CROP RESPONSE TO ONE-PASS FALL LAND PREPARATION ON THE FLOOD PLAIN CLAY SOIL IN MISSISSIPPI

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INTERPRETIVE SUMMARY

Conservation tillage systems including no-tillage (NT) may reduce machinery, fuel, and labor costs, as well as soil erosion. Most studies have shown that after the first 2 years on coarse and medium texture soil, NT yields were equal or higher than conventional tillage (CT). However, on the poorly drained silty clay soils, NT yields have been more variable. Therefore, field studies were conducted evaluating crop yield response to selected tillage rotation and systems on a Leeper silty clay loam soil (fine, montmorillonitic, nonacid, thermic, Chromudertic Haplaquepts).

In all studies, the rotation treatments had duplicate plots so each crop-tillage treatment was present each year. Continuous cotton tillage treatments evaluated were: 1) NT (fall mowed cotton stubble and no cultivation during the growing season); 2) MT (fall-mowed cotton stubble, fall bed followed by (fb) harrow before planting with two postemergence cultivations); 3) CT (fall mowed stubble, chisel, disk, bed fb spring re-bed and harrow before planting with two postemergence cultivations); 4) RT (fall mowed cotton stubble fb a harrow before planting and two postemergence cultivations with a high clearance cultivator equipped with ridger wings (ridge-till cultivator); and 5) FPTB (fall mowed cotton stubble fb FPTB and a harrow before planting with two postemergence cultivations). Corn-cotton 2-year rotation tillage treatments evaluated were: 1) RT corn planted no-till and one postemergence cultivation with a ridge-till cultivator fb MT cotton (fall disk corn stubble, fall bed with a harrow before planting and two postemergence cultivations); and 2) RT corn planted no-till with one postemergence cultivation fb fall mowed corn stubble and RT cotton with two postemergence cultivations.

The 5-year (1994-98) cotton-corn rotation tillage study indicated that in continuous cotton, NT had lint yield equal to CT 3 of 5 years. Ridge-tillage (RT) had more variable and lower lint yield than minimum tillage (MT), and CT, 2 of 5 years. Conversely, a one-pass fall paratill bed system (FPTB) produced more lint than both NT and RT 3 of 5 years and CT 4 of 5 years. The 5-year mean lint yields for FPTB, NT, RT, and CT in continuous cotton were 861, 700, 573, and 716, lb/A, respectively. FPTB 5-year mean yield was higher than NT, RT, CT, and RT cotton following RT corn. MT cotton following RT corn had a 5-year mean lint yield of 809 lb/A, 12% more than RT cotton following RT corn and equal to FPTB in continuous cotton.

The tillage treatments for both corn and soybean in the 2-year rotation study were NT, RT, and FPTB. The 6-year (1994-99) study indicated no yield response to a 2-year rotation for either crop; therefore, the results were averaged over rotation. FPTB produced more soybean than NT 5 of 6 years and more than RT 3 of 6 years. Corn yield was similar to soybean in that FPTB produced more yield than NT 4 of 6 years and more than RT 2 of 6 years. FPTB 6-year yield average for corn was 125 and 36 bu/A for soybean. In both corn and soybean, FPTB had 8% more yield than RT and 16% more than NT.

The results indicate tillage may be more necessary on the poorly drained silty clay loam soils to optimize yield in a non-irrigated environment. Cotton following a high residue crop improved lint yield. The one-pass fall based FPTB tillage system for corn, cotton, and soybean was more productive than NT, RT, and CT. Improved yield for the FPTB system may be related to improved water infiltration and root growth. However, for the FPTB system to be successful, one must execute a fall tillage plan. In the Midsouth, this often involves doing the FPTB operation at the same time of harvest. Since this stale seedbed system involves planting no-till, spring labor needs are reduced and the system also allows for more timely planting and thereby improves crop yield potential.