

WEED MANAGEMENT SYSTEMS IN SOUTHERN PIEDMONT COTTON (*Gossypium hirsutum*)

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ABSTRACT

Field studies were conducted at the Southern Piedmont Research Center in Watkinsville, GA to examine weed management strategies for conservation-tillage cotton. Weed management systems that included a post-directed or postemergence herbicide application provided greater weed control than those with preemergence herbicides only. Differences in tillage were specific among weed management systems and varieties were observed. In weed management systems without postemergence weed control, tillage differences were not observed. When a preemergence only weed management system was utilized, cotton grown in the conventional-tillage system yielded the highest. The paraplow followed by in-row chisel planter yielded higher than the other tillage systems. DS119 cotton yielded higher than the DPL90 and Tifcot 56 in plots in which cotton was planted with a in-row chisel either behind fall paraplow or disk-harrow. Varietal differences were not observed when a fluted coulter was used to plant cotton. In the conventional-tillage system, DPL90 yielded higher than DS119 and Tifcot56. Economic analysis showed that net returns were greater with DS119 at the two higher weed management systems under all tillage regimes. Economic returns from DPL90 and Tifcot56 were negative except in conventional-tillage and high weed management systems.

INTRODUCTION

Cotton acreage has increased in Georgia by 500,000 acres in the last ten years and is expected to be approximately 1,000,000 acres by the end of the decade (Crawford, personal communication). Economics and legislation such as the 1990 Farm Bill have lead to an increase in conservation-tillage cotton acres in Georgia overall

and particularly in the highly-erodible soils of the piedmont regions.

The objectives of this research were to evaluate four conservation-tillage systems compared to conventional-tillage in cotton. Within these tillage systems, four weed management systems, and three cotton varieties. A crop enterprise cost analysis was utilized to compare the net returns from tillage systems, weed management, and varieties used.

METHODS

These studies were conducted from 1991 to 1993 at the Southern Piedmont Research Center near Watkinsville, GA on a Cecil sandy loam soil. In all years of the study, rye was planted in the fall after fall tillage operations (disk harrowing and paraplow). The rye cover crop was killed with paraquat applied at 0.5 lb/A when approximately 3000 lbs dry matter/A was present. Cotton was planted shortly after the rye cover crop was killed. The field plots were arranged in a split-split-block design with tillage regimes as whole block split for weed management and variety studies. The whole blocks were five tillage regimes which consisted of conventional-tillage (fall disk harrow followed by spring disk harrow), four conservation-tillage regimes of fall paraplow followed by planting with a fluted coulter or in-row chisel at planting, and fall disk-harrowing followed by planting with a fluted coulter or in-row chisel. These whole tillage blocks were split into weed management and cotton varietal sub-blocks. The weed management consisted of no inputs, preemergence only system consisting of norflurazon plus fluometuron applied at 1.0 lb/A, postemergence only system consisting of a split application of MSMA applied post-directed at 6-8 inch cotton and 10-12 inch cotton at 1.5 lb/A and sethoxydim applied broadcast at 0.20 lb/A, and a preemergence plus postemergence system consisting of norflurazon applied preemergence at 1.0 lb/A followed by a split application of MSMA applied post-directed at 1.5 lb/A at the 6-8 inch and 10-12 inch cotton height. The cotton varietal sub-block consisted of three cotton varieties (DS119, DPL90, and Tifcot 56). Visual weed control ratings were taken 10 weeks after planting and seed cotton yields were taken.

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Seed cotton yields were converted to fiber yields for an economic analysis based on a Crop Enterprise Cost Analysis developed by the Georgia Cooperative Extension Service (Givan and Shurley, 1993) Data were analyzed by computer using ANOVA procedures (SAS, 1985).

RESULTS AND DISCUSSION

Differences in tillage were specific among weed management systems and varieties. In weed management systems without postemergence weed control, tillage differences were not observed. Sicklepod and smooth pigweed control were greater than 80% 10 weeks after planting (WAP) in all tillage systems in which a post-directed application of MSMA was applied. In the weed management system in which no postemergence herbicides were used, sicklepod and smooth pigweed control ranged from 60 to 75% 10 WAP. When a preemergence only weed management system was utilized, cotton grown in the conventional-tillage system yielded higher than other conservation-tillage systems. Under weed management systems utilizing postemergence only weed control, cotton yielded higher than the other tillage systems when the paraplow followed by an in-row chisel planter was used. Under weed management system utilizing preemergence plus postemergence weed control, cotton yields were equivalent between fall paraplow followed by spring planting with fluted coulter and fall paraplow followed by spring planting with an in-row chisel, and conventional-tillage.

DS119 cotton yielded higher than the DPL90 and Tifcot 56 in plots in which cotton was planted with a in-row chisel either behind fall paraplow or disk-harrow. Varietal differences were not observed when a fluted coulter was used to plant cotton. In the conventional-tillage system, DPL90 yielded higher than DS119 and Tifcot56. Economic analysis showed that net returns were greater with DS119 at the two higher weed management systems under all tillage regimes.

Economic analysis revealed that positive net returns resulted when the weed management system consisted of a residual preemergence followed by postemergence herbicide and the cotton variety DS119 was planted under all five tillage systems. The highest net returns among the five tillage systems were with the fall disk-harrow followed by spring in-row chisel for cotton planting (\$50 dollars/A). The lowest net returns were from the conventional-tillage system (\$2/A). When DS119 cotton variety and a postemergence only weed management system were utilized, positive net returns were observed from the fall paraplow followed by spring in-row chisel (\$108/A), fall disk-harrow followed by spring in-row chisel (\$24/A) or fluted coulter (\$11/A), but not the conventional-tillage system. In plots in which DPL90 cotton was planted positive net returns were observed in the conventional-tillage plots with weed management systems that contained a postemergence herbicide.

These data indicate that conservation-tillage cotton requires intensive weed management to be successful. A postemergence weed management system is requisite. Among cotton varieties examined, DS 119 seemed best suited to conservation-tillage while DPL 90 is best suited to conventional-tillage. Among tillage systems examined, the spring in-row chisel preceded by either a fall paraplow of disk-harrowing operation seemed to perform better.

LITERATURE CITED

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