

**PALMER AMARANTH BIOTYPES CONFIRMED RESISTANT TO GLYPHOSATE- AND ALS-
INHIBITING HERBICIDES IN SOUTH CAROLINA**

Michael W. Marshall

Jacob G. Stokes

Clemson University

Blackville, SC

Abstract

Herbicide resistant Palmer amaranth has remained as one of the most troublesome concerns in cotton production in South Carolina. A survey of the distribution of ALS- and glyphosate-resistant Palmer amaranth in South Carolina was initiated in 2008 and continued in 2010. County extension agents collected seed from suspected grower fields in fall of 2008. Seedheads from each location were composited, dried, and cleaned. Palmer amaranth seed was planted in the greenhouse and grown to the 4-leaf stage. At the 4-leaf stage, plants were sprayed with glyphosate at 0, 22, and 44 oz/A, and thifensulfuron at 0, 0.33, and 0.66 oz/A. At 21 days after treatment, plants were visually scored (YES = plant survival or resistance; NO = plant death or susceptibility) to determine activity of glyphosate and thifensulfuron. In the dose response study, three biotype populations were planted in the greenhouse in 10 by 10 cm pots. At the 4-leaf growth stage, plants were sprayed with following rates of glyphosate: 0, 0.25, 0.5, 1, 5, 10, and 50 X where X equals 0.75 lb ae/A rate. Separately, plants were also treated with thifensulfuron at 0, 0.25, 0.5, 1, 10, 50, 100, and 1000X where X equals 0.33 oz/A. Significant number of survey sites (20 counties surveyed to date have resistance to one or both herbicide families) was confirmed to have both ALS- and glyphosate-resistance (27 out of 35 fields sampled). In the dose-response study, all three biotypes exhibited some levels of glyphosate resistance in the 1X to 5X rate range. At rates above 5X, the three biotypes did not exhibit high levels of glyphosate-resistance. A growth reduction starting at 2X was observed in all three biotypes. In contrast to glyphosate study, all three biotypes exhibited high levels of resistance to thifensulfuron (up to 10X rate). Between 10X and 50X, Palmer amaranth dry matter accumulation was inhibited by thifensulfuron. In conclusion, ALS- and glyphosate-resistance continues to spread across the major crop producing areas of South Carolina. Several indirect reports in 2010 indicate that glyphosate-resistance is now spreading across the piedmont region (upstate) of South Carolina. According to greenhouse testing, Palmer amaranth biotypes contained high levels of ALS-resistance and moderate levels of glyphosate-resistance. More testing is needed between the 1X and 5X rates of glyphosate on these biotypes.