

# Strip Tillage and Fertilizer Timing Effects on Corn

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## Objective

To evaluate corn response to strip tillage vs. no-till systems as well as fertilizer timing and placement.

## Background

Cooperator: Ron & Todd Hesterman  
County: Henry  
Nearest Town: Napoleon

	Field I	Field II	Field III
Soil Types:	Millgrove loam	Hoytville clay loam	Hoytville clay loam
Soil Test:	pH 6.2, P 24 ppm, K 95 ppm, OM 2.3%, CEC 8.5	pH 5.6, P 23 ppm, K 143 ppm, OM 3.7%, CEC 15.9	pH 5.6, P 24 ppm, K 165 ppm, OM 3.4%, CEC 14.6
Tillage:	See Methods	See Methods	See Methods
Previous Crop:	Soybeans	Soybeans	Soybeans
Fertilizer:	See Methods	See Methods	See methods
Variety:	Pioneer33G28	Pioneer33G28	Pioneer34B23
Seeding Rate:	30,100 seeds/A	30,600 seeds/A	30,600 seeds/A
Planting Date:	April 27, 2000	May 6, 2000	May 6, 2000
Harvest Date:	October 20, 2000	November 3, 2000	November 3, 2000

## Methods

The study was conducted on three fields within five miles of each other. Experimental design for each field was a randomized complete block using three replications of tillage x fertilizer program treatments. Each treatment plot was 12 rows (30-inch rows) by field length providing approximately 0.8 acres of area. The treatment combinations were as shown on the following page.

Treatment	Tillage	Fall Fertilizer (actual N-P-K lbs/A)	Planting Fertilizer (actual N-P-K lbs/A)	Fertilizer Placement	Sidedress (lbs/A actual N)	Total N-P-K (lbs/A)
1	Strip-till	13-63-45	85-0-0	5" deep in strip	96	193-63-45
2	Strip-till	14-68-50	85-0-0	5" deep in strip	96	195-68-50
3	Strip-till	199-68-50	None	5" deep in strip	None	199-68-50
4	Strip-till	None	90-12-2	2" x 2"	96	186-12-2
5	No-till	None	90-12-2	2" x 2"	96	186-12-2

Treatments 1, 4, and 5 were applied to Field I. Treatments 2, 3, 4, and 5 were applied to Fields II and III. All strip tillage was conducted in the fall of 1999. Fall nitrogen in Treatment 3 consisted of anhydrous ammonia combined with N-serve in addition to dry 14-68-50 fertilizer. Planting time fertilizer consisted of 28% N in treatments 1, 2, 4, and 5 combined with 5-12-2 liquid starter for treatments 4 and 5. Sidedress fertilizer consisted of 28%N.

On May 8 emergence stand counts were taken in Field I. In all three fields at the V2 or two-leaf stage of corn (approx. 7" height), one-foot deep soil samples were taken to monitor nitrate levels. Field I averaged 19.7 ppm nitrate. Replicates of the nitrate levels in Fields II and III were taken for statistical analysis. At corn silking stage, ear leaf samples were taken in all three fields. At corn maturity or black layer, corn stalk nitrate samples were taken. Also at this time, ear and stalk population counts were recorded.

In Field I and Field III, continuous recording thermometers were placed in the no-till areas and in fall strip-till zones. Soil temperature was recorded at the 2" seed zone, and average temperature was calculated for two time periods in Field I and one period in Field III.

## Results

**Table 1. Average Soil Temperature at 2" (°F).**

	No-Till	Strip-Till
Field I-April 8 to 26	47.6	62
Field III-April 8 to 26	54.1	55.4
Field I-May 2 to 24	48	63.3

**Table 2. Field I Results (average of 3 replications).**

Treatment	Emerg Population (plants/A)	Soil NO <sub>3</sub> (ppm)	Ear Leaf Tissue			Stalk NO <sub>3</sub> (ppm)	Final Population (plants/A)	Yield (bu/A)
			%N	%P	%K			
1	31,333 b	–	3.42	0.27	1.96	1966	30,000	179.5
4	31,333 b	–	3.25	0.25	1.92	2400	28,830	181.7
5	21,000 a	–	3.49	0.26	1.88	966	30,500	177
LSD (0.05)	10,040	–	NS	NS	NS	1408	NS	NS

**Table 3. Field II Results (average of 3 replications).**

Treatment	Emerg Population (plants/A)	Soil NO <sub>3</sub> (ppm)	Ear Leaf Tissue			Stalk NO <sub>3</sub> (ppm)	Final Population (plants/A)	Yield (bu/A)
			%N	%P	%K			
2	–	20.0 b	2.74	0.25	2.21 b	233	28,670	165.7 c
3	–	18.7 b	2.85	0.25	2.23 b	100	29,330	162.1 bc
4	–	15.3 a	2.86	0.26	2.07 a	400	27,830	153.8 ab
5	–	19.7 b	2.88	0.25	2.05 a	433	29,500	152.6 a
LSD (0.05)	–	2.9	NS	NS	0.06	NS	NS	8.4

**Table 4. Field III Results (average of 3 replications).**

Treatment	Emerg Population (plants/A)	Soil NO <sub>3</sub> (ppm)	Ear Leaf Tissue			Stalk NO <sub>3</sub> (ppm)	Final Population (plants/A)	Yield (bu/A)
			%N	%P	%K			
2	–	33.7 b	3.17	0.27 c	2.35	2500 b	28,333	148.0 b
3	–	14.7 a	2.83	0.23 a	2.32	167 a	28,333	145.9 a
4	–	17.0 a	2.99	0.25 b	2.09	100 a	28,500	139.8 ab
5	–	19.0 ab	2.9	0.24 ab	2.08	200 a	29,500	139.7 a
LSD (0.05)	–	14.7	NS	0.02	NS	1036	NS	5.9

## Summary

Within all three fields, strip tillage compared to no-till with identical fertilizer application had similar corn yields.

In Field I, strip tillage resulted in significantly quicker corn emergence 10 days after planting. Fertilizer timing and placement did not affect yield between the strip-tillage treatments.

In Field II, fall-applied dry P and K with a higher total pounds per acre of N-P-K yielded significantly better than liquid starter at planting. This did not happen in Field III, however.

In both clay loam fields, corn yields were not significantly different comparing fall-applied anhydrous ammonia nitrogen to spring-applied 28% nitrogen having the same total pounds per acre of actual N-P-K using strip tillage.

One may conclude for both clay loam fields, fall applied N-P-K in strip tillage resulted in yields equal to or better than the other cropping systems used in this study.

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