

CONVENTIONAL AND AIR ASSIST SPRAYERS FOR WEED CONTROL IN SUGARBEET. Alan G. Dexter, John L. Luecke and Vernon L. Hofman, Professor and Research Specialist, Plant Sciences Department, North Dakota State University and University of Minnesota and Associate Professor, Agricultural and Biosystems Engineering Department, North Dakota State University, Fargo, ND 58105.

The objective of this research was to compare weed control from herbicides applied through conventional spray nozzles and herbicides applied through Shear Guard nozzles from Spray-Air USA Inc. The Shear Guard nozzles use high velocity air to atomize the liquid and blow the droplets towards the target plants. Five herbicide treatments were applied three times with the first treatment on cotyledon to two-leaf sugarbeet and the second and third treatments at six-to ten-day intervals. The micro-rate treatment was desmedipham & phenmedipham & ethofumesate at 0.08 lb/A plus triflusaluron at 0.004 lb/A plus clopyralid at 0.03 lb/A plus clethodim at 0.03 lb/A plus methylated seed oil adjuvant at 1.5% v/v. Each herbicide rate was reduced by 25% for the 75% micro-rate treatment and by 50% for the 50% micro-rate treatment. The methylated seed oil rate was maintained at 1.5% v/v. The mid-rate treatment was desmedipham & phenmedipham & ethofumesate at 0.12 (time 1)/0.16 (time 2)/0.22 (time 3) lb/A plus triflusaluron at 0.004 lb/A plus clopyralid at 0.03 lb/A plus clethodim at 0.03 lb/A plus methylated seed oil at 1.5% v/v. The conventional rate was desmedipham & phenmedipham & ethofumesate at 0.25 (time 1)/0.33 (time 2)/0.5 (time 3) lb/A plus triflusaluron at 0.008 lb/A plus clopyralid at 0.06 lb/A plus clethodim at 0.047 lb/A. Amaranth, canola, flax, quinoa (*Chenopodium quinoa*) and sugarbeet were seeded in each plot. Bioassay species control and sugarbeet injury were evaluated at Prosper and Fargo, ND in 2005 and at Prosper, ND in 2006. The conventional sprayer was operated at 40 psi with XR8001 nozzles at 6 mph to deliver 5 gpa and with XR 80015 nozzles at 4.5 mph to deliver 10 gpa. The air assist sprayer was set to deliver 5 or 10 gpa at 4 mph using 10 inches of air in 2005 and to deliver 10 gpa at 4 mph using 10 or 20 inches of air in 2006.

Bioassay species control and sugarbeet injury in 2005 were not significantly affected by changing spray volume from 5 gpa to 10 gpa. Since spray volume had little effect on herbicide phytotoxicity in 2005, all treatments in 2006 were applied at 10 gpa. However, the air amount in 2006 was set at either 10 inches or 20 inches using a gauge on the sprayer while air amount was only set at 10 inches in 2005.

Averaged over all bioassay species and all herbicide rates, herbicides applied using 20 inches of air gave slightly better control than when applied using 10 inches of air. Herbicide treatments applied with the air assist sprayer gave better control of bioassay species and more sugarbeet injury than the same treatments applied with the conventional sprayer. The increased control of bioassay species with the air assist sprayer was not generally sufficient to allow a significant reduction in herbicide rate while maintaining weed control as compared to the conventional sprayer.