

MANAGEMENT OF GLYPHOSATE-RESISTANT COMMON RAGWEED. Jeff M. Stachler, John L. Luecke, and Jason M. Fisher, Assistant Professor, Research Specialist, and Graduate Research Assistant, Department of Plant Sciences, North Dakota State University and University of Minnesota, Fargo, ND 58108-6050.

Glyphosate-resistant common ragweed was first reported in Minnesota and North Dakota in 2008. Glyphosate-resistant common ragweed biotypes continue to increase. With the rapid introduction of glyphosate-resistant sugar beet and the continued use of glyphosate-resistant corn and soybean in the rotation, glyphosate-resistant common ragweed will become more challenging to control in sugar beet. Field research was conducted to determine the response of glyphosate-resistant sugar beet and common ragweed to clopyralid and glyphosate applied at various rates, timings, and number of applications. Crystal 539 RR sugar beet was planted May 7, 2009 at the research site near Buxton, ND. Factors in the study included initial application timing (2.5, 7.6, and 15.2 cm in height common ragweed) and various treatments. Treatments at each timing included glyphosate (840 g ae/ha) applied alone and in combination with clopyralid at 8.6, 17.2, and 34.5 g ae/ha in a single application. Additional treatments included clopyralid applied twice at 8.6 and 17.2 g/ha and 17.2 followed by 34.5 g/ha and three times at 17.2 g/ha and 8.6 followed by 8.6, followed by 17.2 g/ha. Glyphosate (840 g/ha) was only applied two and three times beginning at 7.6 cm common ragweed. Herbicides were applied with a carbon dioxide pressurized bicycle sprayer initially on June 4, 19, and 25th. Ten common ragweed plants per plot were flagged at the time of the initial applications. Visual evaluations were recorded for the whole plot and the individual flagged plants 21 days after each application and at harvest.

An interaction occurred between timing and treatments for all variables, except sugar beet injury at harvest which only showed a significant treatment effect. Glyphosate (840 g/ha) applied to 2.5, 7.6, and 15.2 cm plants controlled common ragweed 71, 48, and 41% at 21 DAT, respectively. Death of individually flagged common ragweed plants 21 days after the glyphosate application ranged from 87 to 30% for 2.5 cm and 15.2 cm plants, respectively. Glyphosate caused 57, 87, and 93% of initially flagged 7.6 cm common ragweed plants to produce no visible seeds at harvest when applied one, two, and three times, respectively. Regardless of the number of glyphosate applications, visual control of all plants in the plots at harvest was less than 70%.

Clopyralid controlled greater than 89% of common ragweed 21 DAT when applied at 17.2 g/ha or greater to 2.5 cm plants. Clopyralid controlled less than 73% of common ragweed 21 DAT when applied at any rate to 7.6 and 15.2 cm plants. Common ragweed control improved over time with clopyralid applied in a single application to 7.6 and 15.2 cm plants, but remained the same with clopyralid applied in a single application at 17.2 and 34.5 g/ha to 2.5 cm plants. Clopyralid applied multiple times controlled common ragweed greater than 92% at harvest. Clopyralid controlled common ragweed 90 to 98% at harvest when applied once at 17.2 and 34.5 g/ha to 2.5 and 7.6 cm plants and controlled common ragweed less than 88% when applied once to 15.2 cm plants and at 8.6 g/ha. Clopyralid caused 100% mortality of flagged plants when applied at 34.5 g/ha and twice or more at any rate, regardless of plant size at time of application, except clopyralid applied twice at 8.6 g/ha to 7.6 cm plants.

Clopyralid caused 5 to 24% sugar beet injury 21 DAT when applied at any rate at the 2.5 cm common ragweed stage and caused less than 10% injury when applied at the other two timings. At harvest, clopyralid caused the greatest (14%) sugar beet injury when applied at a total of 52 g/ha and averaged across timings.

Glyphosate-resistant common ragweed exists at this field research location. Glyphosate more effectively controls resistant plants when applied to 2.5 cm plants and applied multiple times, although complete control is not possible. Increasing rates of clopyralid and frequency of applications improved common ragweed control, but increased injury. Clopyralid plus glyphosate controlled more initial common ragweed when applied at 2.5 cm plants compared to larger plants. Clopyralid (8.6 g/ha) plus glyphosate (840 g/ha) applied twice to 2.5 cm common ragweed should provide the greatest common ragweed control, the greatest safety to sugar beet, and the least competition with common ragweed.