10

Effects of Tillage, Rye Cover Crop, Herbicide Program and Planting Date on Browntop Millet Control in Glyphosate-Tolerant Cotton

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INTRODUCTION

Cotton production practices in the Mississippi Delta usually include fall tillage either as shallow tillage to re-establish beds and irrigation furrows, or deep tillage followed by bedding to alleviate soil compaction. These operations bury cotton residues and cause considerable soil erosion. Addition of a winter cover crop in cotton production may improve soil properties and weed control. Winter cover crops reduce populations of many winter and summer annual weeds. Although termination of cover crops is required, reducing the number of species may result in a more uniform burndown, and reduce the need for preemergence treatments at planting. However, little is known about whether a cover crop can alter weed distributions or cause species shifts during subsequent crop development. The contributions of cover crops to the entire weed control system need to be understood before being included in a production system

Browntop millet (*Brachiaria ramose* (L.) Stapf) is grown for hay and pasture in the southeastern U.S., as well as in food plots for deer and game birds. It is also used to stabilize disturbed soil in forestry. Browntop millet is becoming a dominant weed in pre- and post-harvest fields of cotton, corn, and soybean in the Mississippi Delta. Though readily controlled by preemergence herbicides and glyphosate, browntop millet continues to germinate after preemergence herbicide activity diminishes, becomes established beneath the cotton canopy, and intertwines with cotton shoots. Browntop millet may interfere with mechanical harvest, reduce lint quality and color grade, and increase trash content.

OBJECTIVES

To determine seasonal and long term changes in browntop millet populations with respect to tillage, herbicide applications, rye cover crop, and planting date in cotton.

RESULTS

Table 1. Effects of tillage, rye cover crop and herbicide program on cotton yield and browntop millet biomass at harvest.

		Seed Cotton			Browntop Millet		
Main Effects		2004	2005	2006	2004	2005	2006
		--------- kg/ha ----------			---------- g dry weight/m^2 -------		
Tillage							
	Conventional	2483a	2867a	3377b	4a	53a	8a
	Reduced	2778b	2752a	2887a	62b	135b	22b
Cover crop							
	Rye	2728b	2697a	3070a	18a	126b	28b
	No Rye	2534a	2922b	3194a	48b	62a	2a
Herbicide							
	With PRE	2669a	2816a	3062a	8a	89a	10a
	No PRE	2593a	2803a	3202a	59b	98a	21a

Means within a column and main effect followed by the same letter are not significantly different at the 5% level.

Table 2. Effects of tillage and early planting on browntop millet (BTM) population prior to layby application, and on biomass and percentage control at harvest.

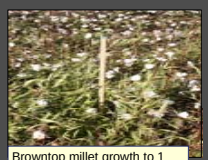
	Weed count prior to last glyphosate application		BTM biomass		BTM control	
Main Effects	6-29-05	6-21-06	2005	2006	2005	2006
	--------- Plants/m^2 ------		--g dry weight/ m^2---		--------% control-------	
Planting						
Early	14a	312a	--	104b	85a	61a
Normal	7a	147a	--	35a	93a	84b
Tillage						
Conventional	3a	44a	--	37a	97b	85b
Reduced	19b	415b	--	102b	81a	59a

Means within a column and main effect followed by the same letter are not significantly different at the 5% level.

Browntop millet germination following irrigation.

Browntop millet revealed after defoliation.

Browntop millet interference in cotton .



Browntop millet growth to 1 meter.

Browntop millet seed production.

Browntop millet interference with harvest.

MATERIALS AND METHODS

Location: USDA-ARS Southern Weed Science Research Farm, Stoneville, MS

Soil: Dundee silt loam soil, pH 6.7, 1% OM.

Variety: Glyphosate-resistant cotton cultivar 'DP 436RR' planted either April 1 or May 5.

Tillage: Conventional - Fall disking, subsoiling and bedding. Reduced tillage - single pass with a shallow furrow-opening sweep in spring.

Design: a split plot arrangement in a RCBD with four replications

Plot size: Eight rows, 40 inches wide, by 96 ft

Irrigation: as needed

Burndown: glyphosate at 1.1 kg/ha to kill existing vegetation and the rye cover crop.

Herbicide Programs: PRE: metolachlor (1.1 kg/ha), fluometuron (1.1 kg/ha), glyphosate (1.1 kg/ha), followed by glyphosate (1.1 kg/ha) POST at 1-leaf and 4-leaf cotton; No PRE: glyphosate (1.1 kg/ha) at planting followed by glyphosate (1.1 kg/ha) POST at 1-leaf and 4-leaf cotton. Layby: glyphosate (1.1 kg/ha).

Analysis: Data subjected to analysis of variance. Means were separated at the 5% level using an LSD test.

CONCLUSIONS

Rye cover crop, reduced tillage and early planting resulted in higher browntop millet populations and biomass indicating that these conditions were favorable for browntop millet germination and survival.

Although glyphosate reduced browntop millet populations to near zero between applications, browntop millet was re-established beneath the cotton canopy and became the most prevalent weed from the last glyphosate application to cotton defoliation.

These results indicate a need for application of a residual herbicide along with a postemergence herbicide at layby to manage late season browntop millet.