SEQUENTIAL APPLICATIONS FOR RESCUE CONTROL OF GLYPHOSATE RESISTANT PALMER AMARANTH

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Abstract

Glyphosate-resistant (GR) Palmer amaranth was first reported in 2005 in Georgia. Since that time, GR-Palmer amaranth has spread throughout the mid-south and southeastern U.S. Growers have been forced to dramatically alter weed control practices in areas where this weed is problematic. Crops that are tolerant to glyphosate, glufosinate, and dicamba are under development and will be commercially available as Roundup Ready Xtend® crops. While timely herbicide applications will be critical with this technology, timely herbicide applications are not always feasible due to unforeseen circumstances such as weather. Therefore, data is needed regarding control of GR-Palmer amaranth that is larger than recommended at the time of herbicide application. Substantial previous research is available regarding postemergence applications of glufosinate on GR-Palmer amaranth; however, little previous research has been conducted evaluating GR-Palmer amaranth control with dicamba. Therefore, this research was conducted to evaluate control of GR-Palmer amaranth following sequential timings application in a rescue scenario with glyphosate + dicamba and glufosinate + dicamba.

An experiment was conducted in 2014 at Hood Farms in Dundee, MS to determine the effect of timing between sequential applications and herbicide program on GR-Palmer amaranth control. The experiment was initiated in a grower field with heavy natural infestations of GR-Palmer amaranth. Herbicide applications were initiated when Palmer amaranth plants were 20 to 25 cm in height and 40 to 50 cm in height. A sequential application for each growth stage was made at five different timings which included 1, 2, 3, 4 and 5 weeks after initial treatment of each growth stage. Applications were made with a CO_2 powered backpack sprayer at a pressure of 317 kPa and an application volume of 140 L/ha. Treatments utilized in this experiment included: glyphosate + dicamba at 0.8 kg ae/ha and 0.6 kg ai/ha as well as glufosinate + dicamba at 0.6 kg ai/ha each. All herbicide treatments were applied using Turbo Teejet Induction 110015 tips. Visual estimates of weed control, the number of Palmer amaranth plants per square meter, count reduction of Palmer amaranth plants per square meter, height of Palmer amaranth plants per square meter, and height reduction of Palmer amaranth plants per square meter were collected at two and four weeks after each herbicide application. Experiments were conducted using a factorial arrangements of treatments in a randomized complete block design with four replications. Visual estimates of weed control, number of plants per square meter, count reduction, plant height, and plant height reduction data were subjected to analysis of variance and means were separated using Fisher's Protected LSD at $p = 0.05$.

Four weeks after final applications, GR-Palmer amaranth percent height reduction was significantly greater when applications were made $\leq$ 3 weeks after initial treatment with height reductions ranging from 78 to 82% for plants initially treated at 20 to 25 cm in height. Sequential applications following initial application to 20 to 25 cm Palmer amaranth made $\geq$ 2 weeks after initial application significantly reduced Palmer amaranth counts from 59 to 82%. Sequential applications containing glufosinate + dicamba applied 1, 2, and 3 weeks after initial application maximized height reductions compared to other treatments when initial applications were made to 40 to 50 cm GR-Palmer amaranth. Sequential application tank mixtures containing glufosinate + dicamba provided more consistent control of 40 to 50 cm Palmer amaranth.

Sequential herbicide applications provided effective rescue control of Palmer amaranth. Control was not ideal but can facilitate crop harvest. Sequential applications should be made no later than 3 weeks after initial application regardless of Palmer amaranth size.