



# Effects of Tillage Systems in Corn and Soybean Production

## Trial Objective

- When it comes to tillage, several factors are considered in the decision-making process including weed and pest management, soil and water conservation, and time and input costs.
- Today, farmers have access to an array of tillage options, ranging from conventional tillage to minimum tillage to no-till. Farm operations deploy different tillage types to meet the productivity and sustainability requirements of each piece of land. It is necessary to periodically evaluate the continued suitability of tillage systems for any piece of land.
- The objective of this trial was to evaluate the productivity of three tillage systems in both corn and soybean operations.

## Research Site Details

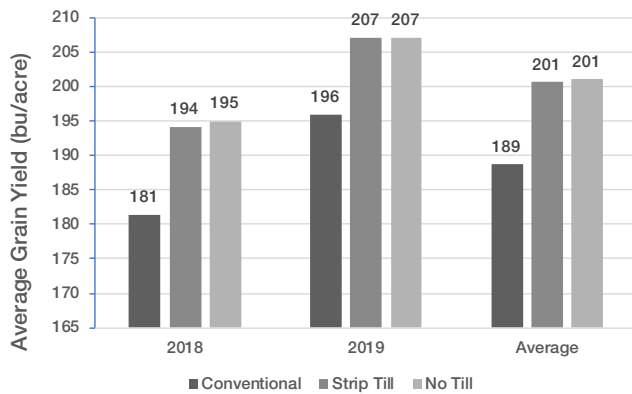
Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Planting Rate (seeds/acre)
Huxley, IA	Clay loam	Soybean	Conventional, Strip tillage, No-till	5/9/18, 5/16/19	9/27/18, 10/30/19	220	34K
Huxley, IA	Clay loam	Corn	Conventional, Strip tillage, No-till	5/17/18, 5/16/19	9/27/18, 10/9/19	60	140K

- The trial was carried out in 2018 and 2019.
- In 2018, a 112 relative maturity (RM) VT Double PRO® RIB Complete® corn product and a 2.4 maturity group (MG) soybean variety were used for the trial.
- In 2019, a 112 RM SmartStax® RIB Complete® corn product and a 2.2 MG soybean variety were used for the trial.
- In both years and in both crops, the trials were carried out in 15 x 500 ft plots with 30-inch spacing and 6 replications.
- Conventional tillage consisted of a chisel plow followed by a soil finisher. The chisel plow consisted of a two-gang disk unit followed by ripping shanks that went about 18 inches deep, followed by a set of chisels to smooth out the soil surface and incorporate residue. The soil finisher unit was comprised of a disk gang, a cultivator, and tine harrow units.
- Strip tillage was carried out in conjunction with liquid nitrogen application. The strip bar unit consisted of a no-till coulter in the front, followed by a liquid nitrogen knife, followed by a Vulcan strip-till unit comprised of row cleaners, no-till coulters that penetrated 2 to 3 inches deep and 7 inches wide, and a rolling basket to break any large soil clumps and smooth the soil surface for planting.
- All tillage operations were carried out in the spring.
- Weed management and the amount of nitrogen applied were the same in all tillage systems.

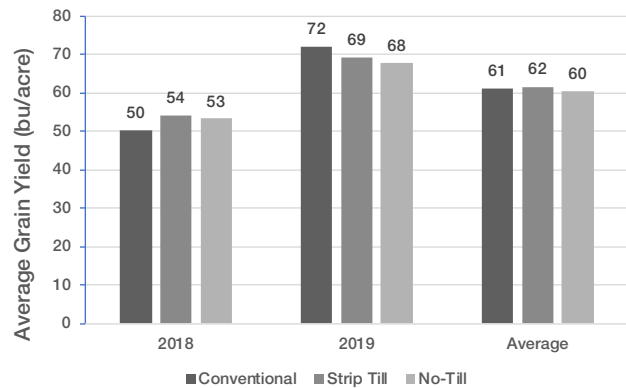


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## Understanding the Results



**Figure 1. Corn yield response to three tillage systems over a two-year period in central Iowa.**



**Figure 2. Soybean yield response to three tillage systems over a two-year period in central Iowa.**

- Yields were generally higher in 2019 than in 2018 in both crops.
- In corn, yield was lowest for conventional tillage but nearly the same for strip tillage and no-till in both years (Figure 1).
- In soybean, yields were nearly the same for strip tillage and no-till in both years. While conventional tillage produced the lowest yield in 2018, it yielded the highest in 2019. On average, however, there wasn't much difference between the three systems over the two-year period (Figure 2).

## Key Learnings

- Crop yield response to tillage can be widely variable and site-specific, often impacted by environmental factors, soil type and drainage, and the cropping sequence. Thus, it requires multiple years of research to truly determine the productivity of tillage systems.
- This trial suggests that the type of tillage system is not a major factor in soybean production at the trial location. To save on production costs, however, no-till could be recommended if an efficient weed management strategy (such as chemical control) is available. In corn, strip tillage and no-till yielded 12 bu/acre better than conventional tillage over the two-year period, also suggesting that conventional tillage could be eliminated if an effective weed management strategy is available.
- Irrespective of the crop chosen, the right tillage type should be the one that provides the best economic returns while still ensuring better environmental stewardship.



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