

No-Till vs. Chisel for Corn/Soybean Rotations

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Objective

To compare tillage effects on corn and soybean yields when using no-till and disk chisel tillage systems in a two-year trial.

Background

Cooperator:	Darke County Farm	Soil Type:	Patton, Crosby, Hoytville
Nearest Town:	Greenville	Drainage:	Subsurface
		Row Width:	30 inches

1999 Soybean/1998 Corn Field

Soil Test: pH 6.4, P 34 ppm, K 164 ppm
Fertilizer: 0-46-0 (100 lbs/A)
0-0-60 (125 lbs/A)
Variety: Countrymark 3685
Planting Date: May 4, 1999
Harvest Date: October 2, 1999
Harvest Pop.: No-till- 176,176 plants/A
Chisel- 196,504 plants/A

1999 Corn/1998 Soybean Field

Soil Test: pH 6.8, P 51 ppm, K 149 ppm
Fertilizer: 18-46-0 (135 lbs/A)
0-0-60 (100 lbs/A)
150 lbs/A nitrogen with herbicide
Hybrid: Pioneer 33Y18
Planting Date: April 30, 1999
Harvest Date: October 5, 1999
Harvest Pop.: No-till- 20,808 plants/A
Chisel- 21,816 plants/A

Methods

The two crop fields are adjacent to each other at the same site. Four two-year sequences of tillage treatments were analyzed. The four treatments were placed in a completely randomized design with six replications in each field. Half of the no-till plots were chiseled in 1998 and half the chiseled plots were in no-till in 1998. This was done to allow for comparisons of one year of chiseling and one-year of no-till with continuous no-till and continuous chiseling. The chiseled plots were prepared using a soil commander disk ripper followed by a single pass of a field cultivator with cultipacker. Both crops were planted with a Buffalo slot planter into adequate soil moisture and adequate rainfall for good germination. In this year's corn field, a moderate infestation of wireworm reduced the plant population from a planting rate of 30,000 seeds/acre.

Results

Table 1. Soybean Tillage and Yield, 2 Year Summary.

Tillage and Rotation	Yield (bu/A)
Chiseled soybeans following no-till corn	51.08 a
Chiseled soybeans following chiseled corn	50.40 a
No-till soybeans following chiseled corn	42.94 b
No-till soybeans following no-till corn	37.47 c

Soybean F = 296.1 (Significant differences to be found)
CV = 1.2%, LSD = 1.23 at 5% level of significance.

Table 1. Soybean Tillage and Yield, 2 Year Summary.

Tillage and Rotation	Yield (bu/A)
Chiseled corn following no-till soybeans	184.65
Chiseled corn following chiseled soybeans	182.625
No-till corn following chiseled soybeans	181.703
No-till corn following no-till soybeans	180.463

Corn F < 1 (No significant differences)
CV = 2.3%, LSD = 9.22 at 5% level of significance.

Summary and Notes

Soybean yields in the chiseled plots were significantly higher than no-till. This same field showed a yield advantage in chiseled plots for corn of 32 bushels per acre following 1997 no-till soybeans. The field had been in no-till corn and soybean rotation since 1993. As this year's soybeans developed, a very obvious difference in plant height was apparent with the no-till soybeans being several inches shorter and never completely filling between the rows. Two years of no-till in the trial (seven straight years of no-till) yielded significantly less soybeans than the three other two-year sequences.

There were no significant differences in the corn yields in the 1999 chiseled plots when compared to no-till. This same field showed no significant differences between no-till soybeans and chiseled soybeans in 1998. Like the other field, it had been in a no-till corn and soybean rotation since 1993.

It appears that there is some factor in this year's soybean field that limits yield when planting no-till corn or soybeans. This trial demonstrates that the advantages of keeping a field in long-term no-till management or chiseling after several years of no-till can be location-specific.

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