

## CORN AND SOYBEAN RESPONSE TO ROTATION AND TILLAGE ON A PRAIRIE CLAY SOIL

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**ABSTRACT:** A study, initiated in the fall of 1999 to evaluate corn and soybean response to a corn-soybean rotation and selected tillage system on a Prairie clay soil (Catalpa silty clay loam), was continued in 2002. The 2002 environmental growing conditions were very favorable for corn and less than optimum for soybean which experienced a 3-week dry period for the month of August. All corn rotation/tillage treatments had no effect on yield. Pioneer 3223 (116 day maturity), averaged over rotation/tillage system, produced 5.9 bu/ac more than Pioneer 34B23 (110 day maturity). Due to wet fall conditions, the MG (maturity group) V DP 5915RR soybean was not harvestable and the yields are only reported for MG IV Ag 4702 variety. AG 4702 produced a mean yield of 42.4 bu/ac (averaged over tillage/rotation treatments). The fall colter-chisel-harrow system with continuous soybean or following no-till corn produced yields of 45.8 and 49.6 bu/ac, respectively. These yields were higher than no-till soybean following no-till corn, no-till continuous soybean, and no-till corn followed by winter cover crop and no-till soybean. The fall colter-chisel-harrow in continuous soybean and following no-till corn in the rotation were taller at maturity than all no-till soybean treatments.

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**KEYWORDS:** Corn, rotation, soybean, tillage

**MATERIALS AND METHODS:** A field study initiated in the fall of 1999 to evaluate corn and soybean response to a corn-soybean rotation with selected tillage systems was continued in 2002. The study was conducted as a split plot experiment in a RCB with variety or hybrid as main plot factor and tillage system as subplot factor with 4 replications. Subplot size was 4 (30 inch) rows x 60 ft. P and K fertilizer were applied in the fall of 2001 at the rate of 250 lb/ac of muriate of potash and 150 lb/ac of super phosphate (0-46-0). Nitrogen fertilizer solution (32% UAN) at 160 lb N/A was applied as a sidedress application to all corn plots on 5/15/02.

The fall colter-chisel-harrow treatments were applied on 11/22/01 (Table 1). All treatments were planted with a no-till planter equipped with residue removers and colters. Gramoxone Max (paraquat) + surfactant at 1.0 lb ai/ac + 0.8 pt/ac in 40 gpa was applied on 4/16/02 as a burndown to the winter cover crop (Balsam clover) and entire study area. Pioneer 3223 and Pioneer 34B23 corn hybrid were seeded at 28,000 seed/ac in 30-inch rows on 4/23/02. Gramoxone Max (paraquat) + dimethenamid-P + atrazine (Guardsman Max) + surfactant at 0.28 + 0.63 + 1.24 lb ai/ac + 0.4 pt/ac was applied preemergence to all corn plots after planting. Lorsban (chlorpyrifos) at 1.3 lb ai/ac was applied in-furrow at planting. Clarity (banvel) at 0.5 lb ai/ac

was applied postemergence on 5/21/02. Evik (ametryn) + surfactant at 1.8 lb ai/ac + 1 pt/ac was applied on 6/05/02 with a hooded shield sprayer to corn 12 to 16 inches tall. Intrepid (methoxyfenozide) at 0.06 lb ai/ac was applied on 6/24/02 for southwestern corn borer (*Diatraea grandiosella*) control.

Deltapine DP 5915RR and Asgrow AG 4702 soybean were planted no-till in 30 inch rows on all treatments on 4/23/02. Roundup Ultra (glyphosate) at 1.0 lb ai/ac was applied to all soybean plots on 5/16/02 and repeated on 6/17/02 and 7/07/02. Orthene (acephate) at 0.27 lb ai/ac was applied to soybean for striped blister beetle (*Epicauta vittata*) control on 6/24/02.

The center 2 rows in each corn plot were harvested with a plot combine for grain yield on 9/04/02. The center 2 rows of AG 4702 soybean plots were harvested for grain yield 9/07/02. All grain samples were weighed, and seed moisture and test weight were determined with Dickey John GAC® 2000 grain analysis computer analyzer. Corn and soybean grain yields were adjusted to 15 and 13% seed moisture, respectively. All data were subjected to statistical analysis and means were separated using Fisher Protected LSD at the 5% significance level.

**RESULTS AND DISCUSSION:** The environmental growing conditions were very favorable for corn and less favorable for soybeans which experienced a 3-week dry period in early August. Rain, soggy soil conditions in October through November resulted in the failure to harvest the DP 5915RR soybean variety in this study. In the corn study, rotation/tillage treatments had no effect on yield and there was no rotation/tillage by hybrid interaction (Table 1). Yields ranged from 141.8 to 163 bu/ac. Pioneer 3223 (116 day maturity) produced 154.9 bu/ac, 5.9 bu/ac more than Pioneer 34B23 (110 day maturity).

The AG 4702 (MG IV) soybean variety produced a study mean yield of 42.4 bu/ac (Table 2). The fall-colter-chisel-harrow treatments either following no-till corn or as continuous soybean produced similar yields, 49.4 and 45.8 bu/ac, respectively. Both of these treatments produced more yield than no-till soybeans following no-till corn or no-till continuous soybeans. Plant height at maturity data indicated that the fall colter-chisel-harrow tillage systems either following no-till corn or in continuous soybean were similar in height and both were taller than all no-till soybean treatments.

**COOPERATORS:** None

**PUBLICATIONS:** None

**Table 1.** Corn hybrid yield response to tillage and rotation on a Prairie clay soil in 2002, Verona, MS.

Rotation/tillage	-----Corn hybrid-----		
	Pioneer 3223	Pioneer 34B23	Mean
	-----Yield bu/ac-----		
1) No-till (NT) continuous corn	151.8	149.8	150.8
2) Cover crop + NT soybean (Bn) followed by (Fb) NT corn	146.5	141.8	144.2
3) NT Bn Fb NT corn	163.0	148.1	155.6
4) Fall colter-chisel-harrow Bn Fb NT corn	<u>158.3</u>	<u>156.2</u>	157.3
	Mean	154.9	149.0
Hybrid LSD (.05):	4.1		
Tillage LSD (.05):	NS		
VAR x Tillage LSD (.0.5):	NS		
% CV:	3.5		

**Table 2.** Soybean variety, plant height at maturity, and yield response to tillage and rotation on a Prairie clay soil in 2002, Verona, MS.

Rotation/tillage	AG 4702	Ht at maturity.
	Yield bu/ac	(inches)
1) No-till (NT) continuous soybean (Bn)	37.6	28.3
2) Cover crop + NT corn followed by (Fb) NT Bn	40.4	31.2
3) NT corn Fb NT Bn	39.0	30.4
4) NT corn Fb Fall colter-chisel-harrow Bn	49.4	34.5
5) Fall colter-chisel-harrow continuous Bn	<u>45.8</u>	<u>33.7</u>
	Mean	42.4
	LSD (.05): 4.8	31.6
	% CV: 3.5	4.8
		2.5
		5.1