

GLYPHOSATE-RESISTANT PALMER AMARANTH AND COTTON RESPONSE TO RESIDUAL AT-PLANT HERBICIDES APPLIED ON THE SOIL SURFACE OR PRE-PLANT INCORPORATED**J. Kichler****University of Georgia****Oglethorpe, GA****A.S. Culpepper****J. Chafin****University of Georgia****Tifton, GA****Abstract**

The development and spread of glyphosate-resistance in Palmer amaranth is forcing GA cotton growers to return to tillage as a means of controlling weed populations, especially in non-irrigated fields. Although residual herbicides can control Palmer amaranth, they are only effective when sufficient moisture is present at the time of application to ensure activation. The objective of this study was to determine if growers would benefit from incorporating residual herbicides in dryland cotton production.

The research project was divided into two components. The first was a Palmer amaranth control study that was located in Macon County, GA, in a field with a significant population of glyphosate-resistant Palmer amaranth. The second was a weed-free herbicide tolerance study that was conducted at the UGA Ponder Farm in Tift County, GA. Ten herbicide options (Reflex at 1 pt/A, Staple at 2 oz/A, Cotoran at 2 pt/A, Direx at 2 pt/A, Prowl H₂O at 2.1 pt/A, Treflan at 1.5 pt/A, Dual Magnum at 1 pt/A, Prowl + Reflex, Prowl + Reflex + Staple, and a no herbicide) were applied both pre-plant incorporated (PPI) and preemergence (PRE), for a total of 20 treatments. The plots were maintained in dryland production. At the Palmer amaranth site, moisture was available at planting for PPI applications but a rainfall to activate PRE herbicide applications did not occur until twelve days after planting. At the crop tolerance site, heavy rains occurred the week during cotton emergence. Palmer amaranth control and cotton injury were evaluated several times throughout the growing season.

At 14 days after treatment (DAT), Treflan applied PRE only controlled glyphosate-resistant Palmer amaranth 74%. When applied PPI, Treflan controlled Palmer amaranth 98%. Reflex, Staple, Dual Magnum and Prowl provided 80-87% control of Palmer amaranth when applied PRE and 92 to 96% control when applied PPI. Control of Palmer amaranth by Direx (91-93%) or Cotoran (82-84%) was not affected by application method. Treflan (46%), Prowl (51%), Dual Magnum (53%) and Cotoran (63%) provided significantly less control of Palmer amaranth when applied PRE as compared to Staple (73%), Direx (75%), and Reflex (79%) at 28 DAT. PPI applications improved Palmer amaranth control 13 to 40% for all herbicides except Cotoran and Direx.

Combinations of Prowl plus Reflex or Prowl plus Reflex plus Staple controlled Palmer amaranth more effectively than any herbicide applied alone. Control from these treatments was at least 94% at 14 DAT, regardless of application method. By 28 DAT, Prowl plus Reflex plus Staple (91%) was 15% more effective than Prowl plus Reflex when applied PRE; however, incorporating the Prowl plus Reflex improved control to 88%. By 63 DAT, control by Prowl plus Reflex (57%) was less effective than Prowl plus Reflex plus Staple (73%) and incorporating either treatment increased control by 10%.

At 24 days after planting (DAP), all treatments with Prowl PRE injured cotton 20 to 26%; no injury was observed when Prowl was applied PPI. Prowl injury was a result of foliar uptake that occurred when cotton was emerging through saturated soils (92% sand). Injury symptoms included enlarged cotyledons, stacked node development, and malformed true leaf growth. Dual magnum caused 12-13% stunting to cotton when applied PRE or PPI. Less than 4% injury was observed for all other herbicide treatments. Early season cotton injury resulted in reduced seed cotton yields relative to the non-treated check (4480 lb/A) for Prowl PRE and Dual Mangum. Treatments with Prowl applied PRE reduced yields 10 to 12% while Dual Magnum PPI or PRE reduced yields by 8%.

Results from this experiment suggest that Prowl, Treflan, Staple, or Reflex could be applied PPI in dryland conditions to improve residual control of glyphosate-resistant Palmer amaranth without concerns for crop injury.