A REVIEW OF SOYBEAN TILLAGE STUDIES CONDUCTED ON BROWN LOAM SOILS OF NORTH MISSISSIPPI

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Research on tillage practices has been conducted at Mississippi Agricultural and Forestry Experiment Station, North Branch, for more than two decades. Unfortunately, yield data have been inconsistent and quite frustrating to scientists. In many studies the first years' yield data showed a substantial yield reduction for the no-till system. Yet, when experimental plots were maintained on the same site for consecutive years this yield difference tended to disappear when using the same mechanical, chemical and cultural practices. This paper reviews the data from our tillage studies and summarizes our findings in no-till soybean research.

In 17 field experiments where conventional and no-tilled systems were compared on monocrop soybeans, an average of 22% reduction resulted in grain yield the first test year (Table 1). It was considered that grasses, poor crop stands and plant injury from herbicides caused some of this reduction. These experiments were conducted on sites that were conventional tilled in the year prior to the study and had virtually a clean soil surface.

In the second and succeeding experimental years when no-till plot sites were maintained in the same location, the no-till yields were reduced by an average of 13% in a monocrop system. Crop residue was not burned, baled or destroyed by plowing on these sites.

It appears that a definite relationship exists between the accumulation of crop residue and improved no-till monocrop soybean yields. Even though not measured at this location, there should be a reduction in evaporation when a mulch is allowed to build.

In a three-year double cropping study there was a reduction in the average yields for no-tilled double cropped soybeans. There was no difference, however, in the average yields of the no-tilled monocrop soybeans in the same study (Table 2).

Although there was adequate crop residue from the wheat straw in the double crop no-till soybeans It may not necessarily serve as a mulch. Beneficially, wheat straw residue can serve a dual role in no-till double crop wheat-soybean regime. First, it can serve as a thatch to help break the force of the raindrops. This helps prevent erosion. Second, it can form a mulch to retain moisture from runoff and evaporation. How good a mulch the

thatch would form could depend on stubble height, coarseness or fineness of chopped straw and how even it is spread.

Soil moisture is an important factor in determining soybean grain yield. It would be impractical to use either ground or surface water for irrigation on the Brown Loam Hills of Mississippi for soybean production. Since the hill lands of North Mississippi have a moderate production capability, an additional increase in production cost through irrigation may not necessarily result in additional returns. A thatch of crop residue may help in reducing runoff, reducing evaporation, and conserving soil moisture to be available at the appropriate growth stage. Future research at this station will deal with how to form better mulches for moisture conservation using no-till planting practices.

Table 1. A summary of monocrop soybean tillage experiments conducted at MAFES, North Branch between 1978-1983 where the experimental site was conventional tilled in years prior to the experimental study.

Tillage System	Average grain yield and percent yield reduction for no-till			
	Soybean grain yield		Yield reduction	
	First year of experiment	Average of succeeding years of experiment	First Year of experiment	Average of succeeding years of experiment
	bu/A		%	
C.T.[1/]	31.4	27.9	0	0
N.T.[2/]	24.4	24.3	22	13

Table 2. Comparison of tillage regimes and row spacing on soybean yields when grown as a monocrop and as soybean-wheat double crop at MAFES, North Branch during 1981-1983.

Preplant tillage	Row spacing	Soybean Cropping Regime							
		Monocrop				Double Crop			
		1981	1982	1983	Avg.	1981	1982	1983	Avg.
		bushels per acre							
C.T.[1/]	36"	38	33	38	36.3	43	33	34	36.7
C.T.	10"	32	35	40	35.7	36	35	36	35.7
N.T.[2/]	36"	35	35	41	37.0	36	31	21	29.3
N.T.	10"	31	37	39	35.7	31	29	36	32.0

1/ Conventional tilled seedbed (disked, chiseled, disked, field condition, plant).
2/ No-tilled seedbed (planted in old seedbed with a no-tillplanter).