Wheat Residue: Tillage System Impact on Planting Time Soil Conditions and Corn Yield

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Objective

Determine differences in planting time soil conditions in various tillage systems for corn planted into wheat residue.

Background

Cooperator:	OARDC Hoytville Farm	Previous Crop:	Wheat
County	Wood	Planting Date:	May 19, 1998
Soil Type:	Hoytville clay	Planting Rate:	28,000 seeds/A

Methods

After wheat harvest, stubble was mowed. In November 1997, 90' long plots were chisel plowed or strip tilled. In May 1998, half of the chisel plow plots were further tilled with field cultivator and finishing tool for optimum planting conditions. The remaining chisel plow plots were undisturbed (stale seedbed). On April 24, 1998, row sweeping was done in four plots to remove wheat residue from the corn row area without moving soil. On May 18, 1998, another four plots received row sweeping immediately before corn planting. Four plots remained as no-till.

Hourly soil temperature (two-inch depth in seed zone) was recorded on all plots from April 25, 1998, until May 17. Growing Degree Days (GDD) were calculated based on the soil temperatures. GDD for soil temperature under sod was also used for comparison as this is the soil temperature recorded for the branch experiment station.

Soil moisture data came from collecting two-inch deep soil samples in seed zones and drying. The May 26, 1998, soil temperature was recorded under full sun at 3 p.m. at two-inch depth (seed zone) with an air temperature of 80 degrees F and corn at one-inch height.

Results

Treatment	Growing Degree Days (April 25-May 17)	Soil Moisture (% water)	5/26/98 Soil Temperature (°F)	Emerged Population (plants/A)	Yield (bu/A)
No-Till	241.3 A	19.8 A	72.5 A	26,500 AB	174.2 A
Sod	264.8 B	--	--	--	--
April Sweep	267.5 B	18.3 A	76.3 ABC	26,250 AB	182.4 A
May Sweep	--	--	74.4 AB	24,250 AB	166.8 A
Strip Till	274.2 BC	17.7 A	77.5 BC	24,000 A	170.6 A
Chisel/Till	289.6 C	--	74.5 ABC	26,250 AB	182.6 A
Chisel Stale	--	19.3 A	79.3 C	27,750 B	182.4 A
LSD (0.05)	18.6	3.06	3.85	3,544	17.2
CV (%)	3.7	8.2	3.4	9.1	6.5

Treatment averages followed by the same letter are not significantly different from each other. All data represents a minimum of 3 replications.

Summary and Notes

No-till soil temperature was significantly cooler compared to any other tillage system, according to Growing Degree Days (GDD) data. However, May 26 soil temperature in no-till was only significantly cooler than the strip till and chisel stale seed bed treatments. One may conclude that fall tillage is necessary in wheat stubble to improve soil warming for corn next year as compared to no-till or row sweeping in the spring.

Soil moisture was not significantly different among the tillage systems compared for moisture. Strip till had the lowest corn population, with chisel stale seed bed being significantly higher compared to strip till. Populations in all other tillage systems were not significantly different from no-till. Although corn yields varied, yields among all tillage systems were not significantly different.

From this one-year study, one may conclude that when planting corn into wheat residue, planting time soil temperature did not influence corn yield. However, due to rain on May 3, planting was delayed until May 18. Soil temperatures were already high (more than 80 degrees), and the benefit of soil warming from various tillage systems may have not been expressed. This experiment will be repeated next year in order to achieve earlier planting into cool soil.

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