

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

Crop Year—2021

Soil Type: Galva	Galva, Primghar, Marcus
Previous Crop	Varied by crop rotation
Hybrid/Variety	Corn: Pioneer P0421; Soybean – Pioneer P27A17X
Planting Date	Corn: April 23; Soybean: May 3
Row Spacing	30 in.
Seeding Rate	Corn at 35,077 seeds/acre; Soybean at 139,089 seeds/acre
Tillage	Fall ST, CP, DR and MP: October 14, 2020; Spring soil disk (except NT and ST: April 20
Fertilizer	24-60-80 on all plots November 3, 2020
Nitrogen	UAN at 200 lb. N/acre: June 2 for all corn plots
Harvest Date	Corn: October 2; Soybean: October 5
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

Table 1. Corn and soybean grain yields for 2021 crop rotation by tillage system.

Tillage System	Continuous Corn Rotation	Corn-Corn-Soybean Rotation	Corn-Soybean Rotation
	corn yield (bushels/acre)		soybean yield (bushels/acre)
No-tillage	148.3	150.7	69.6
Strip-tillage	144.0	154.4	68.0
Chisel plow	174.2	183.6	74.5
Deep rip	153.9	176.1	75.0
Moldboard plow	181.5	171.4	71.9
	P = 0.4058	P = 0.2790	P = 0.6262

Key Takeaways

In 2022, tillage systems did not significantly affect corn or soybean yields in any of the crop rotations, however, there were some trends. For instance, continuous corn yields seemed to be higher with increased tillage intensity and soybean yields followed the same trend in the corn-soybean rotation.

A continuous corn yield drag of 6.8 bushels per acre (4%) was observed compared with the second-year corn yields from the corn-corn-soybean rotation.