

COMPARISON OF VENTURI SPRAY TIPS AND SPRAY PRESSURES ON GLYPHOSATE AND PARAQUAT EFFICACY. Robert E. Wolf, Cathy L. Minihan and Dallas E. Peterson, Extension Specialist, Biological and Agricultural Engineering, Assistant Scientist and Professor, Department of Agronomy, Kansas State University, Manhattan, KS 66506.

This study was designed to measure herbicide efficacy and droplet characteristics using three venture style tips at three different operating spray pressures. Venturi style tips including air induction (AI) from Spraying Systems, air mix (AM) from Greenleaf, and ultra lo-drift (ULD) from Hypro were compared to the turbo flat-fan (TT), also from Spraying Systems. The four tips were compared at spray pressures of 207, 345, and 482 kPa with a spray volume of 94 L/ha. The nozzle angle and orifice size used in all treatments was 11002. To maintain the target application volume, the application speed was altered at the different pressures. The applications were made with a tractor plot-sprayer equipped with a 3 m rear mounted boom. Nozzles were spaced at 76 cm, located 51 cm above the target, and were tilted with a rearward incline of 15 degrees. Glyphosate and paraquat were used to compare efficacy on velvetleaf, common sunflower, sorghum and corn. The study was comprised of 24 treatments with three replications. In addition to efficacy ratings, water sensitive cards were placed under the spray boom to collect the droplet data. Two cards per treatment over two replications were summarized representing 96 cards. DropletScan software was used to analyze the cards and SAS was used to separate difference in means.

Efficacy ratings show that very few interactions were significant among herbicide, tip and spray pressure variables. Species control varied between glyphosate and paraquat as would be expected. Paraquat provided better velvetleaf control, glyphosate gave better sorghum and corn control, and common sunflower was similar for the two herbicides.

Only minor differences in control occurred among spray tips or spray pressures. Weed control was or tended to be slightly lower with the turbo flat-fan than the venture style tips. The difference in control was greatest for the velvetleaf, but still was less than 10 percent. Among the venture tips, AI and AM tips tended to give slightly better weed control than the ULD tips. However, the differences were small and usually not significant. No significant differences in weed control occurred among the three pressures.

The droplet statistics volume median diameter (VMD, 50%), actual GPA collected, percent area coverage, and droplets less than 200 microns were measured from the water sensitive cards for each tip. The VMD means for the AI, ULD, AM, and TT was 625, 582, 571, and 549 microns respectively. The AI had a significantly larger micron size than the AM and TT. None of the other comparisons for VMD were significant. Significant differences were also measured for percent area coverage among the chemical, tip and pressure interactions. Percent area coverage means ranged from 47 to 20 percent. Differences among treatments separated by at least 11.5 percent were significant. An important statistic for indicating drift potential is the number of droplets that are 200 microns or less in size. No significant differences were found for this statistic. Also, no significant difference in collected GPA was found.

As evidenced in this study, very few significant differences were found among treatments. One plausible explanation for reduced control with the turbo flat-fan tip may be that high temperature and low humidity conditions were present when the trial was sprayed. The smaller drops produced compared to the venture style tips may have been subjected to evaporation or faster drying. Overall, these results suggest that equal or better weed control can be achieved with the new venture style tips compared to the turbo flat-fan tips, regardless of whether a systemic or contact herbicide is being applied. All tips can also be used within a pressure range of 207 to 482 kPa while maintaining a similar level of performance. Performance over a wide range of pressure is important with the use of spray controllers that maintain spray volumes over speed changes that result in pressure adjustments. Venturi tips appear to be a viable option to minimize spray drift potential and maximize performance.