THE EFFECT OF NOZZLE TYPE AND APPLICATION VOLUME FOR ANNUAL WEED CONTROL IN LIBERTY-LINK SOYBEANS WITH GLUFOSINATE.

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This study was conducted in Liberty-Link soybeans to evaluate glufosinate herbicide efficacy at two locations in Minnesota, comparing a conventional nozzle, one chamber type nozzle, and two low-drift air induction nozzles at two water volume rates. The nozzle comparisons included an extended range flat-fan nozzle (XR flat-fan) from Spraying Systems, the chamber style turbo flat-fan from Spraying Systems (TT); a pre-orifice/venturi air induction flat-fan (AIXR) from Spraying Systems and a venturi/air induction GuardianAir (GA) from Hypro. The nozzle treatments delivered spray volumes of 10 and 15 gallons per acre while maintaining fine, medium and coarse size droplets.

A field experiment was conducted the summer of 2009 at the Southwest Research and Outreach Center in Lamberton, MN and the Southern Research and Outreach Center in Waseca, MN. The experimental design was a randomized complete block design with treatments arranged in a 2 by 4 factorial consisting of spray volume by spray tip design. Treatments were replicated four times and efficacy was evaluated at 10 and 30 days after treatment. Soybean yield was measured for each treatment and final was adjusted to 13% moisture. The soybean varieties MBS Genetics SG2378LL and S080137LL were planted on May 19th at Lamberton and May 28th at Waseca respectively in 30 inch wide rows at 160,000 seeds per acre. The applications were made on June 20th at Lamberton and on June 26th at Waseca with a tractor-mounted 3-point sprayer equipped with a 4 nozzle boom. Nozzles were spaced at 15 inches and located 20 inches above the target. Glufosinate (Ignite 280 SL herbicide) at 22 oz/acre with AMS at 3.0 lbs/acre was applied to 4 - 6 inch or smaller common lambsquarters, common waterhemp, redroot pigweed, barnyard grass, giant foxtail and green foxtail, depending on location. Soybeans were at the V3 leaf stage and approximately 5 inches in height at the time of herbicide application. Air temperatures were 83^{o}F at Waseca and 73^{o} F at Lamberton at the time of application. The operating pressure of 40 psi for each nozzle treatment was selected to deliver spray volumes of 10 and 15 gallons per acre while maintaining fine, medium and coarse size droplets. The flow rates were attained by selecting the following manufacturers spray tip orifice sizes: XR11015, XR11002, TT11015, TT11002, AIXR110015, AIXR11002, GA110015 and GA11002. Analysis: Data was subjected to ANOVA and means were separated with Fisher's protected LSD ($P \leq .10$).

Data were analyzed separately by location. At Waseca, at the 10 gpa rate, lambsquarter control from the AIXR nozzle tip was was significantly less than the XR tip. At the 15 gpa rate, TT nozzle tip was significantly less than both the XR and GA tips. Control of Amaranth species (redroot pigweed and waterhemp) was similar for all nozzle types at both locations except for the AIXR spray tips which provided reduced control at the 10 gpa rate at Waseca. When averaged over nozzle types, Amaranth efficacy ratings at Lamberton provided significantly better control at the 15 gpa rate compared to the 10 gpa rate 91% versus 89% control (at $p = 0.01$). There were no significant differences among spray tips for the control of a mixed grass species (Green Foxtail and Barnyard Grass) at either the 10 or 15 gpa rates at Lamberton. Giant Foxtail

control at Waseca was similar for all nozzle types except control was lower for the XR spray tip compared to the GA tip at the 15 gpa rate. No significant interactions were found among nozzle and spray-volume variables at either Waseca or Lamberton. Waseca soybean yields were not significantly different either among spray tips or spray volumes. When averaged across spray volume, Lamberton soybean yields were lowest for the GA nozzle tip (at $p = 0.10$).

The wide-spread use of glyphosate tolerate soybeans has increased the use of drift-reduction nozzles. Applicators who currently use nozzles designed to reduce drift while maintaining adequate efficacy for glyphosate, could use "drift-reduction" style nozzles with glufosinate and not experience significant reductions in weed control or soybean yield loss. The risk of a reduction in soybean yield with the use of "drift-reduction" nozzles will decline even more if growers adopt a sequential weed control program of a soil applied herbicide followed by a glufosinate herbicide application or the use of two multiple applications of gulfosinate applied postemergence.