WINTER COVER CROPS FOR MANAGING GLYPHOSATE-RESISTANT PALMER AMARANTH IN COTTON

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Abstract

A glyphosate dominated weed management strategy in corn, soybean, and cotton in the southern U.S. has resulted in the selection and rapid increase of glyphosate-resistant Palmer amaranth. Herbicide alternatives to glyphosate are often compromised by resistance (i.e. ALS-inhibitor). Cultural programs are urgently needed to manage these weeds that are effective, economic, and sustainable. Palmer amaranth seed depends on light for germination. Typically, a heavy plant residue on the soil surface significantly reduces the germination of small seeded weeds such as Palmer amaranth. The widespread adoption of cover crops potentially could reduce Palmer amaranth emergence early in the season. Therefore, the objectives of this experiment were to determine efficacy of fall planted cover crops on glyphosate-resistant Palmer amaranth populations in cotton and determine impact of selected herbicide programs in conjunction with fall cover crops on cotton growth and yield. Field experiments were conducted on growers' fields and at Edisto Research and Education Center located near Blackville, SC. Cover crop mixture (rye, oats, turnip, vetch, radish, and clover) was seeded at 70 lb. /A between October and December 2012, 2013, and 2014 in half of the field. The rest was left unplanted (weedy winter cover). Cover crops/weedy cover sections were terminated with glyphosate, 2, 4-D ester and Valor (pre-plant burndown) approximately 20 days before planting. Cotton variety 'Phytogen Widestrike 499' was planted at 3.8 seed/ft. row in mid-May of each year. Pre-emergence (PRE) herbicides of Reflex at 1.0 pt./A plus diuron at 1.0 pt./A plus paraquat at 3 pt./A were applied shortly after planting followed by POST1 (APT1) [treatment were glyphosate at 32 oz./A plus Warrant at 3 pt./A or Liberty at 29 oz./A plus Dual Magnum at 1.0 pt./A or Liberty at 29 oz./A plus Staple at 2.5 oz./A] at 2-3 lf cotton, POST2 (APT2) [treatments were glyphosate at 32 oz./A + Warrant at 3 pt./A, Liberty at 29 oz./A, or Liberty at 29 oz./A plus Dual Magnum at 1.0 pt./A] at 6-8 lf cotton, and LAYBY [MSMA at 2.67 pt./A plus diuron at 1.0 pt./A] at 18-20 inch cotton. Palmer amaranth populations were collected using of 1.0 m^2 quadrat at the following application timings APT1, APT2, and at LAYBY. Palmer amaranth population data and seed cotton yield data were analyzed using ANOVA and means separated at the P = 0.05 level. The presence of a cover crop significantly reduced early season Palmer amaranth populations compared to no cover crop when combined across treatments. Liberty plus Staple and Dual Magnum significantly reduced Palmer amaranth populations in the no cover regime compare to the glyphosate based programs. In-season cotton visual injury was not observed at this location. No significant seed cotton yield differences were observed between the cover crop and herbicide treatments. In conclusion, fall seeded cover crops appeared to reduce early season emergence of Palmer amaranth from the soil seed bank. Liberty based systems with residual herbicides provided consistently better Palmer amaranth control in these studies in both cover crop systems. Seed cotton yields were not affected by the cover crop or herbicide programs. When used in combination, cover crops, aggressive herbicide programs with mixtures of different modes-of-action, and removal of late season Palmer amaranth escapes will reduce the magnitude of the weed seed bank over time.