

SANDY LOAM SOIL

Carl Weiler - Laveen

Final Irrigation Date	Time of Last Boll Setting	Top Boll Size - Grams	Top Boll		Lint Lbs/Acre
			Percentage of 5 Locks	1st Pick % of Crop	
September 3	August 24	5.26	69	97	1,002
September 17	August 24	4.92	80	97	1,040

CROP HISTORY: COTTON; PLOT SIZE: 4 rows x 1220 ft., 4 replic.; PLANTED: March 26; LBS. SEED: 17 lbs.; HERBICIDE: Preplant Treflan; FERTILIZER: 10 T. manure, 125 lbs. NH₃; PER CENT TURNOUT: 1st - 30%, 2nd - 25.73%; HARVEST DATES: November 18, December 18.

CLAY LOAM SOIL**

Sasser Farms - Glendale

Final Irrigation Date	Time of Last Boll Setting	Top Boll Size - Grams	Top Boll		Lint Lbs/Acre
			Percentage of 5 Locks	1st Pick % of Crop	
September 8	August 18	4.17	62.5	90	1,310
September 20	August 18	4.14	64.0	90	1,245

CROP HISTORY: COTTON: 5 yrs.; PLOT SIZE: 4 rows x 1220 ft., 4 replic.; PLANTED: April 14; LBS. SEED: 15 lbs.; HERBICIDE: 1 1/2 pt. Treflan; FERTILIZER: 300 lbs. 16-20-0, 400 lbs. Uran 32; INSECTICIDES: 12 applications; HARVEST DATES: November 18, December 26.

MINIMUM TILLAGE EXPERIMENTS

M.D. Cannon

Following is a summary of the minimum tillage work which was initiated by H.N. Stapleton in 1965. Except for 1968 the tests were continued every year through 1973. They were conducted at three locations, the Cotton Research Center, Marana Farm and the Safford Experiment Station.

The treatments were a comparison of conventional preplant tillage with various systems of minimum tillage. In all cases the conventional system included the following operations: (1) Disk, (2) Plow, (3) Disk, (4) Disk, (5) Float, and (6) List. Chisel-listing depths varied from 14 to 20 inches as measured from the bottom of the old furrow. In some cases the rows were moved one-half row width laterally; in some cases they were not. One list-only treatment was included each year and in all cases involved a lateral move.

More than 1,900 draft-fuel tests were run, using all the equipment involved in the program. Measured variables were speed, drawbar pull, wheel slip and fuel consumption, from which values were derived for horsepower-hours per acre and per gallon of fuel and theoretical field capacity.

Yields were measured each year. During 1966 and 1967 there were significant yield increases from chisel-listing with no advantage for the deepest treatment as compared to shallow and medium. At Safford in 1971 there was a significant increase from conventional tillage and shallow and medium-depth chisel-listing as compared to list only and medium chisel-listing with a row move.

Under a reduced program in 1972 and 1973 there was no significant difference in yields when comparing conventional to minimum tillage.

Table I is a summary of yield results from the minimum tillage tests conducted at all three stations.

Table I. Summary of yield results, pounds of seed cotton/acre, minimum tillage experiments 1965 through 1973.

<u>Tillage System</u>		<u>Location</u>		
		<u>Marana, CRC and Safford</u>	<u>Marana</u>	<u>Safford</u>
A. <u>1965, 1966 and 1967</u>				
Conventional		2,851		2,820
List only	move rows 20"	--		2,926
Chisel-list 14"	" "	--		3,074
Chisel-list 16-18"	" "	3,185		3,115
Chisel-list 18-20"	" "	3,147		3,072
B. <u>1969</u>				
Conventional		<u>CRC</u> 2,998	<u>Marana</u> 3,374	<u>Safford</u> 2,710
List only	move rows 20"	3,346	3,421	2,272
Chisel-list 14"		--	3,454	2,426
Chisel-list 18"		3,421	3,416	2,528
Chisel-list 18"	move rows 20"	3,482	3,250	2,276
C. <u>1969, 1970 and 1971</u>				
Conventional		<u>Marana</u> 2,594		<u>Safford</u> 2,178
List only	move rows 20"	2,592		1,937
Chisel-list 14"		2,621		2,124
Chisel-list 18"		2,649		2,167
Chisel-list 18"	move rows 20"	2,494		2,003
D. <u>1972 and 1973</u>				
Conventional		<u>CRC</u> 3,452		
List only	move rows 20"	3,248		
Chisel-list 14"		3,646		

Stapleton's draft-fuel measurements are summarized in Table II. Shallow chisel-listing required only 10.25 horsepower-hours/acre as compared to 45.57 for conventional, or 22.5 percent as much energy. Time requirements are in approximately the same proportion, with 88.14 minutes/acre required for conventional tillage and 15.37 for shallow chisel-listing.

Table II. Energy and time inputs for different tillage systems.

<u>Tillage System</u>	Hp-hr/A	% of Convnt'l	Minutes per A	% of Convnt'l
Conventional	45.57	100.00	88.14	100.00
List only	7.77	17.05	14.42	16.02
Chisel-list 14"	10.25	22.49	15.37	17.44
Chisel-list 16-18"	12.05	26.46	21.24	24.10
Chisel 18-20" and list (2 operations)*	26.62	58.41	46.53	52.79

*Two passes required due to horsepower limitations of tractor.

The time required as shown in the above table should be increased for each operation because the values are based on theoretical field capacity and do not include time for turning, repairs, etc. A reasonable factor would be 10 percent additional time for disking and floating and 20 percent for other operations.

Figure 1 is a Gantt chart depicting the time requirements and scheduling possibilities when preparing 500 acres of land for cotton. The upper chart shows the schedule for three tractors performing conventional tillage. The second is for chisel-list tillage, using the same three tractors, and the third is for chisel-listing with only two tractors. Loss of field capacity due to turning and other interruptions is included. The conventional system requires a total of 1,102 man and machine hours and a total elapsed time of 394 hours, approximately 6 1/2 sixty-hour weeks. Chisel-listing with three tractors requires 328 hours and a total time span of 132 hours. Chisel-listing with two tractors also requires 328 man and machine hours and about 3 1/2 sixty-hour weeks.

Conclusions

Results from these eight years of testing would seem to prove conclusively that chisel-listing did not depress yields.

More important, however, was the highly significant savings in energy inputs when chisel-listing, particularly the shallow and medium-depth operations at 14 to 18 inches below the old furrow level. These energy inputs can be translated to fuel consumption, a critically important item at this time.

Savings in time and labor also cannot be ignored.

There are some problems associated with chisel-list tillage. It does result in some trash in the drill row that interferes with planting, particularly unit planters. The half-row lateral move is definitely superior for trash coverage. Slower ground speeds when chisel-listing decrease the throw of the lister moldboards. Welding slatted extensions to the moldboards will alleviate this problem.

Preplant herbicides obviously cannot be broadcasted and disked in, but they can be applied over the beds and incorporated with a rolling cultivator.

FIG. 1. TIME REQUIREMENTS AND SCHEDULING OF OPERATIONS, CONVENTIONAL TILLAGE COMPARED TO CHISEL-LISTING

