

IDENTIFICATION AND MANAGEMENT OF GLYPHOSATE-RESISTANT ANNUAL BLUEGRASS (*Poa annua* L.)

Kenton M. Binkholder
Dr. Reid J. Smeda, Thesis Supervisor

ABSTRACT

Annual bluegrass is the most problematic weed on golf courses in the Transition Zone and Southern United States. Applications of glyphosate are common on dormant zoysiagrass to remove winter annual weeds. In 2007, a suspect population of annual bluegrass (hereafter referred to as CCMO1) in Columbia, Missouri survived an application of glyphosate following more than 10 years of continuous applications. Research was conducted in vitro to identify the extent of glyphosate-resistance in CCMO1. At the field level, alternative herbicides were evaluated for effectiveness on CCMO1. Finally, greenhouse studies were conducted to determine the impact of glyphosate on annual bluegrass seed production at different growth stages. Results indicate that the CCMO1 biotype of annual bluegrass is glyphosate resistant, with an I_{50} of 0.49 kg ae·ha⁻¹ for CCMO1 compared to 0.09 kg·ha⁻¹ for S. This resulted in a resistance index (R:S I_{50} ratio) of 5.2 for CCMO1. Field results demonstrated that pre-emergence (PRE) herbicides significantly improved CCMO1 control versus post-emergence (POST) herbicides. The addition of a POST herbicide following a PRE resulted in the most consistent control of annual bluegrass. Seed production in the absence of glyphosate was 15,000 to 16,000 and 21,000 to 30,000 seeds per plant for S and CCMO1 plants, respectively. The addition of glyphosate reduced the number of seeds by 98% and 85% for S and CCMO1 plants, respectively. However, use of glyphosate at recommended rates resulted in viable production of seeds from CCMO1 plants, suggesting that continued applications of glyphosate on glyphosate-resistant annual bluegrass will increase viable seeds in the soil seed-bank.