Effects of Tillage on Corn Following Soybeans or Wheat

Alan Sundermeier, Agriculture and Natural Resources Extension Agent
Matt Davis, Manager, OARDC Northwest Branch Research Farm

Objective

To evaluate the effects of tillage on corn yield following either soybeans or wheat.

Background

Cooperator:	OARDC NW Branch	Herbicides:	Bicep
County:	Wood	Varieties:	Pioneer 34B23
Soil Type:	Hoytville clay	Planting Date:	May 20, 2000
Previous Crops:	Soybeans and Wheat	Planting Rate:	30,000 seeds/A
Tillage:	See methods	Row Width:	30 inches
Fertilizer:	150-50-75 lb/A Actual N-P_2O_5-K_2O	Harvest Date:	October 25, 2000

Methods

In the fall of 1999, experiment plots were established in soybean stubble and in wheat stubble in a randomized complete block design with three replications. Treatments consisted of the following eight tillage systems:

1. No-till only.
2. No-till and row sweeper (10 days before planting to sweep residue off row).
3. Fall strip tillage with flat seedbed.
4. Fall strip tillage with raised seedbed.
5. Fall chisel plow and fall finish tool (stale seedbed).
6. Fall chisel plow and spring finish tool.
7. Fall moldboard plow and fall finish tool (stale seedbed).
8. No-till and fall deep subsoil (paratill deep ripper with no further tillage).

Individual treatment plot size was 10 feet wide by 50 feet in length. Corn was planted after spring finish tillage was completed. Hourly soil temperature (two-inch depth in seed zone) was recorded on four tillage systems from April 20 to May 9, 2000. Average soil temperatures were calculated. Soil moisture was determined from two-inch deep soil samples collected on May 9, 2000. This date was considered acceptable planting for strip tillage, row sweeper, and stale seedbed plots. Residue percentage was determined on May 9, 2000. Final corn stand populations were taken two weeks before harvest.

Results

Table 1. Soil Properties.

Treatment #	After Soybean			After Wheat		
	Residue (% in row)	Soil Temperature (°F)	Soil Moisture (% water)	Residue (% in row)	Soil Temperature (°F)	Soil Moisture (% water)
1	72.5 c	19.4	19.4	99.0 d	55.7 a	21.4
2	10.0 a	18.2	18.2	15.0 a	58.1 b	18.1
4	15.0 ab	18.6	18.6	39.0 b	57.7 ab	19.6
5	30.0 bc	19.3	19.3	50.0 c	59.2 b	19.9
LSD (0.05)	5.6	NS	NS	2.6	2.2	NS

Means within a column followed by the same letter are not significantly different.
NS = Not Significant.

Table 2. Corn Harvest Populations and Yields.

Treatment #	After Soybean		After Wheat	
	Final Stand (plants/A)	Yield (bu/A)	Final Stand (plants/A)	Yield (bu/A)
1	24,000 abc	128.3	20,750 a	64.9 a
2	23,250 ab	124.6	24,250 ab	81.5 abc
3	24,000 abc	131.7	23,500 ab	85.7 abcd
4	25,000 bc	129.2	23,500 ab	78.3 ab
5	25,250 bc	130.1	25,250 b	108.5 d
6	26,000 bc	122.8	24,750 b	83.3 abc
7	22,000 a	128.3	24,250 ab	103.9 cd
8	23,500 abc	130.2	23,500 ab	90.1 bcd
LSD (0.05)	2,605	NS	3,533	22.8

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NS = Not Significant.

Summary and Notes

Soybean residue, although well scattered, was a thin layer since 1999 was the first year of no-till which may have allowed tillage systems to have no effect on yield even though there was a significant difference in the amount of soybean residue among the four treatments. The results of the soybean portion of the study indicate that no-till will produce the highest net return after soybeans due to fewer trips across the field and reduced labor.

The large amount of wheat residue resulted in cooler soil temperatures in no-till. The no-till soil was also wetter at planting time although not significantly. These soil conditions in no-till are believed to have resulted in lower plant population and subsequently lower yield. The wheat portion of this study confirms that higher corn yields may be achieved when wheat residue is

incorporated into soil. No-till corn is not recommended in Hoytville clay soils following wheat based upon this study. Excess rainfall during most of the season may have affected the treatments this season.

For additional information, contact: Alan Sundermeier
The Ohio State University Extension
sundermeier.5@osu.edu