

COTTON PLANT RESPONSE TO TILLAGE SYSTEM

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ABSTRACT: In comparing two tillage systems for plant survival the conventional system had a survival rate of 79% to 60% in the no-tillage system. Visual differences were evident when comparing side-by-side systems at four weeks after planting. There was in fact no difference between the tillage systems at four, twelve and sixteen weeks after planting. However, canopy closure appeared different at four, twelve and sixteen weeks after planting when in reality there was no significant difference between the two systems. The no-tillage system had four percent more bolls than the conventional system. The no-tillage system had a final yield six percent higher than the conventional system.

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MATERIALS AND METHODS: The experiment was located on a Grenada Silt loam soil with less than 2% slope. Average depth to the fragipan in the soil was 14 inches. Tillage systems evaluated were tilled and no tilled. The experimental design was a RCB with four replications. Plots were four rows spaced 38 in apart and fifty feet long. Treatments have been maintained in these plots for more than three years. The tilled plot area was disked in late March and redisked in the second week of April before the plots were hipped. Five hundred pounds of 17-17-17 fertilizer was broadcast across the entire plot area in April prior to planting. Planting was the first week of May with a John Deere 7300 planter. Sure-Grow 241 BG/RR cotton was planted at approximately four seed per foot of row. Terrachlor Super X 18.8G (Pentachloronitrobenzene) 1.5 lb ai/ac + Temik 15G (aldicarb) 0.75lb ai/ac were applied as granules in furrow at planting. Cotoran (fluometuron) 1.0 lb ai/ac was broadcast over the tilled area. Cotoran + Gramoxone (fluometuron + paraquat) 1.0 lb ai/ac + 0.625 lb ai/ac was broadcast over the no-tilled plots behind the planter. Roundup at 1.0 lb/ai/ac was sprayed over the entire plot area two weeks after emergence. CyPro (cyanazine) at 0.75 ai/ac was direct sprayed over the plot area as a lay by treatment. In the no-tilled plots, old cotton stalks were shred immediately after harvest in 2001. The no-till plots were left undisturbed through the winter. Roundup (glyphosate) 1.0 lb ai/ac was sprayed over the entire no-till area in the last week of March. Four hundred pounds of 17-17-17 (N-P-K) were broadcast with a spin spreader in mid-April by a custom applicator. Suregrow 215 BG/RR was planted the first week of May with approximately four seed per foot of row. Terrachlor Super X 18.8G (Pentachloronitrobenzene) 1.5 lb ai/ac + Temik 15G (aldicarb) 0.75lb ai/ac was applied as granules in furrow at planting. Cotoran + Gramoxone (fluometuron + paraquat) at 1.0 lb ai/ac + 0.625 lb ai/ac was broadcast behind the planter. Roundup at 1.0 lb ai/ac was sprayed over the entire plot area two weeks after emergence. Staple (pyrithiobac) .06 oz ai/ac was mixed in 20 gallon of water and sprayed broadcast over the entire plot area six

weeks after planting. CyPro (cyanazine) 0.75 lb ai/ac and MSMA (MSMA) 1.5 lb. ai./ac. was post-direct sprayed over the entire plot area as a lay by treatment on June 25. Cotton was defoliated the first week of October with Superboll (ethephon) 1.5 lb. ai/ac + DEF 6 (tribufos) 1.5 lb ai/ac and picked the third week of October.

RESULTS AND DISCUSSION:

Plant Population: The conventional tilled plots were on beds, which increased surface drainage during the wet period in May immediately after planting. The excessive rainfall during this time kept the no-till plots wet and runoff was slow in the plot area because of the shallow slope. The field germination rate in the conventional tilled cotton was 79% and the no tilled was 60% (Table1). Although not significantly different, the tilled treatment had 43,077 plants/ac compared to the no-till which had 32,812 plants/acre.

Plant Height and Canopy Cover: Differences in plant height for the tilled and no-tilled cotton was most noticeable the first month after planting and thereafter the difference between tillage systems was less noticeable. Canopy cover was less in the no-tilled plots throughout the growing season. Even though the plant height and canopy cover was significantly different at the 0.05 level of significance as measured in this study there was visual difference between the tilled and no-tilled plots (Table 2).

Fruiting Sites: Plants in the no-tilled system had more fruiting sites per plant and more boll retention per plant than the conventional tilled system. One factor for the higher boll retention and number is that fewer plants offered less competition allowing for higher bolls number. Another factor is the no-tilled plots retained more moisture during the periods of drought while setting fruit resulting in more fruit retention (Table 3).

Earliness: No-tilled system had 78% of first pick cotton compared to 84% for the conventional tilled. These differences were not great enough for significance at the 0.05 level in this study. The no-tillage system had more fruit at the 2nd, 3rd, and 4th position than the conventional system that could account for the lower percentage of first pick. (Table 4).

Yield: There was no difference in yield between the no-till system and the conventional tilled system (Table 4).

TABLES:

Table 1. Plant population for cotton at four weeks after planting in two tillage systems.

<u>Tillage System</u>	<u>Field Germination %</u>	<u>Plant Population per Acre</u>
No-till system	60	32812
Conventional tilled system	79	43077
LSD 0.05		N S

Table 2. Plant height and canopy closure for cotton plants grown in two tillage systems.

<u>Tillage System</u>	<u>Plant Height in WAP</u>			<u>Canopy Closure in WAP</u>		
	<u>4</u>	<u>12</u>	<u>16</u>	<u>4</u>	<u>12</u>	<u>16</u>
No-till system	20	36	43	28	77	87
Conventional tilled system	23	37	44	33	79	88
LSD 0.05	NS	NS	NS	NS	NS	NS

Table 3. Number of bolls per acre for cotton grown in two tillage systems.

<u>Tillage System</u>	<u>Bolls per Acre</u>
No-till system	360,987
Convention tilled system	344,616
LSD 0.05	NS

Table 4. Seed cotton yields from two tillage systems.

<u>Tillage System</u>	<u>Percent First Pick</u>	<u>Seed Cotton Yield</u>
No-till system	78	2869
Conventional tilled system	84	2693
LSD 0.05	NS	NS