Strip Tillage and Fertilizer Timing Effects on Corn in Clay Soil

Alan Sundermeier, Agriculture and Natural Resources Extension Agent
Ed Lentz, Extension Northwest District Agronomist

Objective

To evaluate corn response in two strip-tillage systems and one no-till system on clay soil.

Background

Cooperator:	Ron & Todd Hesterman	Soil Test:	P 16 ppm, K 143 ppm, OM 3.2%
County:	Henry	Fertilizer:	Variable
Soil type:	Clay, CEC 13.7	Planting Date:	April 26, 1999
Tillage:	Strip-till or no-till	Planting Rate:	31,000 seeds/A
Previous Crop:	Soybeans	Harvest Date:	October 5, 1999

Methods

The experimental design was a complete randomized block of field-length, 12-row-wide strips with three replications. Fall strip tillage was done on November 29, 1998.

Tillage	Fall Fertilizer (actual lb/A N-P-K)	Fertilizer Placement	Planting Fertilizer (actual lb/A N-P-K)	Sidedress N (lbs/A)	Total Fertilizer (actual lb/A N-P-K)
Fall strip	179-50-64	5" deep in strip	none	none	179-50-64
Fall strip	none	2 x 2	140-12-3	48	188-12-3
No-till	none	2 x 2	140-12-3	48	188-12-3

On April 7, 1999, the no-till areas had 90% residue coverage compared to 40% residue in the strip-tilled zone. At corn stage V2 (7-in. height), 12-inch-deep soil nitrate samples were taken. At corn stage V5 (14-in. height), top leaf tissue samples were taken. At corn silking stage, ear leaf tissue samples were taken. At corn maturity (black layer), corn stalk nitrate samples were taken. Also at this time, ear and stalk population counts were made.

Continuous recording soil thermometers were placed in the no-till area and in the fall strip-till zone. Soil temperature was recorded at the 2-in. seed zone, and mean soil temperatures (average of high and low) were calculated.

	Mean Temperature (°F)	
	April 14 -29	May 5 - 25
No-till	49.5	60.8
Strip till	50.5	62

Results

Table 1. Soil Nitrate and Plant Tissue Samples (average of 3 replications).

Tillage/ Fertilizer Timing	Soil Nitrate (ppm)	V5 tissue			Ear leaf tissue			Stalk Nitrate (ppm)
		N (%)	P (%)	K (%)	N (%)	P (%)	K (%)	
No-till Spring Fertilizer	24	4.51	0.27	2.56	2.89	0.25	1.85	1626
Fall Strip Till Spring Fertilizer	18	4.5	0.27	2.64	2.82	0.24	1.9	960
Fall Strip Till Fall Fertilizer	24.2	4.36	0.27	2.53	2.84	0.24	1.9	1950
	NS	NS	NS	NS	NS	NS	NS	NS

NS = not significant at P=0.05

Table 2. Corn Populations and Yields (average of 3 replications).

Tillage/ Fertilizer Timing	Ear Population (ears/A)	Harvest Population (plants/A)	Yield (bu/A)
No-till Spring Fertilizer	28766 B	26633 B	157.8
Fall Strip Till Spring Fertilizer	31433 A	31333 A	159.7
Fall Strip Till Fall Fertilizer	31533 A	30300 A	159.9
LSD (0.05)	2615	1387	NS

Treatment means followed by the same letter are not significantly different from each other

Summary and Notes

Nearly all data collected, including yield, did not show a significant difference among any of the treatments except ear and stalk populations being significantly lower in the no-till. This field has a high CEC (high clay content) which may cause fertilizer timing to be less important.

Weather may have minimized nitrogen losses. Soil was dry from fall throughout the following season. This may have kept fall-applied N from leaching. Also soils were warm, which may have allowed more natural release of organic Nitrogen.

For additional information, contact: Alan Sundermeier
The Ohio State University Extension
sundermeier.5osu.edu