

EFFECTS OF TILLAGE ON CORN YIELD

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Multi-year project

Justification:

Because of a variety of conditions, including weather and soil properties, many of Missouri's soils are highly erosive. In the recent past, Missouri ranked second among all states for average soil loss. Soil conservation is essential to continued productivity of Missouri cropland. No-tillage is an excellent method for soil conservation. Plant residues left on the surface of the soil intercept falling rain drops, dissipating their energy, and reducing their ability to dislodge soil particles.

This experiment is part of a long-term study conducted on plots that were first established in 1991. Tillage treatments have been applied to the same plots in each year for 14 years. The objective of this experiment is to determine if corn yield is affected by the use of no-tillage practices.

Methods:

The experimental design was a randomized complete block with four replications. Two tillage treatments were imposed. Tilled plots were chisel plowed on March 21 and field cultivated on April 18. No-tillage plots were planted without tillage. Hybrid DKC61-45 was planted in plots of both tilled and no-tillage treatments on April 19. The previous crop was soybean. Plots were 100 feet long and eight 30-inch rows wide.

Pre-emergence herbicides were Dual II Magnum, Roundup WeatherMax, and Aatrex. One post emergence application of Roundup WeatherMax was made. Nitrogen fertilizer was top-dressed at 160 pounds/acre as ammonium nitrate.

Stand counts were made at about the 5-leaf stage in four 20-foot lengths of row in each plot. Before harvest rows 2, 3, 6, and 7 were end-trimmed to 20 feet. These four rows were harvested with a plot combine and yield was corrected to 15% moisture.

Results:

There was no difference between the two tillage treatments for stand density (Figure 1). Sometimes soils remain cool and wet under the residue of no tillage. This can reduce emergence and result in poor stands. Because corn yield is greatly affected by stand density, reduced stands is a concern for farmers considering no-tillage.

Grain for the tilled plots was 86 bushels/acre but only 64 bushels/acre for no-tillage plots (Figure 2). Weather for much of the growing season was hot and dry. These conditions should have benefited no-tillage, but that was not the case. It is unclear why yield results. No-tillage plots were weedy early before RR applied. Maybe that affected yield in a very dry year.

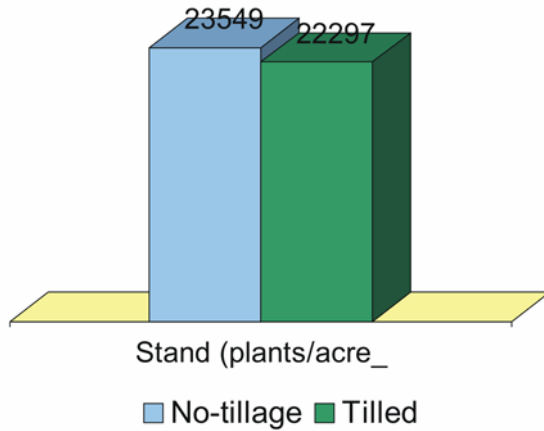


Figure 1. Effect of tillage choice on stand density determined at 5-leaf stage.

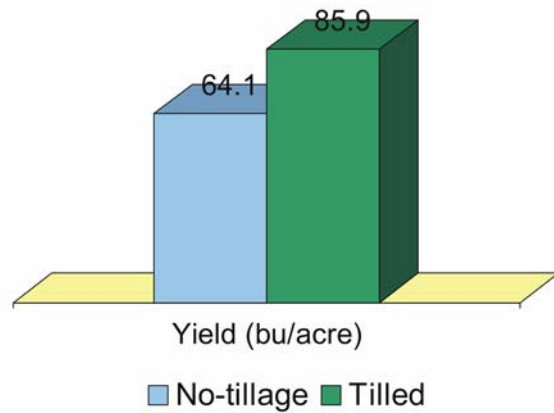


Figure 2. Effect of tillage choice on corn grain yield.

Conclusions:

1. Long term yield averages show 7% yield advantage for no-tillage over tilled
2. This year was opposite. The reason is unknown, but early weed pressure followed by a dry summer may have been the cause.