EXAMINING THE SENSITIVITY OF PALMER AMARANTH TO CHLOROACETAMIDE HERBICIDES

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Abstract

Chloracetamides are one of the most prevalent herbicide chemistries used today, with both metolachlor and acetochlor being among the top 5 herbicides in the U.S. Previous research has suggested that chloroacetamide resistance could be probable in multiple-resistant Amaranthus species. An experiment was conducted in the summer of 2018 to determine the efficacy of chloroacetamide herbicides on different Palmer amaranth (*Amaranthus palmeri*) populations. The field portion of this experiment was conducted at on-farm locations in Marion and Crawfordsville, AR. The experiment was a two-factor, randomized complete block design with factor-A being chloroacetamide herbicide (*S*-metolachlor, acetochlor, and dimethenamid) and factor-B being rate (1/4, 1/2, and 1X labeled rate of herbicides; *S*-metolachlor=1,070 g/ha, acetochlor=1,472 g/ha, dimethenamid=631 g/ha). Overall, the 1X rate of *S*-metolachlor provided less Palmer amaranth control 14 days after treatment (DAT) (60%) compared to a 1X rate of acetochlor (96%) or dimethenamid (94%). However, all chloroacetamide herbicides effectively controlled barnyardgrass (*Echinochloa crus-galli*) greater than 97% 14 DAT. Subsequently, research was performed in the greenhouse on Palmer amaranth accessions collected from Maron and Crawfordsville. This experiment was conducted as a three-factor factorial, with factor-A being Palmer amaranth population (Marion, Crawfordsville, susceptible-1, and susceptible-2), factor-B being chloroacetamide herbicide (similar to field experiment), and factor-C being rate (in increments from 1/256 to 1X). Based on dose response analysis the Marion and Crawfordsville Palmer amaranth populations were more difficult to control with *S*-metolachlor compared to the susceptible accessions with an LD_{50} value that averaged 8.75X higher. Based on field experiments and dose response analysis, it is probable that some populations of Palmer amaranth have developed resistance to metolachlor.