

Tillage, Cover Crop, and Compaction Effect on Corn

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Objective

To evaluate the effect of soil compaction, cover crops, and tillage on corn yields.

Background

Crop Year: 2013	Tillage:	see below
Location: O.A.R.D.C. NW Ag Research Station	Soil Test	
County/Town: Custar, OH, Wood County	Planting Date:	May 8, 2013
Soil Type: Hoytville clay loam	Nitrogen:	none
Drainage: systematic subsoil	Seeding Rate:	31,000
Previous Crop: corn	Harvest Date:	October 28, 2013

Methods

The entries were replicated four times in a randomized complete block design. Plot size- 10 x 50 feet each entry. Harvest data was collected from the center 7 feet. All treatments received the same herbicide application. On October 17, 2012, cereal rye was drill seeded into corn residue on selected treatments. On October 29, 2012, subsoil tillage was done on selected treatments. This tool has a single straight shank spaced 30 inches apart, operated at depth of 12 inches. No further tillage was done. The following spring, all treatments were no-till and planted to Pioneer 0832AMX corn. On June 12, 2013 applied 28% UAN sidedress @ 66.7 gal/acre.

On November 17, 2008, a single axle grain cart was used with half full 10 ton/axle weight and full 20 ton/axle weight. Compacted plots were driven over the entire area of those plots once with tractor and grain cart. The same plots were previously compacted in a similar way in 2002 and 2005.

No-till plots have not received any tillage since 2001.

Cover crops have been planted on the same treatments since fall of 2009.

Results

2013 Yields

Treatment	Compaction	Tillage	2013 Yield
1	None	No-till	157.2 CD
2	None	Fall Subsoil	171.3 E
3	None	Cover Crop	121.9 A
4	10 ton	No-till	165.8 DE
5	10 ton	Fall Subsoil	166.5 E
6	10 ton	Cover Crop	118.5 A
7	20 ton	No-till	149.8 C
8	20 ton	Fall Subsoil	140.5 B
9	20 ton	Cover Crop	116.1 A

LSD (0.5) = 9.0

4 YEAR AVERAGE YIELDS (2010 – 2013)

Treatment	Compaction	Tillage	4 yr. Ave. Yield
1	None	No-till	141.6 C
2	None	Fall Subsoil	140.4 BC
3	None	Cover Crop	135.5 BC
4	10 ton	No-till	143.4 C
5	10 ton	Fall Subsoil	138.8 BC
6	10 ton	Cover Crop	129.3 AB
7	20 ton	No-till	129.6 AB
8	20 ton	Fall Subsoil	122.6 A
9	20 ton	Cover Crop	124.3 A

LSD (0.20) = 11.2

Summary

The addition of a cover crop did not increase corn yield when compared to fall subsoil tillage or no-till. No-till was not significantly different from cover crop treatments in the 4 year yield comparison except for the 10 ton treatment.

A grass cereal rye cover crop planted the fall before corn planting requires close management of pests and nitrogen needs. Corn following a grass cover crop may require additional nitrogen to decompose cover crop residue. In 2013, corn yields were negatively affected by a grass cover crop of cereal rye. This may be due to a nitrogen shortage during early corn development. No other pests were present and corn stand was similar in all treatments.

The 20 ton compaction treatments had lower yields compared to long-term no-till treatments without compaction.

Long-term no-till may be able to withstand the compaction pressure due to improved soil structure compared to annual subsoiling. This disadvantage for subsoiling continues a trend since 2003. The loosened soil structure created by subsoiling means that heavy axle loads that follow may compact the soil and reduce yields. Repeating the subsoiling treatment after compaction did not correct the problem. Late fall subsoiling may not be the best time to perform compaction correction due to wet soil conditions.

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