The Evaluation of Boomless Nozzles for Weed Control in Pastures, Rangelands, and on Roadsides.
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Controlling and eliminating weeds in pastures and rangelands is an enormous challenge for farmers and ranchers. Similar challenges exist for those with responsibility to control weeds in rights-of-way areas. Dense, tall brush and rugged terrain limit the use of ground application systems equipped with booms to spray these areas. Therefore, applications of herbicides are commonly relegated to the use of airplanes or helicopters, which can be very cost prohibitive; or handheld spray systems, which are not very efficient for large areas. Deciding what approach to use is one major challenge. In recent years the use of four-wheelers equipped with small capacity spray tanks and boomless nozzle systems have become popular. These systems are better adapted to uneven terrains and have potential to spray 25-30 foot swaths using a centrally located single or dual nozzle arrangement. Most recently there have been several nozzle designs introduced for this purpose. The adoption of these nozzle types is occurring without a clear understanding of correct operating parameters. Indications are that these nozzle types may not be as effective for weed control as hoped.

Field trials were initiated using a four-wheeler spray system to evaluate boomless nozzles evaluating pattern quality, swath width, droplet spectra, and efficacy. Replicated studies were conducted in a manner consistent with recommended practice for boomless nozzle systems. The nozzle types compared were the TeeJet BoomJet (XP), Hypro Boom Extender (XT), Wilger Combo-Jet (WC-J), and the Evergreen Boom Buster (BB). Tank mix treatments containing glyphosate and paraquat were applied to a growing wheat crop planted in 20-foot wide strips for comparing each nozzle treatment. Visual ratings for efficacy, uniformity of control, and measurements for width of control at four weeks after treatment are reported. Two trials were completed, one with new growth wheat (4-5 inches tall) and the other in a later growth stage (24-30 inches tall). Three replications were evaluated for each treatment. Multiple water sensitive papers (WSP) were used to collect spray droplets across the swath width for each treatment. DropletScan® software, a computer, and a flat-bed scanner were used to calculate critical droplet statistics for all treatments.

The spray system was calibrated to deliver 18 GPA at a spray speed of 3.5 MPH and a spray pressure between 35 and 40 PSI for all treatments. The nozzles for each treatment were configured according to manufacturer's recommendations (charts) to deliver the desired swath width. In the tall wheat trials differences were found at 4 WAT between chemical treatments with glyphosate showing complete control (100%) in the sprayed swath for all nozzle types and with paraquat having significantly less control across all nozzle types. There were differences in nozzle type in the paraquat treatments with the XT showing the most control (77%), the BB next at 73%, followed by the WC-J at 67%, and the XP at 60%. Evaluation for uniformity of control across the pattern width and depth was also measured with little differences found for all nozzle treatments in the glyphosate block. However, on a scale of 1-10 the uniformity of control in the paraquat block indicated some differences. The highest uniformity score was with the XT and the BB (8) and the lowest was with the XP (5) with the Wilger at 7. Another critical evaluation for these nozzle types was effective swath width. Measurements were taken for each treatment in the plot center starting the measurement from the edge of the first wheat row across the effectively controlled area away from the sprayer. Differences were found ranging from 131-inches for the WC-J with glyphosate to a low of 94-inches for the XP with paraquat. The widest swaths were found with the glyphosate treatments. A second trial in smaller wheat had different results for swath width. The XT with paraquat at 192-inches was best and the XP and WC-J with glyphosate measuring the least width at 134 and 146-inches respectively. Efficacy and control uniformity ratings for this trial are not yet completed. The droplet analysis is not complete at this time. [116]