Effects of Tillage Systems in Soybean Production

Trial Objective

- Tillage systems and operations have evolved over the years to meet specific production and/or environmental objectives.
- Considerations such as soil and water conservation, input costs, labor efficiency, timing of tillage, crop rotation, soil health, short- and long-term land usage, crop nutrient management, and pest management drive tillage decisions on farms.
- With improvements in tillage implements and herbicide technologies, farmers use an array of tillage options, ranging from conventional tillage to minimum tillage to no-till.
- Many farms do not use a single tillage system across the farm. Instead, a different tillage type is often deployed to meet the productivity requirement of each field and is in use for several years.
- It is necessary to periodically evaluate the continued suitability of tillage systems.
- The objective of this trial was to evaluate soybean productivity as impacted by three different tillage systems.

Research Site Details

Location	Soil Type	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield (bu/acre)	Seeding Rate (seeds/acre)
Huxley, IA	Clay loam	Corn	Conventional, Strip Till, No Till	05/11/20	10/05/20	60	140,000

- A 2.9 maturity group (MG) soybean variety was used for the trial.
- Trial was carried out in 15 ft x 500 ft plots, with 30-inch row spacing and four replications.
- The conventional tillage system consisted of disking followed by a soil finishing pass. The soil finisher implement comprised of a disk gang, a cultivator, and tine harrow units.
- The strip tillage system consisted of Vulcan Equipment's ZoneMaster® Strip-Till unit comprised of
  - row cleaners,
  - no-till coulters that penetrated 2 to 3 inches deep and 7 inches wide, and
  - rolling basket to break large soil clumps and smooth the soil before planting.
- All tillage operations were carried out in the spring.
- Weed management and nitrogen rate were the same across tillage systems.
- Results from similar trials carried out in 2018 and 2019 are also provided.

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Understanding the Results

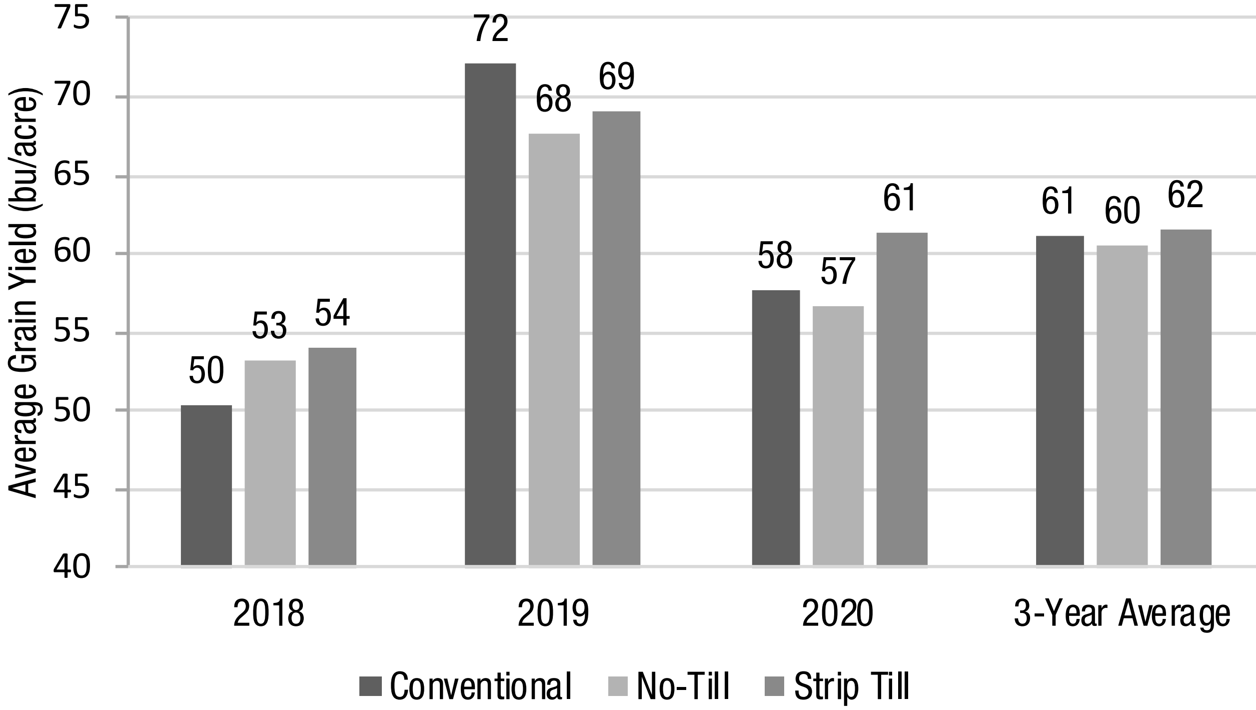

Figure 1. Soybean yield response to three tillage systems over a three-year period in central Iowa. Yield average represents the average performance of each tillage system over the three-year period.

- The average yields in 2020 were nearly the same for conventional tillage and no-till but 3 to 4 bu/acre greater in the strip-till system.
- Plant density observations before harvest (harvest population) were not significantly different between the systems. The densities were 124,400; 124,000; and 123,800 plants/acre for conventional tillage, no-till and strip-till, respectively.
- Grain moisture content after harvest was nearly the same, approximately 11 percent, for all tillage systems.
- Overall, there wasn't much yield differences between the tillage systems over the three-year period.

Key Learnings

- Crop yield response to tillage is site-specific, and often impacted by environmental factors, soil type and drainage, and the cropping sequence. Several years of research are needed to truly determine the productivity of tillage systems.
- This trial suggests tillage system type is not a major factor in soybean production at the trial location. To save on production cost; however, no-till could be recommended if an efficient weed management strategy (such as chemical control) is available.
- Generally, the right tillage type provides the best economic returns while ensuring better environmental stewardship.

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Legal Statements

The information discussed in this report is from a single site, multiple-year, replicated demonstration. This informational piece is designed to report the results of this demonstration and is not intended to infer any confirmed trends. Please use this information accordingly.

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Performance may vary, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields.

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