CONTROLLING PROBLEM WEEDS IN COTTON

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INTRODUCTION

Cotton producers have searched for better and more efficient weed control techniques since the first weed was hand pulled from the first cotton crop grown. Hand pulling, hoeing, cultivation with many types, shapes and designs of plows, grazing with geese, burning, and herbicides have all been used in the fight against weeds. As new and improved control measures evolve, populations of weed species often shift and different weeds become major concerns. In the early 1970s, johnsongrass was considered one of the worst weeds in cotton. Today, johnsongrass is easily controlled on the few acres it infests. However, weeds are still a major nemesis to cotton growers. It is estimated that losses in Arkansas due to weeds amount to approximately 34 million dollars annually (Webster, 1998). Currently, pigweed and morningglory are the two most troublesome weeds for Arkansas cotton growers (Smith, 2000). The latest tool developed in our ever-evolving weed control arsenal has been the introduction OF transgenic cotton varieties tolerant to glyphosate and bromoxynil herbicides. Studies were conducted in Arkansas to evaluate weed control utilizing the glyphosate- and bromoxynil-tolerant cotton systems.

METHODS AND MATERIALS

All studies were conducted in 1999 at the University of Arkansas Southeast Research and Experiment Station located at Rohwer. The variety DP4415RR was utilized in the glyphosate studies and BXN 47 in the bromoxynil tolerant studies. The cotton was planted in conventional till, 38-inch rows and grown under normal insect, irrigation, and fertility management recommended for the area. All preemergent and over-the-top broadcast herbicide applications were applied in 15 gpa total volume with a CO_2 backpack sprayer equipped with 8003 flat fan nozzles. Directed postemergence applications were made with a tractor-mounted directed spray rig equipped with two 8002VS nozzles per row. Herbicides were applied on a 19-inch band in 10 gpa total volume.

RESULTS AND DISCUSSION

In Study 1, fluometuron + prometryn at 0.75 + 0.75 lb ai/acre applied PRE *fb* glyphosate at 0.75 lb ai/acre EP; pyrithiobac + fluometuron at 0.031 + 0.75 lb ai/acre

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PRE *fb* pyrithiobac + glyphosate at 0.063 + 0.75 lb ai/acre EP; pyrithiobac at 0.031 lb ai/acre PRE *fb* pyrithiobac + glyphosate at 0.063 + 0.75 lb ai/acre EP; and clomazone at 1.0 lb ai/acre PRE *fb* glyphosate at 0.75 lb ai/acre EP were compared to glyphosate at 0.75 lb ai/acre applied at the 3-4 and 6-8 leaf stage of cotton. None of the treatments containing soil-applied residual herbicides were superior to the two postemergence applications of glyphosate for control of large crabgrass (*Digitaria sanguinalis*, DIGSA), barnyardgrass (*Echinochloa crus-galli*, ECHCG), pitted morningglory (*Ipomoea lacunosa*, IPOLA), prickly sida (*Sida spinosa*, SIDSP), and redroot pigweed (*Amaranthus retroflexus*, AMARA) (Fig 1). Fluometuron + prometryn *fb* glyphosate, pyrithiobac + fluometuron *fb* pyrithiobac + glyphosate, pyrithiobac *fb* pyrithiobac + glyphosate and clomazone *fb* glyphosate provided significantly less control of IPOLA than the two applications of glyphosate. Pyrithiobac *fb* pyrithiobac + glyphosate also provided less control of DIGSA and ECHCG.

Various combinations of pendimethalin at 1.0 lb ai/acre applied PPI; fluometuron at 1.0 lb ai/acre PRE; and glyphosate at 1.0 lb ai/acre EP (2-4 lf cotton) were compared for control of IPOLA, AMARE, SIDSP, broadleaf signalgrass (*Brachiaria platyphylla*, BRAPP), ECHCG, and DIGSA in Study 2. Combinations included pendimethalin *fb* glyphosate, pendimethalin *fb* fluometuron *fb* glyphosate, fluometuron *fb* glyphosate, glyphosate alone, and pendimethalin *fb* fluometuron. The single application of glyphosate at the 2-4 leaf stage of cotton provided significantly less control of IPOLA than treatments including a soil applied residual herbicide (Fig 2). Pendimethalin *fb* glyphosate and pendimethalin *fb* fluometuron provided less IPOLA control than pendimethalin *fb* fluometuron *fb* glyphosate and fluometuron *fb* glyphosate. No differences in control of other species were noted between any treatments.

Study 3 compared pendimethalin at 1.0 lb ai/acre PPI *fb* glyphosate at 0.75 lb ai/acre EP *fb* glyphosate + diuron at 0.75 + 0.75 lb ai/acre LP; pendimethalin at 1.0 lb ai/acre PPI *fb* glyphosate + pyrithiobac at 0.75 + 0.063 lb ai/acre EP *fb* glyphosate + diuron at 0.75 + 0.75 lb ai/acre LP; pendimethalin at 1.0 lb ai/acre PPI *fb* glyphosate at 0.75 lb ai/acre EP *fb* cynazine + MSMA at 0.75 + 2.0 lb ai/acre LP; and glyphosate at 0.75 lb ai/acre EP *fb* glyphosate at 0.75 lb ai/acre MP *fb* glyphosate at 0.75 lb ai/acre LP for control of ECHCG, IPOLA, SIDSP, and AMARE. The pendimethalin *fb* glyphosate *fb* glyphosate + diuron and the three sequential applications of glyphosate provided significantly less IPOLA control than the other two treatments (Fig 3). All treatments provided greater than 90% control of ECHCG, SIDSP, and AMARE.

Study 4 evaluated combinations of pendimethalin at 1.0 lb ai/acre applied PPI, prometryn at 1.0 lb ai/acre applied PRE and metolachlor at 0.95 and glyphosate at 0.75 lb ai/acre applied early postemergence for weed control until layby applications could be made. Treatments including pendimethalin *fb* prometryn *fb* metolachlor; pendimethalin *fb* prometryn *fb* glyphosate + metolachlor; pendimethalin *fb* glyphosate; and pendimethalin alone were compared at layby for control of IPOLA, AMARE, SIDSP, BRAPP, ECHCG, and DIGSA control. No treatment provided greater than 85% control of IPOLA. Pendimethalin *fb* prometryn *fb* metolachlor and pendimethalin alone provided only 58% and 12% control of IPOLA, respectively (Fig. 4). The addition of

metolachlor to early post applications of glyphosate did not improve weed control over that achieved with pendimethalin *fb* glyphosate. Control of species other than IPOLA was greater than 90% with all treatments except pendimethalin alone.

Study 5 compared pyrithiobac and bromoxynil combinations for control of IPOLA, SIDSP, velvetleaf (*Abutilon theophrasti*, ABUTH), and rice flatsedge (*Cyperus esculentus*, CYPIR). Pyrithiobac was applied alone PRE or in combination with bromoxynil postemergence over-the-top. Each pyrithiobac application was at 0.038 lb ai/acre while the bromoxynil rate was 0.5 lb ai/acre. SIDSP and ABUTH control was excellent with pyrithiobac when applied PRE or in sequential applications PRE *fb* POST in combination with bromoxynil (Fig. 5). The best IPOLA control was acheived when pyrithiobac was applied in sequential applications. Bromoxynil alone applied postemergence failed to provide adequate IPOLA control.

CONCLUSIONS

The introduction of genetically modified plants with tolerance to glyphosate and bromoxynil herbicides have provided improved tools for controlling difficult weeds in cotton. Morningglory, velvetleaf, prickly sida, and pigweed can be adequately controlled with glyphosate or bromoxynil + pyrithobac herbicides if careful attention is paid to application timing.

LITERATURE CITED

Webster, E.P. 1998. Estimated losses due to weeds in Arkansas. Proc., Southern Weed Science Society 51:316.

Smith, K.L. 2000. Estimated losses due to weeds in Arkansas. Proc., Southern Weed Science Society. 53 (submitted).

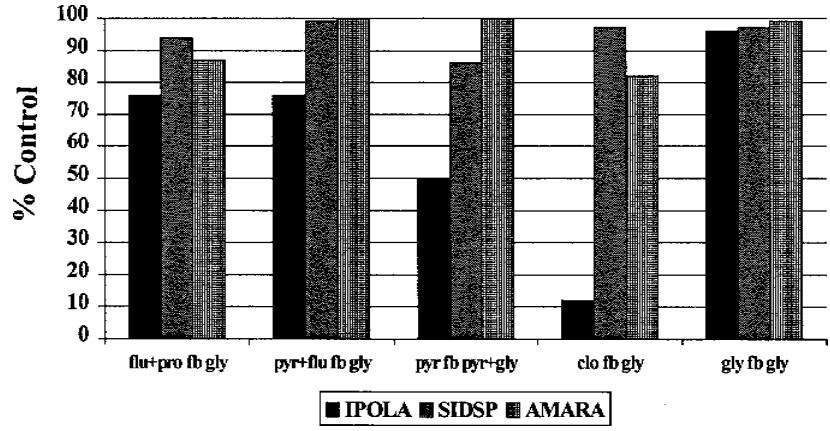

Figure 1. Broadleaf control PRE *fb* MP.

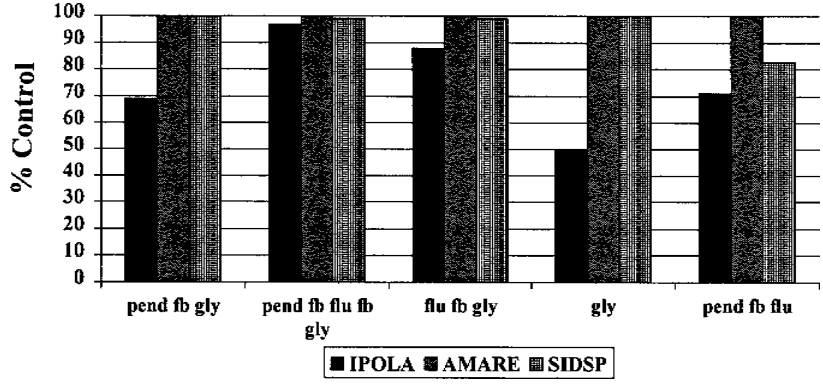

Figure 2. ProwlCotoran in RR cotton broadleaf control.

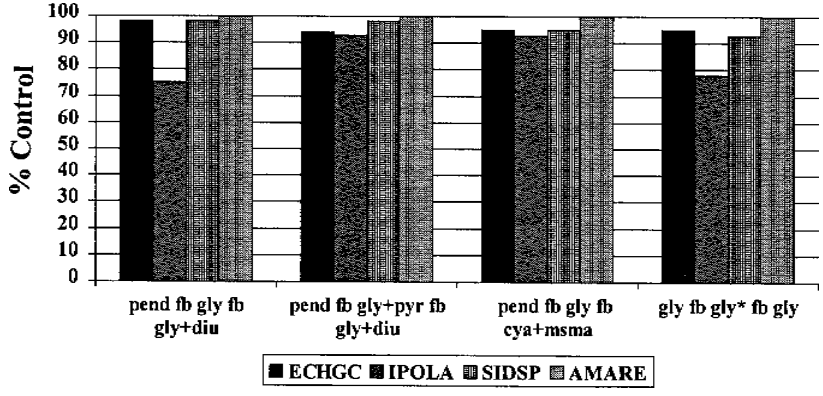

Figure 3. PRE and directed POST applications in RR cotton.

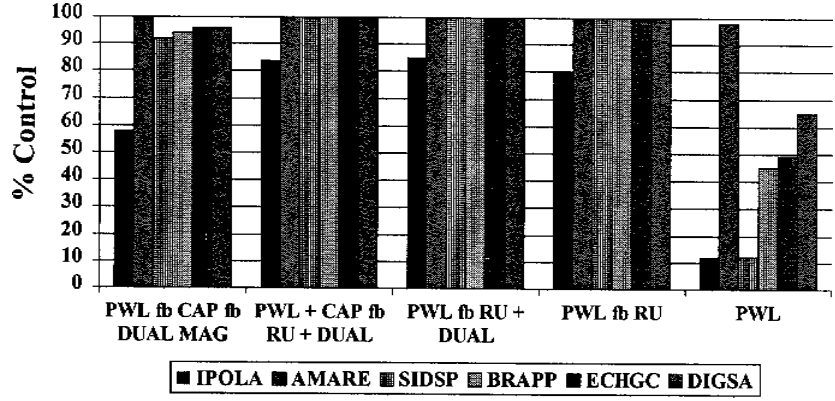

Figure 4. Prowl/Caparol in RR cotton.

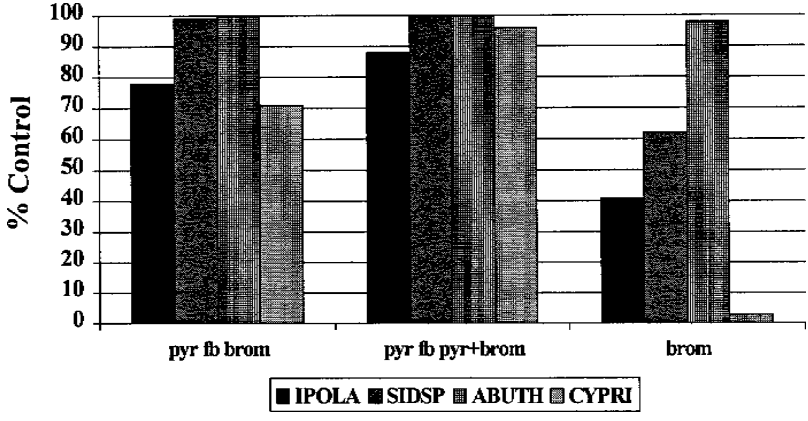

Figure 5. Weed control in BXN cotton.