2003

Compaction Study

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Abstract
The Doon Compaction Study started in the spring of 1997. The goal was to determine the impact heavy grain carts and heavy manure spreaders might be having on the Moody soils and whether deep tilling could restore the yield.

Disciplines
Agricultural Science | Agriculture

Compaction Study

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Introduction

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Materials and Methods

Plots were established in the spring of 1997 by compacting half of the plots using a grain cart with a 13.7-ton axle weight. The total weight (tractor and cart) was 25 tons. Every square foot of the plots was compacted. The plots were then split into four subplots with one receiving V-ripping in the spring, one receiving V-ripping in the fall, one receiving V-ripping in both the spring and fall, and one receiving no deep tilling.

Compacted Plot

Spring V-rip	Spring & Fall V-Rip
No V-rip	Fall V-rip

Non-compacted Plot

Spring V-rip	Spring & Fall V-Rip
No V-rip	Fall V-rip

All plots were lightly disked prior to planting. There are three replications of each compaction and non-compaction treatment and all plots are in a corn-soybean rotation. Yields are collected on the corn portion of the rotation, which is when compaction is considered to cause the greatest yield reduction.

Results and Discussions

The 2001 yield results showed higher yields on the compacted plots (Table 1). More tillage may have dried out the soil or reduced the seedbed quality in a dry year. Plots on the bottomland had the highest yields, regardless, showing that water stress may have caused more yield loss than the compaction in 1997. Dry years do not allow the crop to reach its full potential and are not good years to evaluate compaction problems, as indicated by the 2001 season data. Because the yields on the compacted plot exceed the non-compacted plots, the freeze-thaw cycle has erased the effect of compaction, and this is the final year of the study.

Average yields for the last 5 years are presented in Table 2. The compacted soil seemed to respond to the V-Rip treatment in the spring immediately after the compaction event. This research would support trying to alleviate a compaction problem as soon as possible after it has taken place. If no compaction has taken place, deep tilling has little benefit on the Moody soils. The differences over time are getting smaller each year, and a shortage of rainfall during the season has a greater influence on the yields than compaction did 5 years ago.

Acknowledgments

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Table 1. Yield results for 2001 soil compacted in 1997.

Year	Treatment	V-Rip Treatment	Yield
2001	No compaction	No Ripping	132.1
	No compaction	Spring	133.6
	No compaction	Fall	138.7
	No compaction	Spring & Fall	122.2
	No compaction	Average	131.7
	Compaction	No Ripping	141.1
	Compaction	Spring	134.5
	Compaction	Fall	127.0
	Compaction	Spring & Fall	124.4
	Compaction	Average	131.7

Table 2. Five-year yield averages on compacted and non-compacted plots.

Year	Treatment	V-Rip Treatment	Yield
1997–01	No compaction	No Ripping	147.4
	No compaction	Spring	147.4
	No compaction	Fall	151.7
	No compaction	Spring & Fall	144.3
	No compaction	Average	147.7
	Compaction	No Ripping	150.9
	Compaction	Spring	151.8
	Compaction	Fall	138.8
	Compaction	Spring & Fall	140.3
	Compaction	Average	145.4