

EVALUATION OF GLYPHOSATE PERFORMANCE IN TANKMIXES WITH VARIOUS ADJUVANTS

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Introduction

Roundup® (glyphosate) is a versatile herbicide that has been on the market since 1974. Currently, more than 30 different glyphosate formulations are available for weed control. Formulations contain different glyphosate salts either with or without surfactants. Glyphosate (marketed as Roundup and various other trade names) is widely used by sugar beet growers in Oregon and Idaho to control weeds in Roundup resistant sugar beet hybrids. Glyphosate is a foliar-applied herbicide whose weed efficacy is dependent on leaf retention and the ability to penetrate the leaf cuticle layer. Roundup performance is affected by minerals (iron, calcium, magnesium) commonly found in hard water. Therefore, adjuvants are commonly added in some formulations to reduce herbicide binding to the minerals and to improve leaf penetration.

The objectives of this study were 1) to evaluate weed control efficacy when glyphosate is applied with or without various adjuvants; 2) to evaluate sugar beet response to various glyphosate/adjuvant tankmixes.

Materials and Methods

The study was established on April 8, 2022 at the Malheur Experiment Station, Ontario, OR in a field previously planted to wheat. The study was conducted under furrow irrigation. Treatments (Table 1) were applied using a small plot sprayer when sugar beet plants were at 2- and 8- to 10-leaf stages. The spray volume was 17 gal/acre. All other field activities including fertilizer and preventive sprays followed local production practices.

Table 1. Design and methodology quick facts

Design and Methodology	
Experiment design	Randomized Complete Block with 4 replications
Hybrid	BTS 251N; planted April 8, 2022 and emergence observed April 27, 2022
Plot size	7.33' wide x 27'
First irrigation	Furrow irrigated
Herbicide treatments	Roundup at 11 or 22 fl oz/acre with or without one of the following adjuvants at the recommended rate (plus untreated)
Adjuvants (at recommended label rates)	Ultra PRO AMS, Kicker Plus, Choice Trio, Class Act NG, Jackhammer Elite, Load-Up, pHlame, and Zaar
Sprayer and volume	Small plot sprayer at 17 gal/acre
Irrigation	Furrow
Sprayed	13 May and 31 May 2022 and terminated June 30, 2022

Results and Conclusions

Visible injury and weed control. Evaluations at 7 and 14 days after treatment application indicated no visible sugar beet injury (Figure 1). Plant count on May 27, 2022 ranged from 62,920 to 67,639 plants/acre across Roundup + adjuvant treatments, compared to 65,461 plants/acre for the untreated control. Evaluations on June 14, 2022 (14 days after the last application) indicated improved performance when Roundup 11 to 22 fl oz/acre (glyphosate 0.385 to 0.77 lb ae/acre) was tankmixed with adjuvants, compared to Roundup alone (Figure 2). Weed control with a tank-mixture of Roundup 11 fl oz/acre plus adjuvants (at 17 gal/acre), ranged from 78 to 89% for common lambsquarters, 70 to 88% for hairy nightshade, and 75 to 84% for pigweed species compared to 54, 61, and 53% with Roundup alone, respectively (Figure 2). Roundup 22 fl oz/acre plus adjuvants provided $\geq 88\%$ control for common lambsquarters, $\geq 78\%$ for hairy nightshade, and $\geq 80\%$ for pigweed species, across treatments (Figure 3). The results indicated all adjuvants improved glyphosate control of weeds. The follow up study will use reduced Roundup rates in order to further separate the performance of these adjuvants.

Acknowledgements

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Figure 1. A bird's eye view of the Roundup /adjuvants tankmix study at the Malheur Experiment Station, Ontario, OR 2022. Photo courtesy of Joel Felix, Oregon State University, taken June 7, 2022.

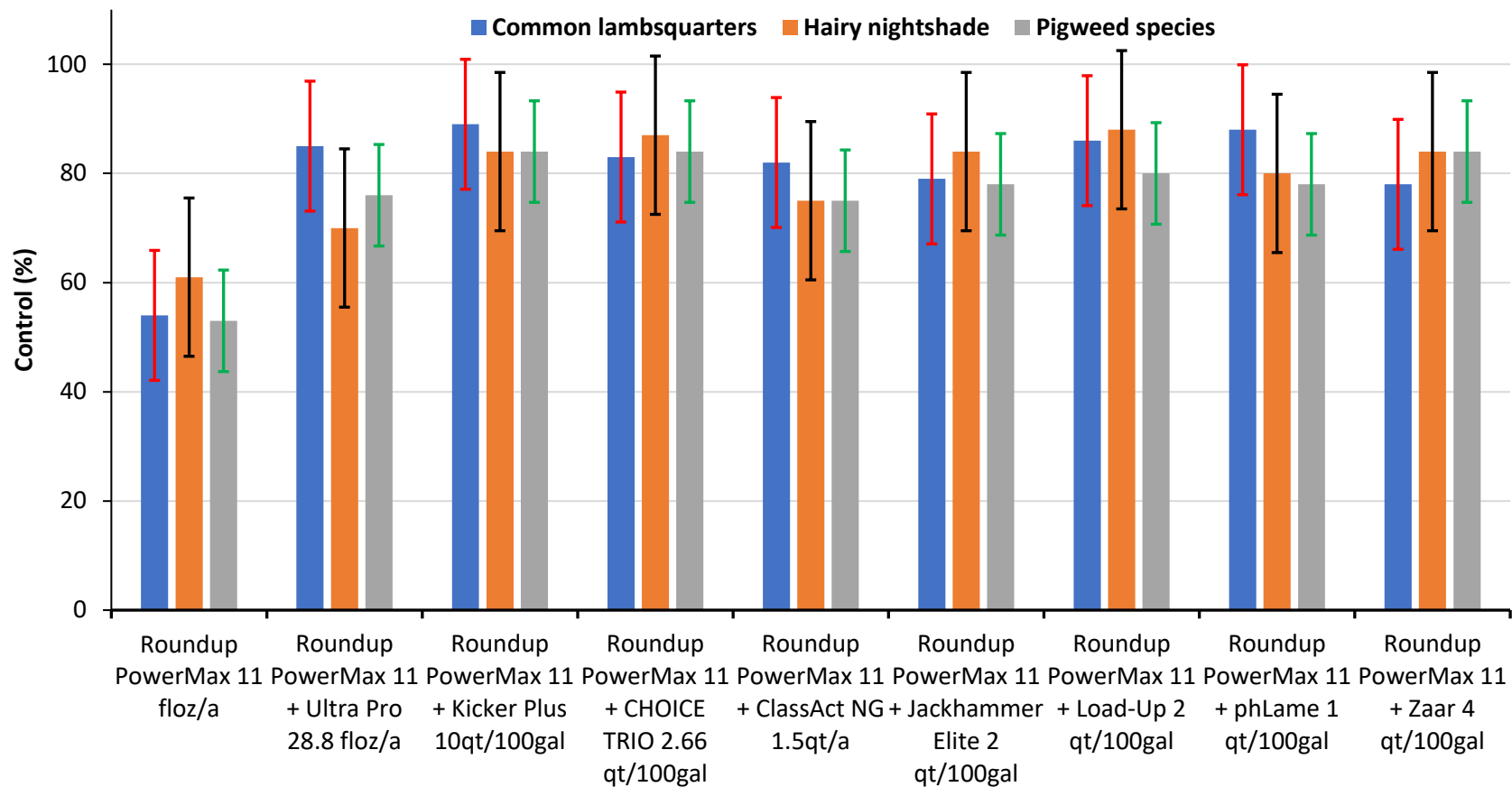


Figure 2. Weed control with Roundup at 11 fl oz/acre (glyphosate 0.385 lb ae/acre) with or without addition of various adjuvants at recommended rate at the Malheur Experiment Station, Ontario, OR 2022. LSD (P = 0.05) 11.9 for common lambsquarters, 14.5 for hairy nightshade, and 9.3 for pigweed species.

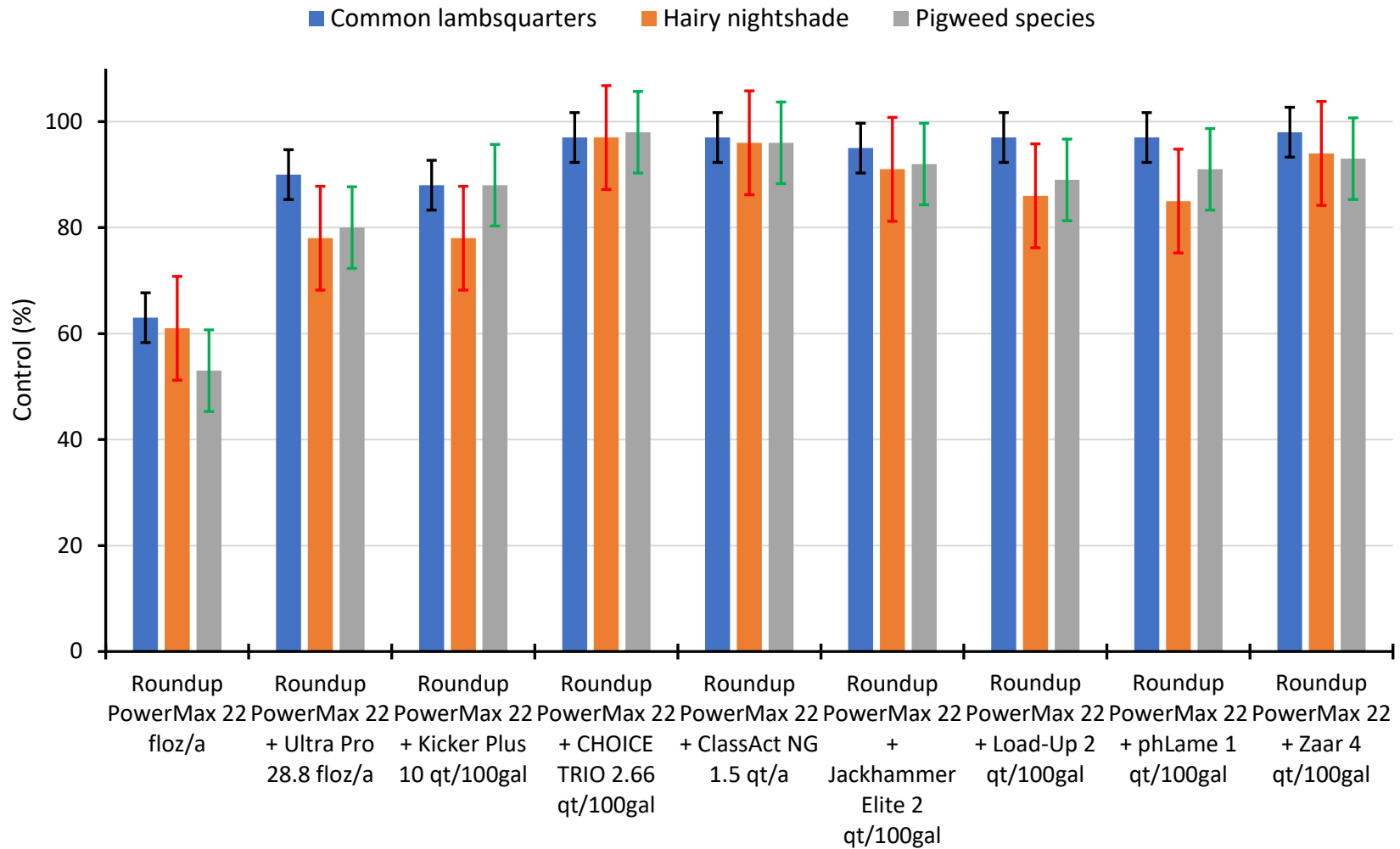


Figure 3. Weed control with Roundup at 22 fl oz/acre (glyphosate 0.385 lb ae/acre) with or without addition of various adjuvants at recommended rate at the Malheur Experiment Station, Ontario, OR 2022. LSD (P = 0.05) 4.7 for common lambsquarters, 9.9 for hairy nightshade, and 7.7 for pigweed species.