EFFICACY OF GRAMOXONE SL AND LIBERTY 280 APPLIED WITH DIFFERENT NOZZLE TYPES AND SPRAY VOLUMES

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Abstract

The widespread use of glyphosate in Roundup Ready crops was partially responsible for changing common herbicide application techniques. Roundup Ready systems allowed growers to reduce equipment costs and labor requirements because only glyphosate was required for weed control. As technology progressed, large high-clearance sprayers were developed for applying glyphosate. However, glyphosate is prone to off-target movement. Therefore, nozzles capable of producing larger droplets over a wide range of operating pressures were developed. Application of Liberty 280 (glufosinate) or Gramoxone SL (paraquat) immediately prior to planting have become increasingly common in midsouthern U.S. crop production because of glyphosate-resistant Palmer amaranth. More information is needed to identify which spray nozzles and spray volumes produce optimum Palmer amaranth control with these herbicides. Research was conducted to compare the efficacy of Liberty 280 and Gramoxone SL applied at two spray volumes with standard flat fan or venturi-type drift reduction nozzles.

The study was conducted in 2012 at the Mississippi State University Delta Research and Extension Center in Stoneville, MS, in a non-crop area known to be infested with Palmer amaranth. Plot size was 6.67 by 20 feet. The experimental area was conventionally tilled prior to study initiation. Treatments were arranged as a three-factor factorial within a randomized complete block experimental design with four replications. Factor 1 was herbicide and included Liberty 280 at 0.53 lb ai/A and Gramoxone SL at 0.75 lb ai/A. Gramoxone SL applications included nonionic surfactant at 0.5% (v/v). Factor 2 was spray volumes consisting of 10 and 20 gallons/A (GPA). Factor 3 was nozzle type and included a standard flat fan (FF) and venturi-type drift reduction nozzle [air induction (AI)]. The lower spray volume (10 GPA) was achieved with 110015 spray nozzles, while 11003 spray nozzles were utilized for the higher spray volume (20 GPA). Spray pressure was held constant at 37 psi. Treatments were applied to six-leaf Palmer amaranth that averaged 4 inches in height. Palmer amaranth control was visually estimated at 7, 14, and 21 days after treatment (DAT). All data were subjected to ANOVA and means were separated using Fisher's protected LSD at $p \leq 0.05$.

Gramoxone SL controlled Palmer amaranth better than Liberty 280 regardless of nozzle type at 7 and 21 DAT. Pooled across 10 and 20 GPA spray volumes, Liberty 280 controlled more Palmer amaranth 7 and 21 DAT when applied with FF nozzles compared with AI nozzles. Palmer amaranth control at 7 DAT was similar following Gramoxone SL applied with FF or AI nozzles; however, Palmer amaranth control was greater when Gramoxone SL was applied with FF nozzles 21 DAT. Pooled across herbicide treatment and nozzle type, Palmer amaranth control was greater 21 DAT following applications at 20 GPA compared with those at 10 GPA. Gramoxone SL controlled Palmer amaranth better than Liberty 280 14 DAT regardless of nozzle type or spray volume. Pooled across Liberty 280 and Gramoxone SL herbicide treatments, Palmer amaranth control was greater 7 and 14 DAT when applications were made with FF nozzles at 10 GPA. With a 20 GPA spray volume, Palmer amaranth control was greater following applications with FF nozzles at 7 DAT, but control was similar 14 DAT for both nozzle types following 20 GPA applications. For each nozzle type, Palmer amaranth control was greater 7 and 14 DAT when applications were made at 20 GPA compared with 10 GPA.

Data from the current experiment indicate that Liberty 280 and Gramoxone SL applications targeting Palmer amaranth should be applied with FF nozzles. Flat fan nozzles are preferred over AI nozzles for spray volumes of 10 and 20 GPA.