Introduction

Bermudagrass (Cynodon spp.) is common in Missouri and difficult to manage. Suppression is reported with aryloxyphenoxypropionate (AOPP) herbicides such as fenoxaprop and fluazifop (Doroh et al., 2011; Lewis et al., 2010).

Genetic variation among varieties of the same species (Wu et al. 2004) may result in intra-species differences in response to AOPP herbicides.

Our previous study found that the ‘Riviera’ and ‘Quickstand’, two common bermudagrass (C. dactylon) varieties, exhibited differential tolerance to fenoxaprop.

Objectives

The objective of this research was to evaluate the variation among older and newer common bermudagrass varieties in response to fenoxaprop-p-ethyl.

Materials and Methods

Research location and conditions:

- Experiments were conducted in a greenhouse environment at the University of Missouri, with 30/25°C (day/night) temperatures and 12 h photoperiod at a light intensity of 600 μmol s⁻¹ m⁻².

Materials:

- Five common bermudagrass varieties, ‘Celebration’, ‘NuMexSahara’, ‘Princess 77’, ‘Riviera’, and ‘Yukon’ were propagated in 13 by 13 cm pots with Pro-mix (Premier Tech Horticuture, Quakertown, PA) potting soil (Fig. 1).
- Plants were maintained at 3 cm height and fertilized weekly with an all-purpose fertilizer (Miracle Gro; The Scotts Company LLC, Marysville, Ohio) at 12.2 kg N ha⁻¹.
- Single applications of fenoxaprop-p (0.2 kg a.i. ha⁻¹) were made using an air-driven hydraulic sprayer (Fig. 2) calibrated to deliver 140 L ha⁻¹ at a spray pressure of 234 kPa using TeeJet XR8001E (TeeJet Technologies, Springfield, Illinois) spray tips.

Measurements:

- Herbicide activity was visually assessed weekly at 0-100%, where 0 indicates no discoloration, and 100 indicates total discoloration (brown).
- Discoloration is expressed as area under percentage discoloration curves (AUPDC), which was calculated based on the following equation:

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AUPDC = \sum_{i=1}^{n} \left( \frac{X_i + X_j}{2} \right) \times (t_{ij} - t)
\]

where \(X_i\) = percent discoloration at \(i\)th observation, \(t_{ij}\) = days after treatments at the \(i\)th observation, and \(n\) = number of total observations (Campbell and Madden, 1990).

- Clipping biomass was collected weekly at 3 cm cutting height through 8 weeks after treatment (WAT) (Fig. 3), and was expressed as early (1-4 weeks) or late (5-8 weeks) stage.

Experimental Design and Data Analysis

- Experiment was arranged as randomized complete block design with 4 replications. Data were analyzed by ANOVA using Proc GLM in SAS (9.2 version by SAS Institute Inc., Cary, North Carolina).

Results

‘Riviera’ and ‘Yukon’ exhibited significantly less discoloration (Fig. 4 and 5) than other varieties. The variety ‘Celebration’ displayed the most discoloration compared to the other varieties tested (Fig. 5).

Production of clippings from all varieties was reduced by more than 90% in the early stage, except ‘Riviera’ and ‘Yukon’, which maintained >30% PCB (Table 1). At 4 to 8 WAT, both ‘Riviera’ and ‘Yukon’ recovered to ≥80% PCB; the PCB for other varieties was <65% (Table 1).

Conclusions

- Significant intra-species variation among common bermudagrass varieties to the herbicide fenoxaprop exists.
- Among the 5 varieties, ‘Riviera’ and ‘Yukon’ appeared to be more tolerant to fenoxaprop, while ‘Celebration’ was assessed most susceptible.
- Turfgrass managers are recommended to consider the variation among bermudagrass varieties when developing a management program for unwanted bermudagrasses.

References