EFFECT OF NOZZLE TYPE ON GLYPHOSATE EFFICACY AND SPRAY PARTICLE DRIFT.

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A field-size study and a small-plot study were conducted near Tiffin and Chesterville, Ohio, respectively, in 2003, to determine the effect of nozzle type and drift control adjuvant on the effectiveness of glyphosate. Both studies were arranged as a randomized complete block with two factors, nozzle type (XR Teejet at 40 psi, Turbo Teejet at 40 psi, AI Teejet at 40 and 60 psi) and drift control adjuvant (0 and 2.5 gal/100 gal spray mixture of Corral AMS Liquid, a liquid ammonium sulfate plus a polyacrylamide drift control adjuvant).

Three replications were used in the field-size study. Plot size was 60 ft wide by 711 to 1212 ft long (length of field). Glyphosate (Roundup UltraMax) was applied at a rate of 1.0 lb ae/A. A commercial-sized Patriot sprayer delivered a spray volume of 15 gal/A for each treatment using a 0.3 gal/min nozzle size. Spray coverage at the canopy level was measured using 26 by 76 mm water-sensitive paper. GPS coordinates were used to mark at least two patches of each weed species evaluated per plot. Weed control was evaluated 28 DAT.

The small-plot study used four replications and a plot size of 10 ft wide by 40 ft long. Glyphosate (Roundup WeatherMax) was applied to each treatment at a rate of 0.75 lb ae/A. All treatments were applied with a hand-held sprayer using 0.2 gal/min nozzles and a spray volume of 15 gal/A. Weed control was evaluated 14 DAT.

In the field-size study, there was no significant interaction between nozzle type and drift control adjuvant, allowing comparison of main effects only. There was no difference in nozzle type or drift control adjuvant for Canada thistle and seedling dandelion. There was a difference between nozzles for control of yellow nutsedge, common ragweed, and Venice mallow at an alpha level of 0.05, and for common lambsquarters and velvetleaf at an alpha level of 0.1. The XR Teejet and AI Teejet at 40 psi provided 93 and 91 % control of yellow nutsedge control compared to the AI Teejet at 60 psi that provided 86 % control. The XR Teejet provided 81 and 77 % control of Venice mallow and velvetleaf, respectively compared to the AI Teejet at 40 and 60 psi that provided 74 and 70 % and 69 and 70 %, respectively. The XR Teejet and Turbo Teejet provided 91 and 93 % control of common ragweed, respectively, compared to the AI Teejet at 60 psi that provided 86 % control. The AI Teejet at 40 psi and the Turbo Teejet provided 94 and 94 % control of common lambsquarters, respectively, compared to the XR Teejet nozzle that showed 91 % control. Adding the drift control adjuvant did not affect common lambsquarters control, but reduced control of velvetleaf, Venice mallow, and yellow nutsedge at an alpha level of 0.05, and common ragweed at an alpha level of 0.1. The drift control adjuvant provided 59 % control of velvetleaf, 64 % control of Venice mallow, 66 % control of yellow nutsedge, and 89 % control of common ragweed compared to no drift control adjuvant that provided 85, 85, 73, and 92 % control respectively.

In the small-plot study, all treatments controlled at least 98% of the giant foxtail, giant ragweed, and common lambsquarters, and control was not affected by nozzle type or drift control adjuvant.

Mixed results were obtained between the two studies. Nozzle type and drift control adjuvant affected weed control with a large commercial sprayer, but not with a small plot sprayer. In these studies, use of a polyacrylamide drift control adjuvant in a commercial sprayer reduced the effectiveness of glyphosate. Glyphosate was more effective when applied with XR Teejet or Turbo Teejet nozzles, compared to AI Teejet nozzles when used in a commercial sprayer.

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