

Palmer amaranth and Morningglory Management in Glyphosate/Glufosinate-Tolerant Cotton

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Palmer amaranth (a.k.a. carelesweed, *Amaranthus palmeri*) is the most common and troublesome weeds on the Texas High Plains. This weed has also become common and troublesome in the south and southeastern part of the United States. In the Texas High Plains, residual herbicides used in a glyphosate-based “system” will control Palmer amaranth, but weed shifts in these systems and in glyphosate only systems have been observed in recent years. Ivyleaf morningglory (*Ipomoea hederacea*) is not controlled well with glyphosate and is becoming problematic in this region. GlyTol® + LibertyLink® (GL) cotton may offer improved opportunities to manage ivyleaf morningglory while maintaining effective control of Palmer amaranth. However, there are concerns about antagonism between glyphosate and glufosinate-ammonium when applied in a tank-mix.

Field trials were conducted in Lubbock, TX in 2010 and 2011 to evaluate tank-mix combinations of glyphosate (Roundup PowerMax) and glufosinate-ammonium (Ignite 280) in GL cotton for control of Palmer amaranth and ivyleaf morningglory. Field trials included Roundup PowerMax and Ignite 280 applied at varying tank-mix rates (1X:1X, 1X:0.75X, 1X:0.5X, 1X:0.25X and 1X:0X for each herbicide). The 1X rate of Roundup PowerMax and Ignite 280 was 22 and 29 oz/A, respectively. All treatments were applied postemergence using a carrier volume of 10 gallons per acre (GPA) to weeds 2 to 4 inches in height. FM 9250GL was planted on May 20, 2010 and May 23, 2011. Greenhouse studies were conducted to quantify antagonistic or synergistic effects. Locally harvested Palmer amaranth (not resistant to Roundup) and ivyleaf morningglory were planted in pots and thinned to two plants. Treatments included an untreated control; Roundup PowerMax (22, 16.5, 11, 5.5 oz/A); Ignite 280 (29, 21.75, 14.5, 7.25 oz/A); and all tank-mix combinations of each herbicide rate. Treatments in greenhouse studies were also applied using 10 GPA to weeds 2 to 4 inches. Above-ground plant biomass was harvested 14 days after treatment. Dry weights were recorded and converted to percent growth (calculated as a percent of the untreated control). Percent growth values for each rate of the two herbicides alone were used to calculate expected responses of tank-mix combinations using Colby’s Method. Expected values were compared to observed percent growth values.

Results of field studies indicated that tank-mixes of Roundup PowerMax and Ignite 280 were less effective at controlling Palmer amaranth (50 to 93% control) than when Roundup PowerMax was applied alone (98 to 99% control). The addition of any rate of Ignite 280 to the full rate of Roundup PowerMax reduced Palmer amaranth control (70 to 93%) when compared to Roundup PowerMax applied alone. Tank-mixes of Roundup PowerMax and Ignite 280 were as effective at controlling ivyleaf morningglory (82 to 95%) when compared to Ignite 280 applied alone (85 to 88%). The addition of any rate of Roundup PowerMax to the full rate of Ignite 280 did not affect control of ivyleaf morningglory. Greenhouse studies confirmed Palmer amaranth antagonism observed in the field. In all but one tank-mix combination of Roundup PowerMax and Ignite 280, reduced Palmer amaranth control was observed when compared to what was expected (according to Colby’s augmented mixed-model methodology). Greenhouse studies of ivyleaf morningglory indicated that low levels of antagonism were apparent with some tank-mix treatments but not with all combinations.

In summary, field and greenhouse studies on ivyleaf morningglory suggest some antagonism with Roundup PowerMax and Ignite 280 tank-mixes, but not to the degree of antagonism seen in Palmer amaranth. These results strongly suggest that sequential applications of these two herbicides (the full rate of one followed by the full rate of the other) are a better option for Palmer amaranth and ivyleaf morningglory weed management in GlyTol® + LibertyLink® cotton.