

MANAGING GLYPHOSATE-RESISTANT PALMER AMARANTH IN CONSERVATION TILLAGE COTTON

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Abstract

Glyphosate-resistant Palmer amaranth threatens the production of conservation tillage cotton in Macon County, Georgia. In 2004 when glyphosate-resistant Palmer amaranth was initially confirmed in Macon County, growers utilized conservation tillage production practices to produce 60% of the cotton in the county. By 2008, conservation tillage production was reduced to 10% of the acreage as this resistant pest forced growers to produce cotton using tillage. An experiment was conducted to determine the impact of cover crop biomass and herbicide programs on the control of glyphosate-resistant Palmer amaranth in dryland conservation tillage production.

The experiment was conducted in Macon County, Georgia during 2008 in a field with a heavy population of glyphosate-resistant Palmer amaranth. A factorial arrangement of treatments including four cover crops (oat, rye, wheat, and no cover), two cover crop termination dates (4 or 2 wk before planting[WBP]), and three herbicide program options including no herbicides or Prowl H₂O (2 pt/A) plus Reflex (1 pt/A) preemergence (PRE) followed by either Roundup WeatherMax (22 oz/A) plus Dual Magnum (1 pt/A) or Ignite 280 (23 oz/A) plus Dual Magnum (1 pt/A) applied topically to 5-leaf cotton and Direx (1 qt/A) plus MSMA (2.5 pt/A) directed to 13-leaf cotton.

The no cover system was disked twice followed by ripping and bedding prior to planting. In all cover crop systems, a 2008 KMC strip-tillage implement with ripper shanks and rolling baskets was used to prepare the seedbed. Plot size was 4 rows by 30 feet and the first rainfall occurred 5 d after planting PHY 485WRF cotton and applying PRE herbicides. Cover crop biomass at planting, Palmer amaranth control throughout the season, visual cotton injury, and cotton yield were measured.

Cover crop plant biomass for rye, wheat, and oat was 5200, 2900, and 3000 lb/A, respectively, when the cover crops were killed 4 WBP. Waiting until 2 WBP to kill the cover crops increased biomass by 36% (for rye) to 121% (for oats). Systems including higher levels of residue improved Palmer amaranth control by 7 to 27% when averaged over the herbicide program at 4 WAP. In the absence of herbicides, cover crops improved Palmer amaranth control when compared to the no-tillage, no-cover control at layby by 40% or less. This low level of control was predominately due to Palmer emergence and growth in the area where the strip-tillage implement prepared the seedbed removing the cover crop residue.

Prowl plus Reflex applied PRE provided excellent early-season control with only a few plants escaping by 4 WAP. Postemergence applications were applied when Palmer amaranth was three inches or less. Roundup plus Dual Magnum did not control emerged Palmer amaranth plants while Ignite plus Dual Magnum provided nearly complete control. By layby, any plant escaping topical herbicide applications was too large to control. The Ignite program provided 93% control at harvest; this level of control was 43% greater than that noted with the Roundup program, when averaged over crop crops and cover crop termination dates.

Visual herbicide injury was not noted with Prowl plus Reflex applied at planting or with directed applications of Direx plus MSMA. At 5 d after treatment, Roundup plus Dual Magnum injured cotton 15% while Ignite plus Dual Magnum injured cotton 30% including occasional leaf drop. By 15 d after treatment, injury was less than 5% with all treatments.

Seed cotton yield was influenced only by herbicide program. Cotton could not be harvested when herbicides were not applied. Seed cotton yield (1291 lb/A) with the Roundup program was 38% less than seed cotton yield (2093lb/A) with the Ignite program.