

INFLUENCE OF VARIOUS HERBICIDES ON THE PHYTOTOXICITY TO CREEPING BENTGRASS FAIRWAY

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INTRODUCTION

Creeping bentgrass (*Agrostis stolonifera*) is a common fairway turf for golf courses in the Northeastern United States. Several herbicides are labeled for the control of various weed species found on golf course fairways, but some products often illicit an undesirable yellowing or other phytotoxic response from the bentgrass plants. The objective of this study was to evaluate the safety of various herbicides when applied to a creeping bentgrass fairway during the summer and also to assess their ability to provide postemergent crabgrass control.

MATERIALS & METHODS

This study was conducted on a monostand of 'L-93' creeping bentgrass with a severe infestation of crabgrass. The area was maintained as a golf course fairway and mowed approximately 4 times per week to a height of 0.5 inches. Besides the treatments listed, no other pesticide applications were made to the study area. Initial application of all treatments was 8 Jul. All treatments are listed in the treatment table. Plots measured 3 ft x 6 ft and were arranged in a randomized complete block with 4 replications. All treatments were applied with a CO₂ pressurized (40 psi) backpack sprayer equipped with a flat fan nozzle and calibrated to deliver 44 gal of water per acre.

The primary purpose of the study was to assess injury to the creeping bentgrass following application of various herbicides and therefore the site was rated visually for injury. Injury was rated on a 0 to 5 scale in which 0 = no injury present, 2.5 = minimum acceptable injury for a creeping bentgrass fairway, and 5.0 = entire plot area brown or dead. In addition to injury, control of a natural infestation of crabgrass was rated during the study. Crabgrass populations were rated on a percent scale in which 0 = no crabgrass present and 100 = entire plot area covered with crabgrass.

RESULTS DISCUSSION

Bentgrass Injury. Within 3 days of the initial application, unacceptable injury (≥ 2.5) to the creeping bentgrass was observed in plots receiving applications of Dismiss (0.188 lb) and Speedzone (1.8 fl oz) (Table 1). However, there were no differences on 11 Jul among the treatment with the greatest injury and those plots treated with Dismiss (0.125 lb), Drive (0.5 lb), Surge, Speedzone (1.1 fl oz), and Trimec bentgrass (1.5 fl oz). On 20 Jul, few treatments had unacceptable injury to the creeping bentgrass. However, plots treated with 7.0 fl oz of Acclaim EXTRA or the high rate of Speedzone continued to illicit objectionable discoloration. On the final rating date (15 Aug), excessive creeping bentgrass injury was observed within plots treated with multiple applications of Acclaim (both rates) and the high rates of Speedzone or Surge. Although Velocity caused some slight discoloration to the bentgrass during the study, only plots receiving weekly applications of Velocity exhibited objectionable injury and this level of injury did not manifest until shortly after the fourth and final application. Various levels of injury were caused by the other treatments in this study, but aside from those mentioned; no treatments caused injury that would be considered unacceptable for a golf course fairway.

Crabgrass control. As expected in this study, crabgrass populations were only reduced in plots received applications of Drive or Acclaim. Although no differences in rate were exhibited in the study, data trended towards and greater reduction of crabgrass as rates of either Drive or Acclaim increased. Regardless of treatment, neither product provided complete postemergent control of crabgrass with 2 applications on the 21-d interval.

DISCUSSION

In this study, the initial application of Dismiss, Drive, Surge, Speedzone, and Trimec bentgrass resulted in moderate to unacceptable injury to the creeping bentgrass. Although delayed by 1 week, the 7.0 oz rate of Acclaim also resulted in significant injury. Within 3 week of the initial application, injury had generally subsided. Sequential applications of various

herbicides, however, caused a resurgence of objectionable discoloration within 2 to 3 weeks after application. The sequential application of Dismiss did not result in unacceptable discoloration and the reduction in rate for the second application did not appear to positively or negatively influence the phytotoxic response. Regardless of herbicide or number of applications, bentgrass within all plots had recovered and no long term discoloration or thinning of turf was observed in the study. Depending on the targeted weed species, various herbicides are available for their selective control in a creeping bentgrass fairway. Caution, however, should be taken when selecting an appropriate rate as the higher rates of several herbicides evaluated in this study resulted in unacceptable discoloration to the bentgrass. This warning may also be more warranted in a situation where mixed stands of *Poa annua* and creeping bentgrass are being managed as the influence of these herbicides on annual bluegrass was not evaluated in this study.

Table 1. Bentgrass injury on creeping bentgrass, 2008.

Treatment and rate in ai/a	Application ^z timing	Bent injury ^y			
		11 Jul	20 Jul	1 Aug	15 Aug
Dismiss 4F 0.125 lb.....	A	2.0 a-d ^x	0.0 g	0.3 de	0.3 h
Dismiss 4F 0.188 lb.....	A	3.0 a	0.5 efg	0.3 de	0.0 h
Dismiss 4F 0.125 lb + Dismiss 4F 0.0625 lb..	A + E	1.8 b-e	1.0 def	0.8 cd	1.8 de
Dismiss 4F 0.125 lb.....	AE	1.8 b-e	0.8 d-g	0.3 de	1.5 def
Sedgehammer 0.046 lb.....	A	1.0 d-g	0.5 efg	0.3 de	0.5 gh
Sedgehammer 0.062 lb.....	AE	0.3 fg	0.5 efg	0.3 de	0.3 h
Drive 0.33 lb + MSO 1.5 pt/a.....	AD	1.8 b-e	1.0 def	0.8 cd	1.3 efg
Drive 0.5 lb + MSO 1.5 pt/a.....	AD	2.3 abc	1.5 cd	1.3 bc	2.3 cd
Acclaim Extra 3.5 fl oz.....	AD	0.5 fg	0.8 d-g	0.0 e	3.0 abc
Acclaim Extra 7.0 fl oz.....	AD	1.0 d-g	3.0 a	1.5 b	3.8 a
Surge 1.2 fl oz.....	AE	2.3 abc	1.0 def	0.3 de	1.8 de
Surge 1.5 fl oz.....	AE	2.3 abc	1.5 cd	0.5 de	2.8 bc
SpeedZone 1.1 fl oz.....	AE	2.0 a-d	1.3 cde	0.3 de	2.3 cd
SpeedZone 1.8 fl oz.....	AE	2.8 ab	2.5 ab	0.8 cd	3.3 ab
Trimec Bentgrass 1.1 fl oz.....	AD	1.0 d-g	0.8 d-g	0.3 de	0.8 fgh
Trimec Bentgrass 1.5 fl oz.....	AD	2.0 a-d	1.3 cde	0.3 de	1.8 de
Lontrel 0.20 fl oz.....	A	0.5 fg	0.3 fg	0.3 de	0.8 fgh
Lontrel 0.5 fl oz.....	A	0.5 fg	0.5 efg	0.8 cd	0.5 gh
Velocity 10 g.....	ABCD	0.8 efg	2.0 bc	2.5 a	0.5 gh
Velocity 10 g.....	AD	1.0 d-g	0.8 d-g	0.3 de	1.3 efg
Velocity 30 g.....	AD	1.3 c-f	1.0 def	0.0 e	1.3 efg
Untreated.....	-	0.0 g	0.3 fg	0.3 de	0.0 h
Untreated.....	-	0.5 fg	0.0 g	0.0 e	0.3 h
Untreated.....	-	0.5 fg	0.5 efg	0.0 e	0.5 gh

^z Treatments were applied as follows: A = 8 Jul, B = 15 Jul, C = 25 Jul, D = 29 Jul, and E = 5 Aug.

^y Bentgrass injury was rated on a 0 to 5 scale where 0 = no injury visible; 2.5 = unacceptable injury for a creeping bentgrass fairway; and 5 = entire plot brown or dead.

^x Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ level according to the Fisher's protected least significant difference t-test.

Table 2. Percent crassgrass of herbicide tolerance on fairway height creeping bentgrass, 2008.

Treatment and rate in ai/a	Application ^z Timing	Percent crabgrass ^y	
		20 Jul	1 Aug
Dismiss 4F 0.125 lb	A	31 abc ^x	24 a-d
Dismiss 4F 0.188 lb	A	27 abc	27 a-d
Dismiss 4F 0.125 lb + Dismiss 4F 0.0625 lb	A + E	27 abc	23 bcd
Dismiss 4F 0.125 lb	AE	31 abc	24 a-d
Sedgehammer 0.046 lb	A	27 abc	19 de
Sedgehammer 0.062 lb	AE	31 abc	23 de
Drive 0.33 lb + MSO 1.5 pt/a	AD	7 d	7 f
Drive 0.5 lb + MSO 1.5 pt/a	AD	1 d	3 f
Acclaim Extra 3.5 fl oz	AD	8 d	11 ef
Acclaim Extra 7.0 fl oz	AD	3 d	7 f
Surge 1.2 fl oz	AE	31 abc	24 a-d
Surge 1.5 fl oz	AE	37 a	32 ab
SpeedZone 1.1 fl oz	AE	31 abc	24 bcd
SpeedZone 1.8 fl oz	AE	37 a	32 ab
Trimec Bentgrass 1.1 fl oz	AD	34 ab	34 a
Trimec Bentgrass 1.5 fl oz	AD	28 abc	25 a-d
Lontrel 0.20 fl oz	A	26 bc	21 cde
Lontrel 0.5 fl oz	A	29 abc	24 a-d
Velocity 10 g	ABCD	35 ab	25 a-d
Velocity 10 g	AD	27 abc	24 bcd
Velocity 30 g	AD	23 c	20 de
Untreated	-	35 ab	31 abc
Untreated	-	33 abc	27 a-d
Untreated	-	31 abc	25 a-d

^z Treatments were applied as follows: A = 8 Jul, B = 15 Jul, C = 25 Jul, D= 29 Jul, and E = 5 Aug.

^y Percent of the plot area infested by crabgrass was visually rated on a 0 to 100 percent scale where 0 = no crabgrass present or 100 = entire plot covered with crabgrass.

^x Means in a column followed by the same letter are not significantly different at P≤0.05 level according to the Fisher's protected least significant difference t-test.