

Soybean Tillage Systems (Interim Report)

Purpose:

No-till has many proven economic and environmental benefits. However, producers are becoming increasingly dissatisfied with the performance of soybeans in no-till planting systems. Wet and cold planting conditions along with increased problems associated with corn residue has forced many growers to reconsider the viability of no-till production.

This project (2010-2013) will assess if no-till production can be significantly improved by fall and or spring single pass tillage systems, residue removal, or use of improved planting equipment. A variety of tillage systems will be tested in small plot trials, as well as the effects of precision seeding.

Methods:

Two small plot trials were established with several different tillage treatments as well as two planting methods in combination with three levels of corn residue removal. In 2011 there were two small plot trials near Lucan and Moorefield; in 2012 two small plot trials were established near Arthur and Moorefield. Two more small plots were established in the fall of 2012. In the fall of 2010 four field scale trials were established for harvest in 2011, and five sites were established in the fall of 2011 for harvest in 2012. Four more sites have been set up in the fall of 2012 for harvest in 2013. Soybean yields were taken to harvest the following growing season. The previous crop at all sites was corn. This report will focus only on the tillage results.

The treatments for the field scale trials included:

1. No-till planting
2. Fall RTS 2x*
3. Spring RTS 2x
4. Fall 1x + Spring 1x RTS

*RTS = Salford residue tillage specialist. 2x = two passes of the RTS

These treatments were randomized and replicated three times. Each treatment at the field scale was 20' wide by at least 1000' long. Trials were planted with a Kearney 15" vacuum planter with precision seed monitor. Yields were measured using a calibrated weigh wagon.

Results:

In the fall of 2010 soil conditions were wet, with most tillage being completed at the trial sites in mid to late November. The spring of 2011 was wet and cool, which delayed planting to late May for most of these trials. The fall of 2011 was excellent for tillage as the weather conditions were dry and warm, with tillage on the trials being completed in late October and early November. The spring of 2012 was very dry and early planting was achieved at all sites. Table 1, shows the results from nine sites from 2011-2012.



Figure 1. A Salford RTS tillage unit being operated in a field near Stratford, Ontario.

Table 1. The Effects of Tillage on Yield (2011-2012)

Treatment	Average Yield Across All Sites (bu/ac)	Yield Advantage (bu/ac)
No-Till	56.8	-
Fall RTS (2x)	56.9	0.1
Fall RTS (1x) + Spring RTS (1x)	57.7	0.9
Spring RTS (2x)	57.9	1.1

Small plot trials are being conducted in conjunction with these large scale field trials. The small plot trials are focusing on tillage treatments, as well as residue removal rates, precision seeding comparisons, and nitrogen applications. Table 2, shows the results of 6 tillage treatments, from 4 small plot trials, conducted in the years 2011-2012.

Table 2. The Effects of Tillage on Soybean Yields at Four Small Plot Locations (2011, Lucan and Moorefield; 2012, Moorefield and Arthur)

Treatment	Yield (Bu/ac)	(5%)
No-till	44.3	abcd
Fall RTS (2x)	45.1	abc
Fall RTS (1x) + Spring RTS (1x)	42.8	bcd
Spring RTS (2x)	42.3	cd
Fall Disc Rip + Spring Cultivate	46.4	a
Fall Moldboard Plow + Spring Cultivate	42.5	cd



Figure 2. The effects of two passes in the spring from a Salford RTS unit (left) versus a fall pass of the moldboard plow and a spring pass with the cultivator (right).

Summary:

This was the second year of a three year study, so final conclusions will be made at the end of the study period.

- Average yields of tilled plots have not been statistically higher than no-till in this study
- Minimal tillage systems provided slightly more yield than no-till in field scale trials

Next Steps:

This was the second year of a three year study. The fall tillage portion of the 2013 trials has been completed. An altered small plot trial design will be used in 2013 that compares three forms of tillage, stalk chopping and residue removal, seeding rates and seeding equipment based on the findings of the first two years. Results and final conclusions will be generated next year.

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