



**HERBICIDE  
RESISTANCE  
ANALYSIS**



**WEED DIAGNOSTICS CENTER**  
**UTIA** INSTITUTE OF  
AGRICULTURE  
THE UNIVERSITY OF TENNESSEE

# INTRODUCTION

ANY GOLF & COUNTRY CLUB, ANYTOWN, USA

Annual bluegrass samples from Any Golf & Country Club (Anytown, USA) were submitted to the University of Tennessee Weed Diagnostics Center to be screened for resistance to glyphosate. Plants were harvested from the golf course on January 8th, 2016 and shipped to the University of Tennessee (Knoxville, TN). After arriving on January 12th, 2016, plants were transplanted into greenhouse pots filled with growing media and maintained under greenhouse conditions optimized for annual bluegrass growth.

## TESTING FOR GLYPHOSATE RESISTANCE

A rapid diagnostic assay was used to screen for glyphosate resistance. Individual annual bluegrass tillers from Any Golf & Country Club (AG) were established in a plant tissue culture medium along with biotypes of annual bluegrass known to be both resistant (R) and susceptible (S) to glyphosate for comparison (Figure 1). Agar contained a modified Murashige & Skoog medium (MS15) optimized for annual bluegrass growth. Prior to transplanting, all annual bluegrass plants were washed free of soil and trimmed to a uniform root length of 4 cm. Plants were then transplanted into agar growing medium containing glyphosate at 100  $\mu$ M as well as agar that did not contain herbicide. Transplanting occurred on January 15th, 2016 and was replicated five times. Plant responses to glyphosate were then assessed seven days later on January 22nd, 2016.

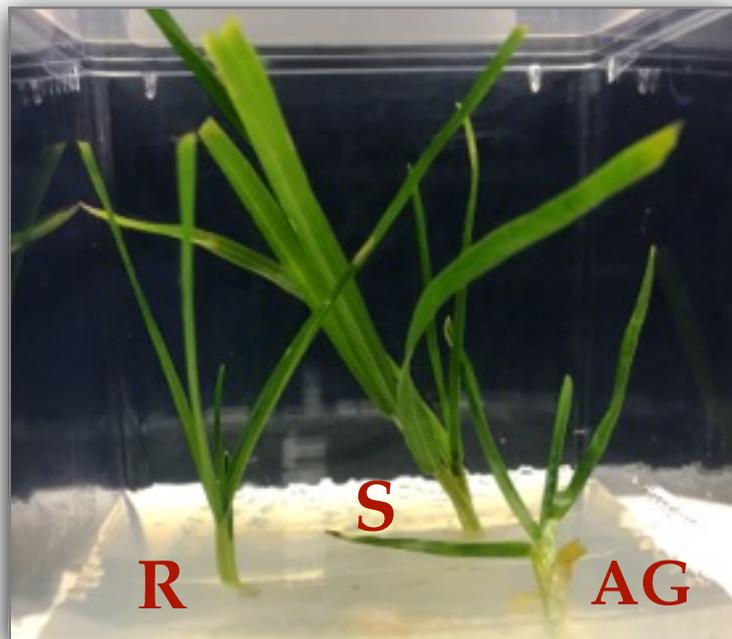


Figure 1. Rapid diagnostic assay to screen for glyphosate resistance in annual bluegrass samples from Any Golf & Country Club (AG). Plants were established along with known resistant (R) and susceptible (S) biotypes in agar culture.

Non-Treated      Glyphosate at 100  $\mu$ M



Figure 2. Response of annual bluegrass samples from **Any Golf & Country Club** seven days following exposure to 100  $\mu$ M glyphosate in agar culture.

Non-Treated      Glyphosate at 100  $\mu$ M



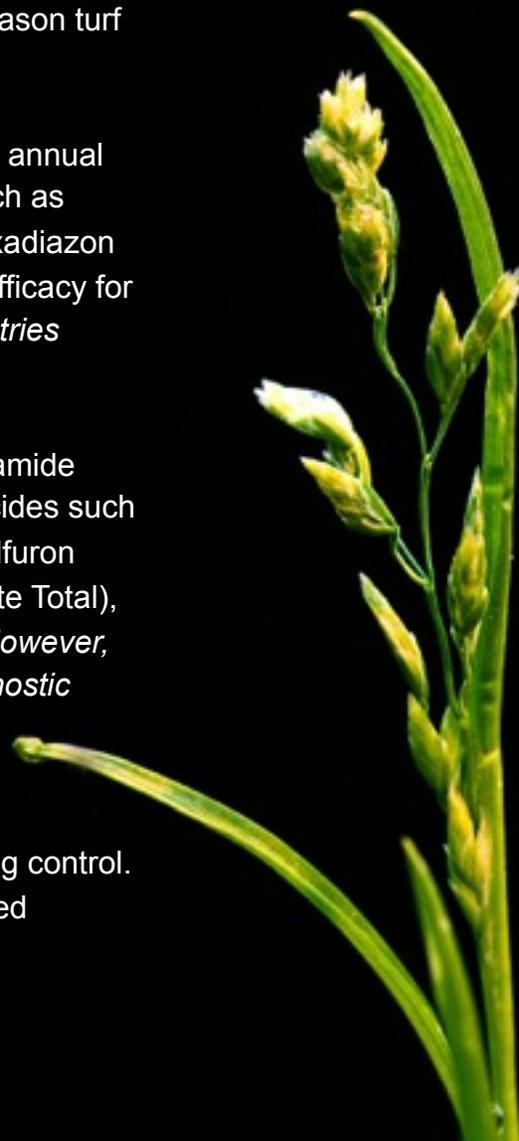
Figure 3. Response of annual bluegrass samples known to be **glyphosate-resistant** seven days following exposure to 100  $\mu$ M glyphosate in agar culture.

# RESULTS

- Rapid diagnostic assays indicate that annual bluegrass samples from Any Golf & Country Club are susceptible to glyphosate (Figure 2). All plants exposed to glyphosate in agar culture showed significant injury seven days after transplanting, similar to a known susceptible line. Comparatively, a biotype known to be resistant to glyphosate via target site mutation showed no symptoms on this date (Figure 3).

# RECOMENDATIONS

- Annual bluegrass samples from Any Golf & Country Club were susceptible to glyphosate. Glyphosate still may be applied according to label recommendations for postemergence annual bluegrass control in dormant warm-season turfgrass.
- Care should be taken to rotate all pre- or postemergence herbicides yearly in order to manage the onset of resistance to any herbicide, including glyphosate. Similar rotational options for use in dormant warm-season turf would include glufosinate (Finale) and diquat (Reward).
- A preemergence program is another feasible option for managing annual bluegrass infestations at Any Golf & Country Club. Herbicides such as prodiamine (Barricade), prodiamine + sulfentrazone (Echelon), oxadiazon (Ronstar), indaziflam (Specticle), or simazine (Princep) all have efficacy for annual bluegrass control. *However, susceptibility to these chemistries should be determined via diagnostic testing before application.*
- Selective postemergence control can be accomplished with pronamide (Kerb) in addition to use of acetolactate synthase inhibiting herbicides such as foramsulfuron (Revolver), trifloxysulfuron (Monument), sulfosulfuron (Certainty), thien carbazon + foramsulfuron + halosulfuron (Tribute Total), flazasulfuron (Katana), and rimsulfuron (Tranxit) among others. *However, susceptibility to these chemistries should be determined via diagnostic testing before application.*
- A combination program of a preemergence herbicide followed by postemergence treatment would be recommended for season long control. This approach is useful in controlling plants that may have escaped preemergence treatment.





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