

Effects of Cover Crops and Tillage on Corn Production in Wheat Residue

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Objective

Comparison of different wheat residue management systems for the following corn crop.

Background

Cooperator:	OARDC NW Branch	Soil Type:	Hoytville clay
County:	Wood	Planting Date:	May 12, 1999
Previous Crop:	Wheat	Harvest Date:	October 10, 1999

Methods

After wheat harvest, stubble was mowed. The experiment design was a completely randomized split plot with three replications of the whole plot treatment levels. Management systems compared were time of tillage divided into cover crop treatments: no-till, July tillage, October tillage with no cover, soybeans, and Austrian winter pea.

Tillage consisted of a pass of a chisel plow followed by a pass of a rotterra power tiller to create soil conditions ready for planting. After July tillage (7/28/98), cover crops were planted on 7/30/98 with 118 lb/ac of Flyer soybeans and 127 lb/ac of winter pea. Both cover crops emerged on 8/12/98. Biomass was measured on 10/6/98 before October tillage (10/20/98) by removing above-ground cover-crop growth in one square foot and drying at 180 degrees F for 48 hours. On 6/10/99 pre-sidedress nitrate soil tests were taken. Also at that time residue counts were taken. Corn stalk population counts were done on 9/16/99. All other inputs remained constant.

Results

Table 1. Tillage Effects.

Tillage System	Biomass (grams/ft²)	Soil Nitrate (ppm)	Residue Cover (%)	Yield (bu/A)
No-till	4.5 B	15.8 A	92 A	161.5 A
July till	5.2 AB	10.0 C	64 B	158.3 A
October till	6.8 A	11.1 B	62 B	158.3 A
LSD (0.05)	2.2	0.6	4.4	10.4
CV (%)	16.7	<1	2.6	4.3

Treatment means followed by the same letter are not significantly different.

Table 2. Cover Crop Effects.

Cover Crop System	Biomass (grams/ft²)	Soil Nitrate (ppm)	Residue Cover (%)	Yield (bu/A)
None	----	11.5 B	69 B	159.4 B
Soybean	10.3 A	12.1 B	75 A	158.7 B
Winter pea	0.7 B	13.2 A	74 A	161.6 A
LSD (0.05)	3.1	0.8	4.5	2.2
CV (%)	47.9	6.5	6.1	2.1

Treatment means followed by the same letter are not significantly different.

There were no significant interactions between tillage treatments and cover crop treatments except for soil nitrate.

Table 3. Interaction of Tillage and Cover Crops.

Tillage System	Soil Nitrate (ppm)		
	No Cover Crop	Soybean	Winter Pea
No-till	15.3	15.7	16.3
July till ¹	10.7	9.7	9.7
October till ²	8.7	11	13.7

¹July till = Tillage before cover crops planted.

²October till = Cover crops planted no-till followed by tillage in October.

Summary and Notes

For the three tillage treatments, no-till had significantly more soil nitrate and residue coverage. Corn yield was not significantly different among the tillage treatments.

Soybean cover crop produced significantly more biomass before October tillage compared to winter pea. However, winter pea contributed significantly more soil nitrate as well as a significantly higher corn yield. It was observed that winter pea was able to withstand the effects of October tillage, thus allowing it to produce more soil nitrate than soybeans.

For additional information, contact:

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