MINIMUM TILLAGE / RESIDUE MANAGEMENT

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OBJECTIVES: Minimum tillage has received attention in recent years as a technique to reduce production costs, improve soil quality, and reduce erosion. This study was initiated to evaluate the effects of minimum tillage on cotton growth and soil quality.

PROCEDURES: The 1990 study was conducted at the U.S. Cotton Research Station in Shafter, CA. The treatments were established in a barley field prior to grain harvest. The barley had been drilled onto 40" beds in the Fall of 1989. The treatments included:

Strip Till	Barley flail chopped at approximately six inches above the bed. An eight inch strip was roto-tilled in the center of each bed.
Shallow	Flail chopped followed by a shallow incorporation with an Oppal roto-tiller.
Fallow	Most of the barley was removed from this treatment the previous winter. No tillage prior to cotton planting.
Deep Incorp	Barley flailed and deeply incorporated with a Howard rototiller.
Flailed	Barley flailed approximately six inches above the surface. No incorporation.

GC-510 was planted using an experimental minimum tillage planter (described elsewhere in this report) on April 5 and a stand failure caused a replant on April 19. It was impossible to move furrow irrigation water into the seed row because of the residue and the general condition of the beds. Sprinklers were used to obtain a stand. Stand counts were made after all seedlings had emerged.

UN-32 was water run with six irrigations for a total of 200 units N applied. Other than an application of sulfur dust, no insecticides were applied. No mechanical cultivation was performed. Weeds were managed with fusilade and hand hoeing.

A penetrometer was used to measure soil compaction in early July, 1990. Extensive plant mapping was done just prior to harvest. The plots were machine harvested for yield estimates.

RESULTS: This was the first year of the study, so these results are speculative at best. Seedling emergence was substantially reduced in the flail chopped plots (Table 1). The residue left on the surface impeeded the seedlings and in some cases the planter was unable to close the slot adequately. The strip till and deep incorporation treatments had better emergence than either the shallow incorporation or the fallow treatment. The penetrometer data (Table 1) detected a trend toward slightly more soil

compaction in the fallow treatment. All plots received equal traffic throughout the season, so this would not explain the observed differences. The differences could be do to beneficial effects of the barley roots.

The plots were machine harvested and the flailed treatment had significantly lower yields than the other four treatments (Table 1). This was probably due to poor seedling emergence followed by reduced early growth. The stubble tended to shade out the seedlings and inhibited their early performance. The plant mapping data did not detect any consistent differences among any of the treatments (Fig.2). The fallow treatment tended to have more bolls on the first two positions.

FUTURE PLANS: Barley was in the Fall of 1990. The treatments will be re-established in the same plots in 1991 and the study will be repeated.

Table 1. Seedling emergence (number per meter), lint yield (bales per acre) and penetrometer data for the 1990 residue management study.

Treatment	Emergence	LSD	Lint Yield	LSD	Penetrometer	LSD
	(seelings / 2m)		(bales / A)		(resistance)	
Strip Till	11.75	ab†	2.5	a	1.94	b
Shallow Incorp	10.25	b	2.4	a	2.07	ab
Fallow	10.25	b	2.5	a	2.23	a
Deep Incorp	13.30	a	2.6	a	2.05	ab
Flail Chop	7.55	c	2.0	b	2.15	ab

† Values followed by the same letter are not statistically different at the 5% level of significance.

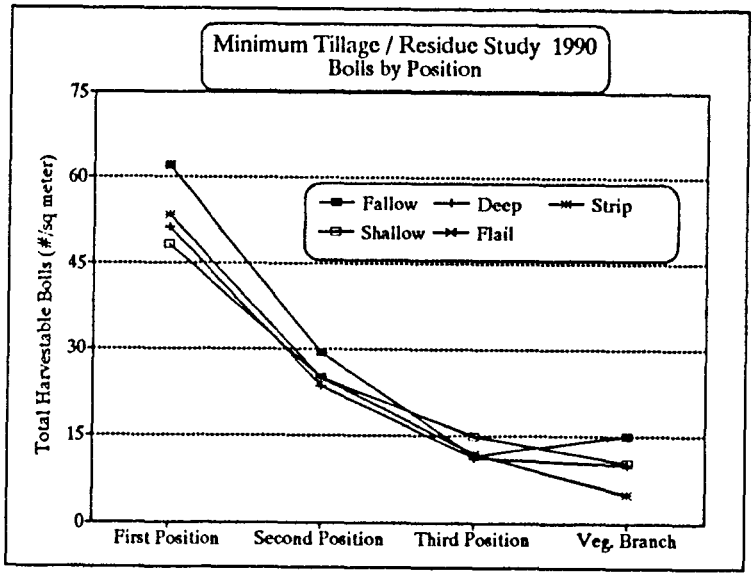

Figure 1. Total number of harvestable bolls by horizontal position on the plant. Shafter, CA. 1990.