

EFFECTS OF TILLAGE ON SOYBEAN YIELDS, NET RETURNS AND INCIDENCE  
OF STEM CANKER ON BLACKLAND PRAIRIE SOIL IN MISSISSIPPI

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The Blackland Prairie Land Resource Area (Black Belt) of Mississippi and Alabama (4.52 million acres total, over 2 million in Mississippi) is comprised of soils with a high content of expanding clay. These soils developed from soft chalky limestone. The topography is gently sloping and, while erosion rates for these soils are much less than for loess soils, erosion is a serious concern among farmers and conservationists in the Black Belt. Extensive erosion occurred in the past due to the practice of preparing the soil in the fall so that cotton and corn could be planted early. Because of past natural and accelerated erosion, chalk outcrops and thin soil occupy a significant acreage in the Black Belt.

A high percentage of the Black Belt in Mississippi is presently in row crops, primarily soybeans which produce relatively little crop residue. This, along with poor conservation practices such as plowing up and down the slope and some fall plowing, have caused erosion to again become rampant. Reduced tillage and no tillage have been shown to be effective in reducing erosion in numerous studies. Double cropping wheat and soybeans can also be an excellent conservation practice. However, some soils are not well suited to double cropping and the acreage of double cropped soybeans that can be managed effectively is limited.

We established a study on Okolona silty clay at the Mississippi Black Belt Branch Station, Brooksville, MS to evaluate five soybean production systems. The systems are (1) conventional land preparation (beginning in the spring) and cultivated, (2) fall chiseling plus conventional, (3) stubble planted and cultivated, (4) stubble planted and not cultivated (no-till), and (5) double cropped with wheat. In the double crop treatment, the wheat and soybeans are no-till planted with soybeans being cultivated. In addition to yields, several other parameters are measured such as (1) net return, (2) runoff and erosion, (3) nutrients in runoff, (4) herbicides in runoff, (5) penetrometer resistance, (6) residue and canopy cover, etc. Data collection began January 1, 1981. This is a report of a small amount of 3-year period 1981-1983, net returns, and the relationship between production systems and an infection of stem canker which occurred during the 1983 growing season.

The yields for treatments where the soil received primary tillage (seedbed prepared) have been better than those for the stubble planted treatments. This same study is also replicated on Leeper silty clay at Mississippi State University (MSU). Yields at MSU for the 3 years show identical trends

those at Brooksville. The main difference in yields between locations is one of magnitude. Yields at MSU are somewhat higher on the Leeper soil (a bottom-land soil).

Production system	Yield				Avg.net returns	Plants infected by stem canker in 1983
	1981	1982	1983 <sup>1/</sup>	2 yr. avg.		
	----- bu/a -----				\$/a/yr.	%
<u>Monocrops:</u>						
Conventional	25.0	27.9	12.6	26.4 a <sup>2/</sup>	53	19.2 c <sup>21</sup>
Fall chisel + conv.	25.1	28.9	8.3	27.0 a	43	34.2 b
No-till plant, cultivated	18.6	21.2	4.2	19.9 b	21	86.0 a
No-till plant, not cultivated	18.4	18.9	5.0	18.6 b	24	80.0 a
<u>Double crop:</u>						
Soybeans	12.8	18.3	9.4	15.6 c	128 <sup>31</sup>	4.2 d
Wheat	(47.6)	(40.9)	(26.7)			

<sup>1/</sup> 1983 soybean yields were severely reduced by an infection of stem canker and drought and were not included in the average.

<sup>2/</sup> Means followed by the same letter are not significantly different at the 5% level of probability.

<sup>3/</sup> Double crop average net returns are based on the combined net returns from both soybeans and wheat for 1981 and 1982.

Stem canker was much worse on plots with high residue cover; i.e., the no-till planted plots. Stem canker was also a problem at MSU in 1983; however, the disease was less severe at MSU and yields were not reduced as much as at Brooksville. Disease ratings were made at both locations during the pod filling stage (mid-September). Disease ratings for MSU were similar to those at Brooksville but at an overall lower rate of infection. The cultivar used at both locations each year of the study was 'Centennial', a soybean cultivar with some resistance to stem canker.

This study is being continued at both locations in 1984 and the plots will be closely monitored for stem canker.