IMPACT OF TILLAGE ON MANAGING GLYPHOSATE-RESISTANT PALMER AMARANTH IN COTTON

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Abstract

A grower's ability to manage glyphosate-resistant Palmer amaranth in Roundup Ready cotton is heavily dependent on residual herbicides. With greater than 50% of the cotton acreage in Georgia produced without irrigation, timely rainfalls often do not activate these residual herbicides in a timely manner. Two experiments were conducted to determine the impact of deep turning, cultivation, or preplant incorporating (PPI) a yellow herbicide on the control of this resistant pest.

Both experiments were conducted in Georgia during 2008 in a field with a heavy population of glyphosate-resistant Palmer amaranth. Experiments were randomized complete block designs with a factorial arrangement of treatments. In the first experiment, two heavy tillage regimes (turning land 10 inch deep or not turning land) were implemented with four herbicide programs including no herbicide; Roundup WeatherMax (22 oz/A) applied topically to 1-, 5-, and 13-leaf cotton; and either Treflan (1.5 pt/A) PPI followed by Reflex (1 pt/A) preemergence (PRE) or Prowl H_20 (2 pt/A) plus Reflex (1 pt/A) PRE with both at-plant herbicide treatments followed by Roundup WeatherMax (22 oz/A) plus Dual Magnum (1 pt/A) topical to 5-leaf cotton and Direx (1 qt/A) plus MSMA (2.5 pt/A) directed to 13-leaf cotton.

A second experiment consisted of two cultivation options (cultivated or not cultivated) and two herbicide options including either Treflan (1.5 pt/A) PPI followed by Reflex (1 pt/A) PRE or Prowl H_20 (2 pt/A) plus Reflex (1 pt/A) PRE with both at-plant herbicide systems followed by Roundup WeatherMax (22 oz/A) plus Dual Magnum (1 pt/A) topical to 5-leaf cotton and Direx (1 qt/A) plus MSMA (2.5 pt/A) directed to 13-leaf cotton.

Plot size was 4 rows by 30 feet for experiment one and 8 rows by 50 feet for experiment two and cotton was harvested with a single row cotton harvester. The first rainfall for both experiments occurred 5 d after planting DP 555 BR cotton and applying at-plant herbicides.

In the first experiment at 1 month after planting, Palmer amaranth plant emergence was reduced 60% by deep turning the land when residual herbicides were not applied. Although populations were reduced throughout the season by deep turning the land, no visual control was noted at harvest when residual herbicides were not applied because of the robust size of plants that did emerge. Deep turning the land in the Prowl PRE system improved Palmer amaranth control 15% and cotton yield by 19% when compared to the same herbicide program without deep turning the land. Deep turning the land did not significantly impact control or yield with the Treflan PPI system. When comparing the Prowl PRE and Treflan PPI systems without deep turning the land, Palmer amaranth control was 11% greater and yield was 26% greater with the Treflan PPI system when compared to the Prowl PRE system. No differences were noted between the Prowl PRE and Treflan PPI systems when the land was deep turned.

In the second experiment, the Treflan PPI system provided 88% control at harvest which was 10% greater than that noted in the Prowl PRE system. Cultivation improved control in the Prowl PRE system by 11% and tended to improve control of the Treflan system by 7%. Cultivation increased yield 8 to 10% with both the Treflan PPI system and the Prowl PRE system.