

TURFGRASS RESEARCH 2023



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Effects of Glyphosate Applied at Different Times on Dormant Zoysiagrass Cultivars in the Transition Zone

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Summary

Winter annual weeds become a major problem during winter dormancy in warm-season turfgrass stands. In the transition zone, a winter glyphosate application is a common practice to reduce winter annual weed competition in zoysiagrass before emerging from dormancy in the spring. Research was conducted on the effects of glyphosate application timings on spring greenup and quality of experimental zoysiagrass genotypes compared to commercially available cultivars. Preliminary data from this study revealed a quicker spring greenup when glyphosate was applied in November compared to March. However, March-applied glyphosate significantly reduced cool-season weeds in experimental plots and enhanced quality compared to the nontreated control.

Rationale

Winter annual weeds become a major concern in warm-season turfgrasses during winter dormancy. To our knowledge, limited research exists on how glyphosate timing affects spring greenup of new zoysiagrass cultivars that have potential for commercialization. Several of these experimental types exhibit good fall color and early spring greenup, which can impact their response to glyphosate applications.

Objective

The objectives of this field trial were 1) to determine if glyphosate application timing affects spring greenup and turf quality of new zoysiagrass cultivars; and 2) determine cultivar spring greenup and quality differences after November or March-applied glyphosate.

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Study Description

A field study was conducted at Shadow Glen Golf Club in Olathe, KS, in the winter of 2021–2022 to investigate the effects of glyphosate timing on spring greenup and turf quality of zoysiagrass. The experiment was a randomized strip plot design with three replicates. Whole plots measured 6 ft by 6 ft and treatments included DALZ 1701, DALZ 1702, DALZ 1808, Innovation, and Meyer; three experimental zoysiagrass cultivars and two commercially available cultivars, respectively. Subplots measured 2 ft by 6 ft and treatments included fall-applied glyphosate, applied on November 22, 2021; spring-applied glyphosate, applied on March 9, 2022; and a nontreated control. Ranger Pro Herbicide (41% glyphosate) was applied using a CO₂ pressurized boom sprayer calibrated to deliver 43 GPA for both timing treatments. No fertilizer or additional herbicides were applied on the study area. Supplemental irrigation was applied two times weekly in the spring. Data collection included: spring greenup, turf quality, genetic color, seedhead production, and % weeds ratings collected weekly until zoysiagrass was fully green for the season. Spring greenup was visually rated on a 1 to 9 scale (1 = straw brown; 9 = completely green plot color) during the transition from winter dormancy to active spring growth. Turf quality was visually rated on a 1 to 9 scale (1 = poorest quality; 9 = optimum color, density, and uniformity), and genetic color was visually rated on a 1 to 9 scale (1 = no color retention; 9 = dark green). Seedheads were visually rated on a 1 to 9 scale (1 = significant seedhead production; 9 = no seedheads) during April and May when zoysiagrass commonly produces seedheads. Weed cover was visually rated on a 0–100% scale (0% = no weed cover; 100% = complete weed cover). All data for each of the ratings were subjected to ANOVA in SAS (v. 9.4) using the GLIMMIX procedure to determine those factors which were significant ($P \leq 0.05$) and means were separated according to Tukey's Honest Significant Difference (HSD).

Results

For many of the rating dates, cultivar by application timing effects were not significant. Therefore, main effects of cultivar and application timing data are presented separately. In May of 2022, spring greenup (combined across cultivars) was higher in fall-applied glyphosate subplots compared to spring-applied subplots. Though not significantly different, spring-applied subplots reached a higher average quality and had less weed pressure compared to fall-applied subplots (Table 1). Subplots that did not receive a glyphosate application had significantly higher weed pressure compared to treatments that received glyphosate regardless of timing (Figure 1). Main effects of cultivar showed DALZ 1702 had faster spring greenup compared to Meyer. Similar results were concluded for genetic color; all cultivars had a significantly higher genetic color rating compared to Meyer (Figure 2). While there were no significant differences in turfgrass quality within whole plots, the three DALZ experimental genotypes had an average quality of 6; whereas, Meyer and Innovation averaged a whole plot quality of 5. Seedhead production was severely reduced in DALZ 1702 and Innovation plots, regardless of glyphosate application timing. Sequential applications were made in November 2022 and March 2023, results after complete zoysiagrass greenup will be reported in the future.

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Table 1. Effect of glyphosate application timing on spring greenup, turf quality, and percent weeds in 5 zoysiagrass cultivars at Shadow Glen Golf Club in 2021

Glyphosate timing ^a	Spring greenup ^b	Turf quality ^c	Weeds (%) ^d
Fall-applied	5.5 a ^e	5.5 a	14 ab
Spring-applied	4.9 b	6.1 a	5 b
Nontreated	5.3 ab	4.9 b	29 a

^a Glyphosate was applied on November 22, 2021 (fall application), and March 9, 2022 (spring application).

^b Spring greenup was rated on May 11, 2022, on a 1 to 9 scale (1 = straw brown; and 9 = completely green color of whole plot).

^c Zoysiagrass quality was rated on May 19, 2022, on a 1 to 9 scale (1 = dead; 6 = acceptable; and 9 = maximum quality).

^d Weeds in experimental plot were visually rated on May 19, 2022, on a percentage scale (0% = no weeds; 100% complete weed cover).

^e Means followed by the same letter in a column are not significantly different according to Tukey's Honest Significant Difference ($P < 0.05$). Means are averages over replication and cultivar, $n = 15$.

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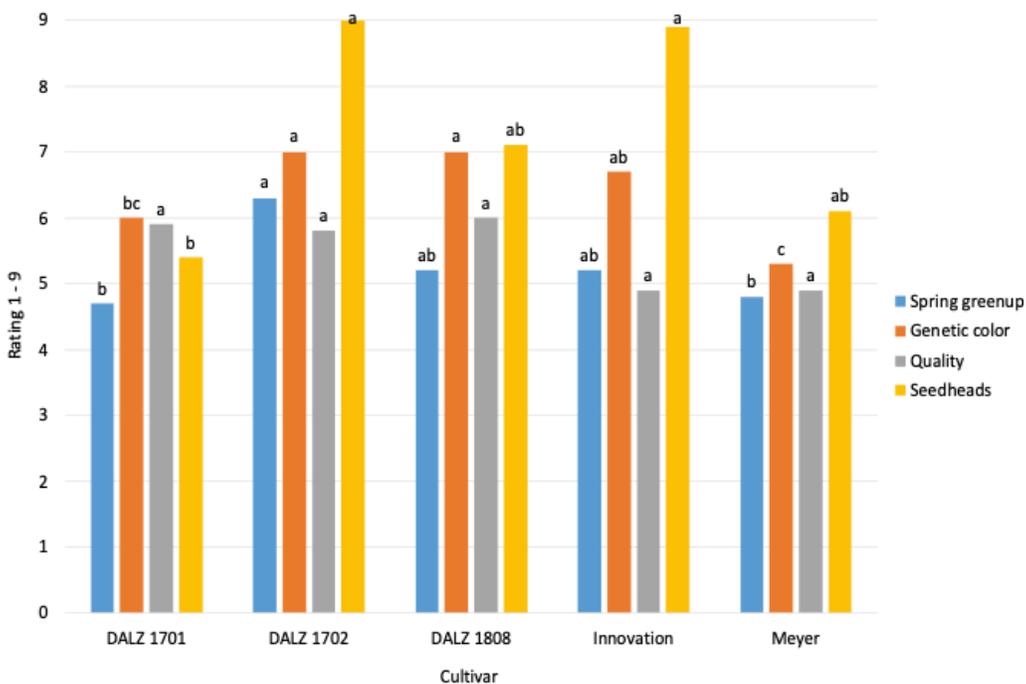


Figure 1. Main effect of cultivar on spring greenup, genetic color, turf quality, and seedhead production. Lowercase letters above bars are not significantly different within each rating according to Tukey's Honest Significant Difference ($P < 0.05$).

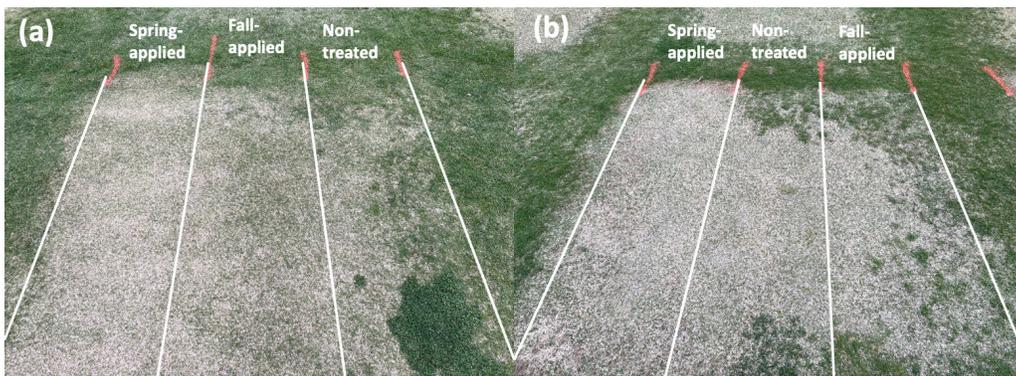


Figure 2. DALZ 1808 (a) and Meyer (b) experimental plots on April 28, 2022.

