

**EFFECTIVENESS OF SOIL RESIDUAL  
HERBICIDES IN ROUNDUP READY  
(GLYPHOSATE-TOLERANT)  
COTTON PROGRAMS**  
**K. L. Smith and J. W. Branson**  
**University of Arkansas**  
**Southeast Research and Extension Center**  
**Monticello, AR**

**Abstract**

Genetically engineered cotton varieties containing the Roundup Gene® offer promise for reduced weed control inputs. However, farmer acceptance has been slow due to the narrow over-the-top application window and perceived yield losses or delayed maturity associated with in crop applications of glyphosate (Roundup) herbicide after the four leaf stage of cotton. Roundup herbicide provides no residual weed control and late germinating weeds often cause harvest problems and yield losses.

Four studies were conducted in 1999 at the University of Arkansas Southeast Research Station located at Rohwer, Arkansas to evaluate the need and/or fit of soil applied residual herbicides in a Roundup Ready cotton program and to evaluate the effectiveness of soil applied residual herbicides in programs containing only one application of glyphosate. DP4415-RR variety was planted on May 19-21 in conventional 38 inch rows. All studies were established in randomized complete block design with four replications. Cotton was grown under normal cultural practices and furrow irrigated as needed. Preemergence (PRE) and over-the-top broadcast treatments were applied in 15 gpa total volume with a CO<sub>2</sub> backpack sprayer equipped with 8003 flat fan nozzles on 19 inch spacing. Directed postemergence treatments were applied with a tractor mounted directed spray rig equipped with two 8002 vs nozzles per row. Herbicides were applied on a 19 inch band in 10 gpa total volume.

In Study 1, fluometuron + prometryn at 0.75 + 0.75 lb ai/A applied PRE followed by (fb) glyphosate at 0.75 lb ai/A EP; pyriithiobac + fluometuron at 0.031 + 0.75 lb ai/A PRE fb pyriithiobac + glyphosate at 0.063 + 0.75 lb ai/A EP; pyriithiobac at 0.031 lb ai/A PRE fb pyriithiobac + glyphosate at 0.063 + 0.75 lb ai/A EP; and clomazone at 1.0 lb ai/A PRE fb glyphosate at 0.75 lb ai/A EP were compared to glyphosate at 0.75 lb ai/A 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* [AMARE]). Fluometuron + prometryn fb glyphosate,

pyriithiobac + fluometuron fb pyriithiobac + glyphosate, pyriithiobac fb pyriithiobac + glyphosate and clomazone fb glyphosate provided significantly less control of IPOLA than the two applications of glyphosate. Pyriithiobac fb pyriithiobac + glyphosate also provided less control of DIGSA and ECHCG.

Different combinations of pendimethalin at 1.0 lb ai/A applied preplant incorporated (PPI); fluometuron at 1.0 lb ai/A PRE; and glyphosate at 1.0 lb ai/A 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 lf stage of cotton provided significantly less control of IPOLA than treatments including a soil applied residual herbicide. 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/A PPI fb glyphosate at 0.75 lb ai/A EP fb glyphosate + diuron at 0.75 + 0.75 lb ai/A LP; pendimethalin at 1.0 lb ai/A PPI fb glyphosate + pyriithiobac at 0.75 + 0.063 lb ai/A EP fb glyphosate + diuron at 0.75 + 0.75 lb ai/A LP; pendimethalin at 1.0 lb ai/A PPI fb glyphosate at 0.75 lb ai/A EP fb cynazine + MSMA at 0.75 + 2.0 lb ai/A LP; and glyphosate at 0.75 lb ai/A EP fb glyphosate at 0.75 lb ai/A MP fb glyphosate at 0.75 lb ai/A 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. All treatments provided greater than 90% control of ECHCG, SIDSP and AMARE.

Study 4 evaluated combinations of pendimethalin at 1.0 lb ai/A applied PPI, prometryn at 1.0 lb ai/A applied PRE and metolachlor at 0.95 lb ai/A and glyphosate at 0.75 lb ai/A 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. 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.