



Long-Term Tillage and Crop Rotation Trial

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Objective

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

Materials and Methods

Site-Year 1: Nashua | Crop Year–2021

Soil type	Floyd, Clyde
Previous crop	Varied by crop rotation
Hybrid/variety	Corn–Kruger K4R 9706SS; soybean–Asgrow 21XF1
Planting date	Corn–April 17, 2021; soybean–April 16, 2021
Row spacing	30-in.
Seeding rate	Corn at 35,077 seeds/acre; soybean at 189,417 seeds/acre
Tillage	Fall ST, CP, DR and MP–November 6, October 25, November 5 and November 4, 2020; Spring soil finisher (except NT and ST)–April 16, 2021
Fertilizer	58 lbs. P ₂ O ₅ /acre and 156 K ₂ O/acre on all plots November 20, 2020
Nitrogen	NH ₃ at 130 lbs. N/acre following soybean and 170 lbs./acre following corn–April 3, 2021 for all corn plots except NT which received urea on April 24, 2021 at 130 lbs. N/acre following soybean and 170 lbs. N/acre following corn.
Harvest date	October 9, 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: Nashua | Crop Year–2022

Soil type	Floyd, Clyde
Previous crop	Varied by crop rotation
Hybrid/variety	Corn–Dekalb DKC5218; soybean–Asgrow 24XF1
Planting date	Corn and soybean–May 12, 2022
Row spacing	30-in.
Seeding rate	Corn at 35,077 seeds/acre; soybean at 189,417 seeds/acre
Tillage	MP–November 9, 2021; CP–November 10, 2021; ST–November 19, 2021; DR–November 30, 2021; spring soil finisher (except NT and ST)–May 11, 2022
Fertilizer	No fall application
Nitrogen	NH ₃ at 130 lbs. N/acre following soybean and 170 lbs./acre following corn–April 10, 2022 for all corn plots. Urea at 130 lbs. N/acre following soybean and 170 lbs./acre following corn–May 18, 2022 for all corn plots
Harvest date	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

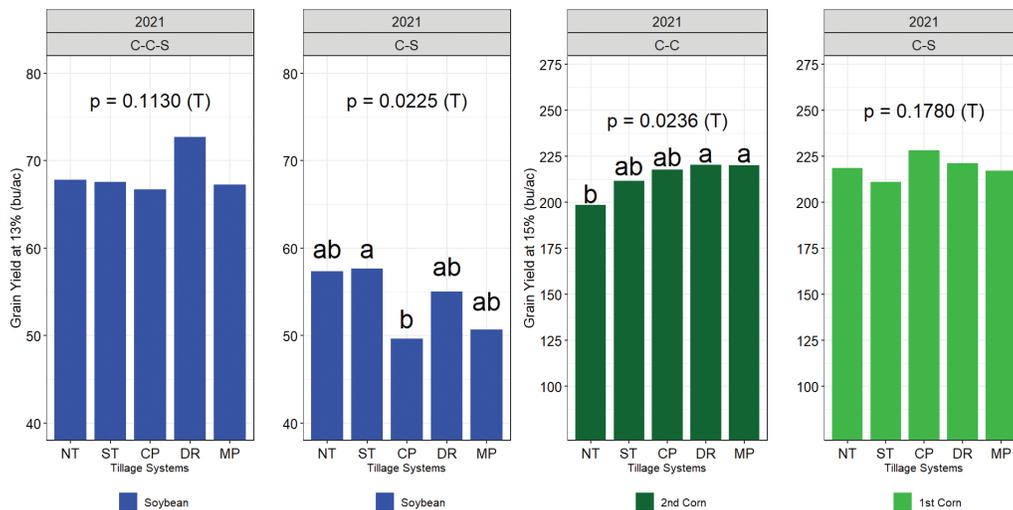


Figure 1. Grain yield in 2021 from the tillage systems within each crop rotation.

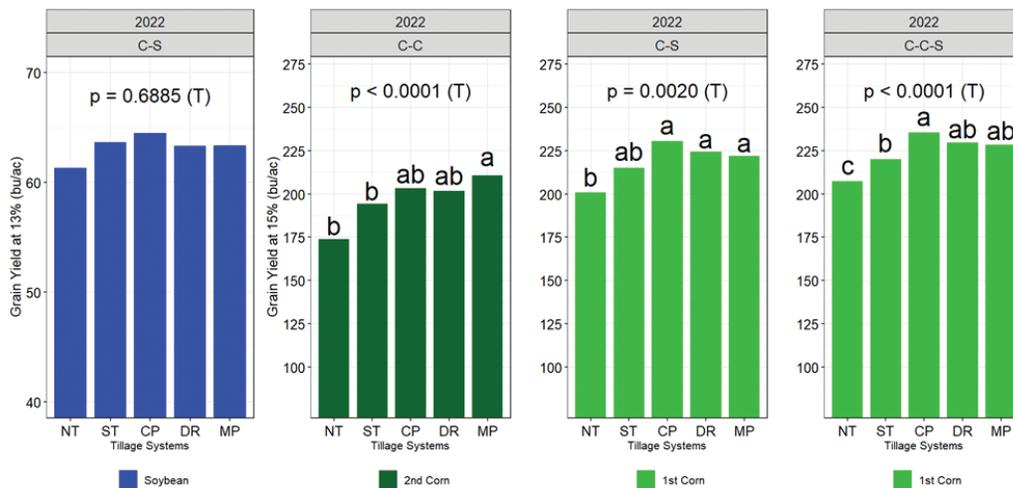


Figure 2. Grain yield in 2022 from the tillage systems within each crop rotation.

Key Takeaways

- In continuous corn system, MP and DR had significantly higher yields in 2021. In 2022, only MP was higher yielding than NT and ST.
- In the corn phase of the corn-soybean rotation in 2021, all tillage systems had similar yields. In 2022, only NT yielded significantly lower than all the other tillage practices. In the soybean phase, in 2021 only there was a significant difference, where CP yielded less than ST.
- In the soybean phase of the C-C-S rotation, there were no differences between the treatments in 2021. However, in 2022, when it was a corn year and the yield trend was similar to the C-S rotation, NT was the lowest yielding, and the CP the highest.

Acknowledgements

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