

FISHER, JASON M., JEFF M. STACHLER* and JOHN L. LUECKE, Department of Plant Sciences, North Dakota State University and University of Minnesota, NDSU - Dept. 7670, P. O. Box 6050, Fargo, ND 58108-6050. **Management of giant ragweed in glyphosate-resistant sugarbeet with clopyralid.**

ABSTRACT

Glyphosate-resistant giant ragweed was first confirmed in southern Minnesota in 2006 and continues to increase. It has been confirmed throughout the Southern Minnesota Beet Sugar Cooperative growing area. Clopyralid is the only other sugarbeet herbicide to effectively control giant ragweed. Since glyphosate is applied fewer times to glyphosate-resistant sugarbeet compared to conventional sugarbeet herbicides to conventional sugarbeet, what rate of clopyralid and how many applications are necessary to achieve control? The objective of this research is to determine the response of glyphosate-resistant sugarbeet and giant ragweed to clopyralid and glyphosate at various rates, timings, and number of applications.

Small-plot field research was conducted in 2009 and 2010 at two locations near Hutchinson, MN. The sugarbeet variety, 'Betaseed 95RR03' was planted on April 24, 2009 and April 23, 2010 in 56 cm rows. Factors in the study consisted of herbicide timing (giant ragweed heights of 2.5, 7.6, and 15.2 cm at the initial application) and herbicide treatments. Herbicide treatments at each timing included glyphosate (840 g ae/ha) applied alone and in combination with clopyralid at 53, 105, and 211 g ae/ha in a single application. In addition, glyphosate (840 g/ha) plus clopyralid was applied twice at the following clopyralid rates: 53, 105, and 105 followed by 211 g/ha. Glyphosate (840 g/ha) plus clopyralid was also applied three times at the following clopyralid rates: 105 g/ha and 53 followed by 53, followed by 211 g/ha. Fifteen giant ragweed plants were flagged per plot prior to the initial application to determine their life history. Treatments were applied with a bicycle sprayer to the middle 4 rows of a 6 row plot at a spray volume of 159 L/ha. Visual whole plot evaluations and individual plant mortality were recorded 21 days after each application. The sugarbeets were harvested in early September and sugar content determined. Locations were considered a random effect and data were subjected to analysis of variance using the Proc Mixed Procedure in SAS. Least Squares means were separated using PDIF at $P < 0.05$.

A herbicide timing by treatment interaction was observed for all measured variables, therefore means could not be combined over each factor. Glyphosate applied in a single application controlled a maximum of only 21% of giant ragweed and caused maximum plant mortality of 28%. This ineffective control of giant ragweed confirms the presence of glyphosate-resistant plants at each location. Clopyralid applied once controlled the most giant ragweed (83%) when applied at 211 g/ha to 7.6 cm plants. Clopyralid applied once caused greater than 94% plant mortality when applied to 2.5 cm giant ragweed or when applied at 211 g/ha. Clopyralid applied twice at 105 g/ha to 7.6 cm plants, applied twice at a total of 316 g/ha to 7.6 cm plants, and applied three times to all sizes, except at a total of 211 g/ha to 15.2 cm plants

controlled greater than 93% of giant ragweed and caused greater than 89% plant mortality. Sugarbeet root yield was maximized (>42 MT/ha) when clopyralid was applied twice or three times at all rates to 2.5 cm giant ragweed and when clopyralid was applied twice at a total of 211 g/ha to 7.6 cm plants and applied three times at a total of 316 g/ha to 7.6 cm plants. Clopyralid must be applied two or more times at a total minimum rate of 211 g/ha in combination with glyphosate (840 g/ha) to giant ragweed smaller than 7.6 cm to maximize sugarbeet yield, and giant ragweed control and mortality.