

December 2011

Field Crops 28.411 - 91

Is Tillage Necessary in a Corn-Soybean Rotation?

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Both rotation and tillage effects have been well documented by various researchers. However, little research has documented the interaction of rotation and tillage on corn yield.

The objective of this study was to measure the response of tillage in a rotation trial that has increasing amounts of continuous corn. The experimental unit is the plot of ground, so the analysis uses rotation cycles to measure the effect of rotation and tillage on the soil.

The conventional tillage (CT) treatment in this study used a fall chisel plow followed by 2x spring field cultivator tillage treatments. Both CT and no-tillage (NT) treatments were then planted with a no-till planter that used a 13-wave coulters, followed by trash whippers, and double disk openers.

Over years, in continuous corn, CT increased corn yield 10 of 24 years, while NT increased yield 1 of 24 years. In a corn-soybean rotation, CT increased corn yield 5 of 24 years and NT, 3 of 24 years. In continuous corn, CT increased corn yield 6 of 12 2-yr cycles (50%). In a corn-soybean rotation, there was no difference between CT and NT. Depending upon 10-year cycle CT increases grain yield 2-8% compared to NT.

Rotated corn has a 13-19% yield advantage over continuous corn. Second-year corn yields 5-9% greater than continuous corn. Third-fourth- and fifth-year corn yields the same yield as continuous corn.

Modern corn hybrids and management practices have the same rotation response as older hybrids and practices.

Tillage does not affect corn yield the first year following soybean for the treatments of a corn-soybean rotation or following five years of soybean (Figure 1). In the second and third consecutive year of corn, tillage interacted with rotation less consistently improving yield 3-6% in the second year, and 6-14% in the third year. The fourth and fifth years of consecutive corn had yield increases of 9-18% with tillage.

In conclusion, if rotation is used, then there is no need to do tillage in the first year of the rotation. As the number of consecutive years of corn increase, tillage may be necessary to maintain corn yield although the rotation effect cannot be overcome with tillage.

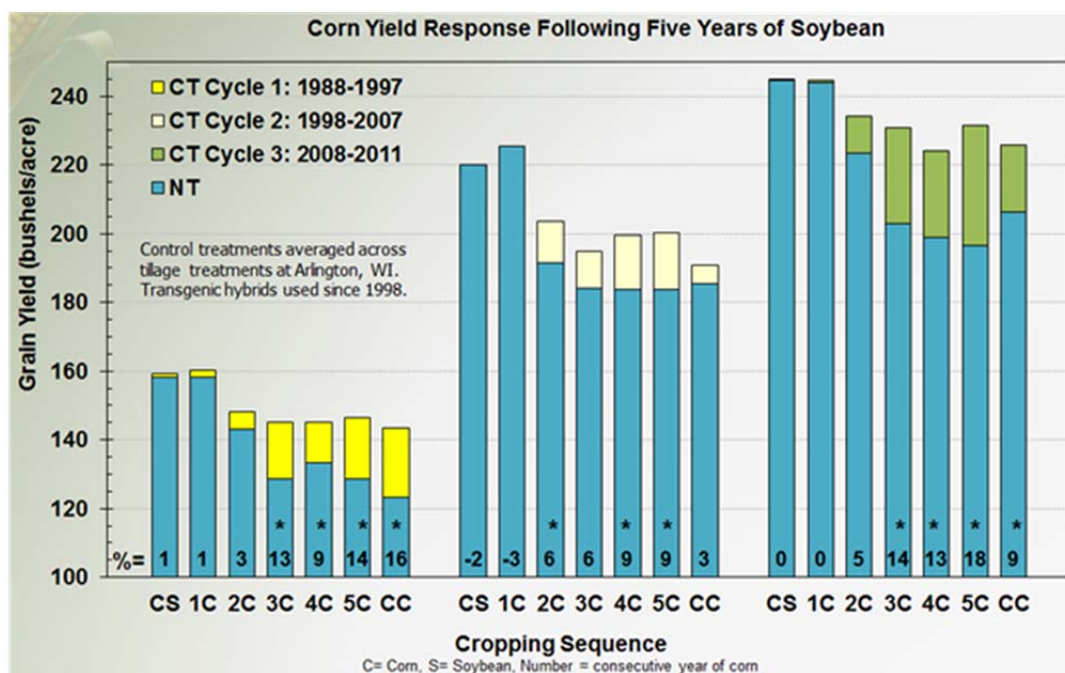


Figure 1. The interaction between rotation and tillage in a corn-soybean rotation at Arlington, WI. CC= continuous corn, CS= corn-soybean rotation, xC= number of consecutive years of corn following five years of soybean.