Influence of Weed Interactions of Conservation-tillage Systems and Weed Management on Cotton

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INTRODUCTION

Conservation-tillage acreage has increased in the U.S. to improve erosion control. It is estimated that over 90% of US. farmland will be under some form of conservation-tillage by the year 2000 (1). However, in the southeastern U.S. there are agronomic and pest management limitations to the adoption of conservation-tillage cotton. In many of the eroded soils of the piedmont, soil compaction can seriously impede cotton growth. Without mechanically disturbing the soil compaction layer, implementation of conservation-tillage cotton will be difficult. Conservation-tillage acreage in the southeast has also been minimal because pest management, including weed control, is difficult.

The objectives of this research were to determine optimal weed management and conservation-tillage system for cotton in the Georgia piedmont.

MATERIALS AND METHODS

Experiment., were established at the Southern Piedmont Research Center near Watkinsville, GA in 1991. The soil was a Cecil sandy loam (Typic Hapludult, clayey, kaolinitic, thermic) with a pH of 5.8 and organic matter of 2.3%. Wheat *(Triticum aestivum* L.) was planted as a cover crop at 100 kg ha^{-1} the fall before cotton establishment. Twenty days before cotton planting, paraquat at 0.6 kg ha^{-1} was applied in 250 L ha^{-1} carrier to kill existing vegetation.

The experimental design was a split-split block with three replications. The whole block consisted of four conservation-tillage systems and a conventional-tillage system for comparisons. Whole blocks were subdivided into sub-plots of three cotton varieties and four herbicide input systems. The three cotton varieties were 'Deltapine 90.' 'Tifcot 56,' and 'DES 119.' The four herbicide input systems were: no-input; norflurazon applied preemergence at 1.1 kg ha^{-1} plus fluometuron applied ' preemergence at 1.1 kg ha^{-1}; norflurazon and fluometron followed by a split application of MSMA at 1.6 kg ha^{-1} post-directed at cotton 10 cm and 18 cm in height; and a postemergence only treatment of a split-application of MSMA postdirected at cotton 10 cm and 18 cm and sethoxydim applied at 0.2 kg ha^{-1} postemergence over the top. MSMA was applied with 0.25% v/v non-ionic surfactant and sethoxydim was applied with a crop oil at 2 L ha^{-1} . Five tillage regimes were examined. These were a conventional tillage (fall and spring disk harrow) and four conservation tillage regimes that are outlined in Table 2.

Visual evaluations of weed control were made 2 and 6 weeks after planting (WAP). A determination of percent boll open was made 2 weeks before harvest. Seed cotton yields were taken out of the two middle rows of each plot.

Weed control evaluations and other cotton growth measurements were subjected to an analysis of variance and means were separated according to Fisher's Protected LSD at the $p < 0.05$ level.

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Table 1. Weed control in conservation-tillage cotton.

Herbicide	XANST[a,b]		CASOB		DIGSA	AMACH	Bolls Open	Seed Cotton Yield
	2WAP	6WAP	2WAP	6WAP	6WAP	6WAP		
	%							kg ha^{-1}
Control	0	0	0	0	0	0	27	631
Norflurazon (1.1 PRE) + Fluometuron (1.1 PRE)	86	55	89	59	70	66	42	1461
MSMA (1.6 PD) + MSMA (1.6 PD) + Sethoxydim (0.2 POT)	83	79	84	81	69	a4	41	2345
Norflurazon (1.1 PRE) + Fluometuron (1.1 PRE) + MSMA (1.6 PD) + MSMA (1.6 PD)	-	82	-	85	40	83	57	2336
LSD (0.05)'	18	7	19	5	11	12	13	882

[a] Visual ratings recorded as weeks after planting.

[b] XANST, CASOB, AMACH, and DIGSA are Bayer codes for common cocklebur, sicklepod, smooth pigweed, and large crabgrass, respectively.

[c] For comparison of any two means within a column.

Table 2. Cotton growth and seed cotton yields over tillage regimes.

Tillage regime			
Fall	Spring	Open Bolls	seed Cotton Yield
		%	kg ha"
Para plow	Coulter Inrow Chisel	32	1492
Para plow	Fluted Coulter	52	1844
Disk harrow	Coulter Inrow Chisel	42	1473
Disk harrow	Fluted Coulter	35	1571
Disk harrow	Disk harrow	41	2086
	LSD (0.05)*	14	NS

* For comparison of any two means within a column.

RESULTS AND DISCUSSION

Visual weed control, percent boll open, and seed cotton yields for the herbicide inputs applied are shown in Table 1. Significant differences in yield and cotton maturity as indicated by percent boll opening were observed. Cotton treated with norflurazon and fluometuron applied preemergence followed by a split application of MSMA and the split application of MSMA with postemergence sethoxydim without a preemergence soil applied herbicide provided the best seed cotton yields. This can be attributed to broadleaf weed provided by treatments containing MSMA (> 80% control of sicklepod, common cocklebur, and smooth pigweed 6 WAP).

There were differences in cotton maturity across tillage regimes. The conventional tillage (disk harrow, fall and spring) and the fall para plow followed by a fluted coulter matured faster than the other tillage treatments. No significant differences in seed cotton yield were found among tillage regimes.

Significant differences in yield were not found among the three cotton varieties examined.

LITERATURE CITED

1. Witt, W. 1980. Weed control in no-tillage. Pages 96-103. *In* (Philips, R. E., G. W. Thomas, and R. L. Blevins, ed.) No-Tillage Research: Research Reports and Reviews. University of Kentucky Agricultural Experiment Station, Lexington.