Palmer amaranth (*Amaranthus palmeri* S. Wats.) Management in Glytol® + LibertyLink® Cotton

J.D. Reed
Texas AgriLife Research
Lubbock, TX
P.A. Dotray
Texas AgriLife Research, Texas AgriLife Extension, Texas Tech University
J.W. Keeling
Texas AgriLife Research
Lubbock, TX

Abstract

The most common weed in cotton fields on the Texas High Plains is Palmer amaranth (*Amaranthus palmeri*). Weeds that are difficult to control with glyphosate are now becoming more common across the region because of long-term glyphosate use. Cotton varieties containing both GlyTol® and LibertyLink® traits will be commercialized as GlyTol® + LibertyLink® (GL) cotton in 2011. GL technology offers producers the potential to manage weeds in cotton with over-the-top applications of two herbicides with two different mechanisms of action.

Field trials were conducted in Lubbock, TX in 2010 to determine optimum tank-mix and sequential applications of glyphosate and glufosinate in GL cotton to control Palmer amaranth. In order to determine optimum tank-mix applications, two tank-mix trials were conducted. The first included glyphosate and glufosinate applied at varying tank-mix rates (1X:1X, 1X:0.75X, 1X:0.5X, 1X:0.25X and 1X:0X for each herbicide). The second included glyphosate and glufosinate applied at an overall 1X rate but varying proportions of each (1X:0X, 0.75X:0.25X, 0.5X:0.5X, 0.25X:0.75X, and 0X:1X). 1X rate of glyphosate corresponded to 0.84 kg ae ha^{-1} while 1X rate of glufosinate corresponded to 0.58 kg ai ha^{-1}. All treatments were applied postemergence (POST) to 5-10 cm weeds and to 13-25 cm weeds.

A third trial evaluated sequential applications of glyphosate and glufosinate in an overall weed management system. All treatments included a preplant incorporated (PPI) application of pendimethalin at 2.3 L ha^{-1}. Early-post (EPOST) and mid-post (MPOST) treatments of glyphosate at 0.84 kg ae ha^{-1} and glufosinate at 0.58 kg ai ha^{-1} were applied in all possible sequential combinations. PPI and POST herbicide applications were made using a tractor-mounted compressed-air or a backpack CO_2-presurized sprayer calibrated to deliver 93.5 L ha^{-1}. For all experiments, FM 9250GL was planted on May 19 on 76.2 cm rows and treated with aldicarb at 0.54 kg ai ha^{-1}. Plots were 4.1 x 9.1 m with three replications. Weed control was visually estimated based on a standard scale of 0 to 100% where 0 = no weed control and 100 = complete weed control. In the systems trial, the middle two rows of each plot were mechanically harvested with a John Deere 7445 two-row cotton stripper and cotton lint weights recorded.

Results indicated that tank-mixes of glyphosate and glufosinate reduced control of Palmer amaranth compared to glyphosate alone. When applied to 5-10 cm weeds, tank-mix combinations of both herbicides were less effective controlling Palmer amaranth (85-92%) than glyphosate (99%). Control of 13-25 cm weeds declined with tank-mixes (57-72%) compared to glyphosate (92%). Proportional tank-mix combinations on 5-10 cm weeds provided less effective Palmer amaranth control (90-96%) than glyphosate (100%) and control declined (55-63%) on 13-25 cm weeds compared to glyphosate (100%).

Sequential applications of glyphosate and glufosinate, regardless of the sequence, effectively controlled Palmer amaranth, although treatments with glyphosate as part of the application sequence were more effective than treatments with only glufosinate. End-of-season control across all systems ranged from 92-100%. Cotton lint yields were similar across treatments. These results indicate that tank-mixes of glyphosate and glufosinate reduce Palmer amaranth control and that sequential applications of these two herbicides are a better option.