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Department of Agronomy

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THE EFFECT OF FALL AND SPRING TILLAGE OF A COMPACTED SOIL ON CORN AND TOBACCO YIELDS

K. L. Wells and Roy V. Catlett

Soil compaction is being diagnosed in increasing instances as the cause of poor crop performance in Kentucky. While the basic causes of compaction can usually be identified, it is much more difficult to prescribe techniques to solve the problem. Following identification of compacted soil as being the cause of poor corn growth in a field in Shelby County, Kentucky, a study was conducted to compare three tillage tools on production of corn and tobacco. The compacted zone was within the top 6-inch layer of soil.

DESCRIPTION OF THE STUDY

The soil was a moderately eroded Shelbyville silt loam on 2-6 percent slopes. Tillage tools tested were moldboard plow, twisted shank chisel plow, and a one-row subsoiler. Chiseling was done on 18-inch centers and the subsoiling was done on 36-inch centers. Tillage was performed either in the fall (October, 1988), or in the spring (April, 1989), in preparation for growing corn and tobacco during the summer of 1989. The surface was smoothed with a disk prior to planting corn and setting tobacco. Each treatment (tillage tool and date of plowing) was replicated four times. Soil test results from the study area were: pH 6.6, P very high, and K Medium. Individual corn plots were 12 ft (4 rows) wide and 50 ft long. Tobacco plots were 30 ft (8 rows) wide and 50 ft long. Fertilization and herbicide practices were the same as the producer used. Bulk density measurements were made on the soil prior to tilling in October, 1988, and again on the fall tilled corn plots after corn was harvested in October, 1989. Yield of both corn and tobacco were measured for each tillage treatment. Yield results are summarized in Table 1, and bulk densities from the fall tilled corn plots are summarized in Table 2.

SUMMARY OF RESULTS

Yields of both corn and tobacco were exceptionally good, reflecting good rainfall during mid-summer (Table 1). Even so, fall plowed plots yielded somewhat better than spring plowed plots. We attribute this to the soil's being drier when it was fall plowed than when it was spring plowed, resulting

in better shattering of compacted soil from fall plowing. The moldboard plow resulted in better yields than the chisel plow or the subsoiler from either fall or spring plowing. This was probably due to the moldboard plow's more effectively shattering the compacted layer than the chisel plow or subsoiler, since the compacted layer was within plow depth of the moldboard plow. Bulk densities of soil taken from the fall tilled plots prior to tillage and after corn harvest, a year later, indicate this (Table 2.). The subsoiler gave the poorest yield results, particularly on tobacco. This was likely due to a much smaller proportion of the compacted zone's being shattered than was done with either the moldboard or chisel plows. In this study with soil compacted at a fairly shallow depth, fall tillage was better than spring tillage and the moldboard plow was better than a chisel plow or a one-row subsoiler for improving yields of corn and tobacco.

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Table 1. Effect of Kind and Time of Tillage on Yield of Corn and Tobacco Grown on a Compacted Soil.

Tillage Tmt	Corn Yield (Bu/A)		Tobacco Yield (lbs cured leaf/A)	
	Fall Plow	Spring Plow	Fall Plow	Spring Plow
Moldboard plow	171	162	4,262	3,698
Chisel plow	163	146	3,604	3,369
Subsoiler	151	141	2,554	2,687

Table 2. Effect of Fall Tillage on Yield of Corn and Bulk Density of Soil.

TMT	Corn Yield (bu/A)	Soil Bulk Density (g/cc)	
		before plowing Oct. 1988	after harvest Oct. 1989
Moldboard plow	171	1.31	1.23
Chisel plow	163	1.33	1.27
Subsoiler	151	1.31	1.28

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