SEQUENTIAL APPLICATIONS OF RESIDUAL HERBICIDES FOR PALMER AMARANTH CONTROL

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Abstract

Amaranthus spp. are among the most troublesome weeds in many cropping systems in the United States. Most herbicide programs are based on control of Palmer amaranth (*Amaranthus palmeri*) because of its rapid growth rate and competitive impacts on crops. Roundup Ready and Flex cotton production systems and the historical effectiveness of glyphosate led to decreased use in residual herbicides to control problem weeds. Widespread incidence of glyphosate-resistant (GR) Palmer amaranth has forced producers to shift back to older residual herbicides to control this weed. Most Mississippi producers are accustomed to using one or two residual herbicide applications during the growing season. However, additional research is needed to evaluate GR Palmer amaranth control with programs including multiple applications of residual herbicides. The objective of this research was to evaluate Palmer amaranth control with programs containing multiple applications of residual herbicides.

The study was conducted in 2012 at the Mississippi State University Delta Research and Extension Center in Stoneville, Mississippi, at a site known to be infested with GR Palmer amaranth. Palmer amaranth at the site contained approximately 25% GR individuals. The soil texture was a Dundee very fine sandy loam with a pH of 6.1 and 1.2% organic matter. Individual plots were four 40-inch rows measuring 30 feet in length. 'Fibermax 1944 GLB2' was seeded at 39,000 seed/A on May 1, 2012. Treatments were arranged as a three-factor factorial within a randomized complete block experimental design with four replications. Factor A was treatments applied prior to cotton emergence [early preplant (EPP) or preemergence (PRE)], factor B was treatments applied postemergence as a broadcast spray (POST-OT), and factor C was treatments applied postemergence as a directed spray (POST-DIR). Palmer amaranth control was visually estimated at weekly intervals from planting until 14 d following the last POST-DIR application. Data were subjected to ANOVA and means were separated using Fisher's protected LSD at p=0.05.

Cotoran PRE or Reflex EPP followed by Cotoran PRE controlled GR Palmer amaranth better than Reflex EPP at 19 d after planting. Pooled across POST-OT treatments, sequential applications of Reflex EPP followed by Cotoran PRE provided greater GR Palmer amaranth control 14 d after the last POST-OT applications than treatments that included only Reflex EPP or Cotoran PRE although the data is not presented. Pooled across treatments prior to emergence, two applications of Roundup PowerMax plus Dual Magnum controlled more GR Palmer amaranth than one application at 14 d after the last POST-OT application. When only Roundup PowerMax plus Direx plus MSMA was applied POST-DIR, GR Palmer amaranth control was greater 14 d after the last POST-DIR application in plots receiving two applications of Roundup PowerMax plus Dual Magnum compared with only one application. However, no differences in control were detected among POST-OT treatments when Roundup PowerMax plus Caparol plus MSMA and Roundup PowerMax plus Direx plus MSMA were utilized as POST-DIR treatments. For each residual herbicide treatment applied prior to cotton emergence, GR Palmer amaranth control was similar regardless of POST-DIR treatments when two applications of Roundup PowerMax plus Dual Magnum were applied POST-OT. However, GR Palmer amaranth control was reduced when only one POST-DIR treatment was applied following two applications of Roundup PowerMax plus Dual Magnum and Reflex EPP compared with Refex EPP followed by Cotoran PRE. Where only one application of Roundup PowerMax plus Dual Magnum was applied POST-OT, both POST-DIR treatments were required to optimize GR Palmer amaranth control. Sequential applications of Reflex EPP followed by Cotoran PRE provided greater GR Palmer amaranth control than either herbicide as single applications. This was likely due to the increased time that Reflex was in the field since it was applied EPP and the shorter length of residual control provided by Cotoran compared with Reflex. Two applications of Roundup PowerMax provided greater GR Palmer amaranth control compared with one application, regardless of residual herbicide applied prior to cotton emergence. A minimum of four applications of a residual herbicide were required to maximize GR Palmer amaranth control by 14 d after the last POST-DIR application.