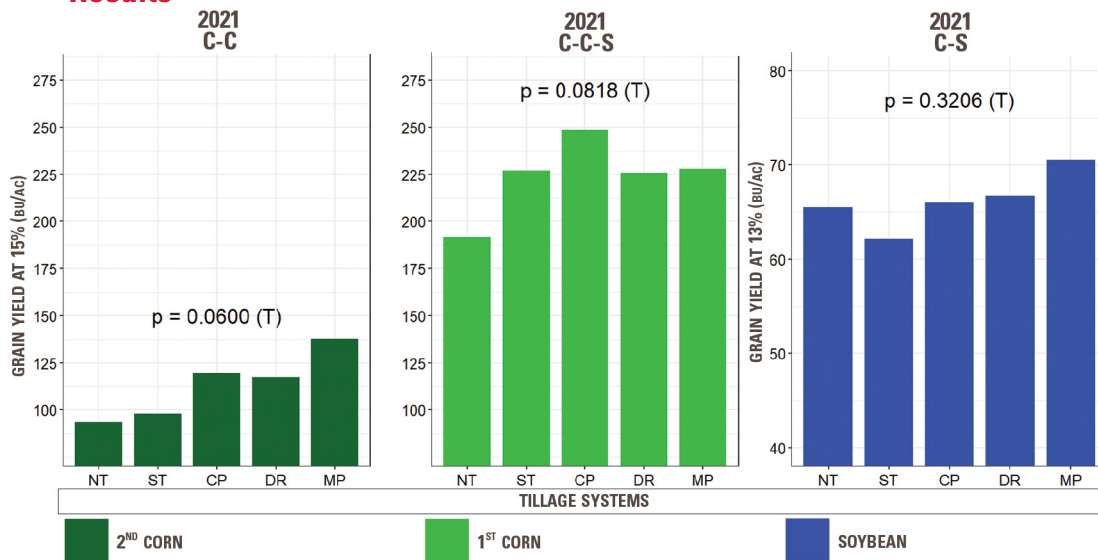


Figure 1. Grain yield in 2021 from the tillage systems within each crop rotation.

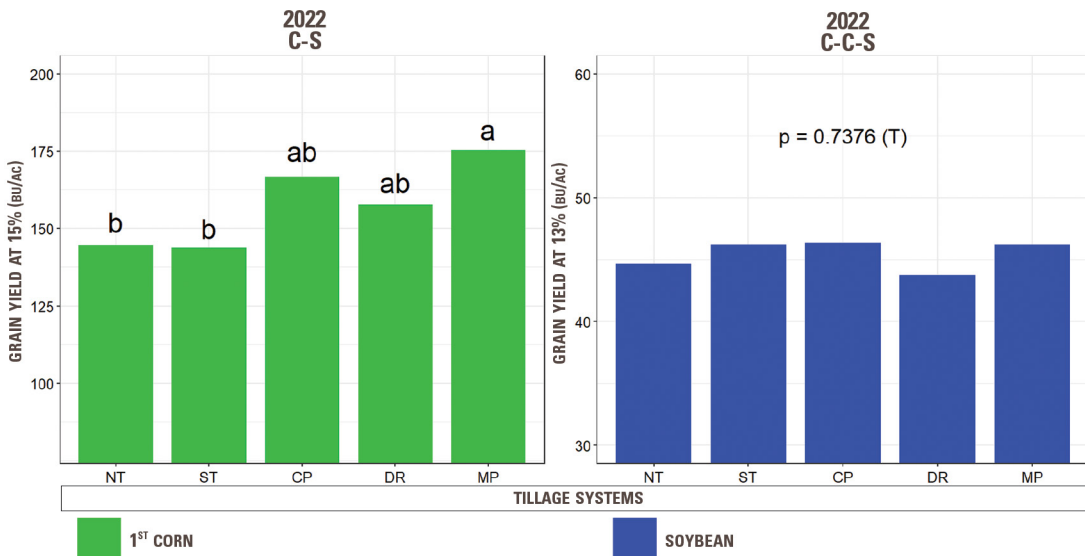


Figure 2. Grain yield in 2022 from the tillage systems within each crop rotation.

Key Takeaways

- In 2021, tillage systems did not significantly affect corn or soybean yields in any of the crop rotations. However, there was marginal significance for continuous corn and corn-corn-soybean yields where more intensive tillage had higher yields.
- In 2021, a continuous corn yield drag of 111.1 bushels/acre (50%) was observed compared with the first-year corn yields from the corn-corn-soybean rotation.
- In 2022, corn yields seemed to increase with increased tillage intensity. MP yielded statistically higher than NT and ST in the corn-soybean rotation.
- There were no statistical differences between tillage systems on soybean yield in the corn-corn-soybean.
- The corn-corn rotation in 2022 was severely lodged and data was not analyzed.

Acknowledgements

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