Post emergent crabgrass control in a low maintenance lawn with herbicides applied at two different timings, 2010

J.E. Kaminski and T. Lulis

Department of Crop and Soil Science
The Pennsylvania State University, University Park

INTRODUCTION

Smooth crabgrass (*Digitaria ischaemum*) is a common weed in managed turfgrass stands throughout the mid-Atlantic region. While preemergent herbicides can be highly effective, early postemergent suppression of crabgrass offer turfgrass managers more flexibility for controlling the weed. The objectives of this study were to evaluate various rates of an experimental and commercially available herbicide (Tenacity) for their ability to control crabgrass when applied at two different stages of the weed (3 to 4 leaf and 1 to 2 tiller).

MATERIALS & METHODS

Two field studies were initiated at the Landscape Management Research Center located in University Park, PA. Site A was a mixed stand of predominantly perennial ryegrass (*Lolium perenne*) an fine leaf fescue (*Festuca* spp). Site B was a weak stand of predominantly perennial ryegrass with a mix of broadleaf weeds, predominantly white clover (*Taraxacum officinale*). Both areas were maintained as a low input lawn and mowed 1 to 2 times per week to a height of 3.0 in. All herbicide treatments were applied with a CO_2 pressurized (40 psi) sprayer equipped with an air-induction flat fan nozzle (AI9504E), and calibrated to deliver 40 GPA. Initial treatments were applied on 8 Jun for both sites and reapplied on either 15 or 21 Jun when crabgrass was at the 1 to 2 tiller stage. All treatments and application dates are listed in the data tables.

Plots measured 3 ft x 6 ft and were arranged in a randomized complete block with four replications. Percent crabgrass and/or clover was rated visually on a 0 to 100% scale where 0 = no crabgrass/clover observed and 100 = entire plot area covered by crabgrass/clover. Turfgrass and crabgrass injury was rated on a scale of 0 to 5 where 0 = no injury visible, and 5.0 = entire plot area brown or dead. All data were subjected to analysis of variance and means were separated at $P \leq 0.05$ according to Fisher's Protected Least Significant Difference Test

RESULTS

Treatments were initiated at both sites on 8 Jun when crabgrass was predominantly in the 3 to 4 leaf (L) stage. Subsequent applications were made on either 15 Jun (Site B) or 23 Jun (Site A). Differences in the application stage were predominantly due to visually differences in the soil moisture at each site.

Site A. The area used to evaluate the efficacy of the two products at site A was relatively dry and turf was of low quality. Within a week of the initial treatments, turfgrass within all plots appeared to be injured indicating that injury due to the application of the herbicides was not the cause (Table 1). Injury to the crabgrass within the plots, however, was observed within plots treated with Tenacity (both rates). By 28 Jun (5 DAT), plots treated with both rates of SA-0230101 and Tenacity at the 1 to 2 T stage had increased injury when compared to the untreated control plots. The greatest injury on 28 was observed within plots treated with Tenacity.

Crabgrass within the study site was considered low to moderate. Few differences were observed among treatments, but plots treated with 2.3 lb/A of SA-0230101 (1-2 T), 8.0 fl oz of Tenacity (both timings), and 6.0 fl oz of Tenacity (3-4 L) resulted in significant suppression of crabgrass when compared to the untreated control plots on 1 of 3 rating dates. By 16 Aug, however, no differences in crabgrass populations were observed among any treatment and plots had between 31 and 74% crabgrass.

Site B. Crabgrass pressure within the second site was severe. When plots were first rated on 18 Jun (10 and 3 DAT) no differences in percent crabgrass were present (Table 3). Differences among treatments were present on 28 Jun with the greatest crabgrass control observed within plots treated with SA-0230101 applied at the 1-2T stage (both rates) and all rates and timings of Tenacity. Percent plot area infested with crabgrass was similar in mid-Jul with the greatest suppression provided by both rates of Tenacity applied at the 1-2T stage (1%). Although slight variation occurred among treatments during the summer, no treatments were providing acceptable crabgrass control when plots were rated on 16 Aug.

DISCUSSION

Crabgrass pressure in the two study sites was moderate to severe. Although control of crabgrass was possible with SA-0230101 and Tenacity early on in the application process, neither herbicide provided acceptable control by mid-August. Although unclear, it is likely that a late-season flush of crabgrass emergence resulted in a rapid resurgence of the weed both study sites in late Jul and early Aug. Future research should continue to assess application timings and the number of subsequent applications necessary to provide adequate crabgrass control. Applications should focus on initial applications on more mature crabgrass and/or the inclusion of additional sequential applications starting early in the season and continuing through the season to control any late-germinating crabgrass.

ACKNOWLEDGEMENTS

We thank David Livingston and the staff at the Valentine Turfgrass Research Facility for assisting in the maintenance of the research plots. This research was funded by SipcamAdvan and the Pennsylvania Turfgrass Council.

Table 1. Turfgrass and crabgrass injury following applications of various rates of Tenacity and SA-0230101 for the early postemergent control of crabgrass, Site A.

	Treatment and rate per 1000 sq ft	Application Code[x]	Turf Injury[z]	Crab injury[y]		
			14 Jun	14 Jun	18 Jun	28 Jun
1	SA-0230101 1.5 lb/A.....	3-4 L	1.8 a[w]	0.3 c	0.8 bc	0.3 de
2	SA-0230101 2.3 lb/A.....	3-4 L	1.0 a	0.3 c	0.8 bc	0.0 e
3	SA-0230101 1.5 lb/A.....	1-2 T	2.0 a	0.5 c	1.0 b	1.8 bc
4	SA-0230101 2.3 lb/A.....	1-2 T	2.0 a	0.3 c	0.3 bc	2.0 b
5	Tenacity 6.0 fl oz/A	3-4 L	2.3 a	1.8 a	2.0 a	1.3 c
6	Tenacity 8.0 fl oz/A	3-4 L	1.8 a	1.3 ab	2.8 a	0.7 d
7	Tenacity 6.0 fl oz/A	1-2 T	1.5 a	0.3 c	0.3 bc	3.3 a
8	Tenacity 8.0 fl oz/A	1-2 T	2.0 a	0.8 bc	0.8 bc	3.0 a
9	Untreated	-	2.5 a	0.3 c	0.5 bc	0.3 de
10	Untreated	-	2.0 a	0.3 c	0.0 c	0.0 e

[z] Turfgrass injury was rated on a 0 to 5 scale where 0 = no injury, ≥ 3 = unacceptable injury, and 5 = brown or dead.

[y] Crabgrass injury was rated on a 0 to 5 scale where 0 = no injury and 5 = all crabgrass brown or dead.

[x] Treatments were applied on 8 Jun (3 to 4 leaf stage) and 23 Jun (1 to 2 tiller stage).

[w] 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 of crabgrass following applications of various rates of Tenacity and SA-0230101 for the early postemergent control of crabgrass, Site A.

	Treatment and rate per 1000 sq ft	Application Code[y]	%Crabgrass[z]		
			28 Jun	14 July	16 Aug
1	SA-0230101 1.5 lb/A	3-4 L	20 abc[x]	20 ab	59 a
2	SA-0230101 2.3 lb/A	3-4 L	16 a-d	15 bcd	65 a
3	SA-0230101 1.5 lb/A	1-2 T	12 bcd	10 b-e	54 a
4	SA-0230101 2.3 lb/A	1-2 T	8 cd	6 de	31 a
5	Tenacity 6.0 fl oz/A	3-4 L	8 cd	8 cde	50 a
6	Tenacity 8.0 fl oz/A	3-4 L	6 d	8 cde	57 a
7	Tenacity 6.0 fl oz/A	1-2 T	19 abc	7 de	51 a
8	Tenacity 8.0 fl oz/A	1-2 T	22 ab	4 e	59 a
9	Untreated	-	26 a	27 a	74 a
10	Untreated	-	19 abc	17 abc	61 a

[z] Percent of crabgrass was assessed visually on a linear 0 to 100% scale where 0 = no crabgrass present, and 100 = entire plot covered with crabgrass.

[y] Treatments were applied on 8 Jun (3 to 4 leaf stage) and 23 Jun (1 to 2 tiller stage).

[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 3. Percent of crabgrass following applications of various rates of Tenacity and SA-0230101 for the early postemergent control of crabgrass, Site B.

	Treatment and rate per 1000 sq ft	Application Code[y]	%Crabgrass[z]			
			18 Jun	28 Jun	14 July	16 Aug
1	SA-0230101 1.5 lb/A	3-4 L	25 a[x]	37 ab	82 a	100 a
2	SA-0230101 2.3 lb/A	3-4 L	20 a	28 abc	75 ab	98 a
3	SA-0230101 1.5 lb/A	1-2 T	12 a	8 de	54 bc	92 a
4	SA-0230101 2.3 lb/A	1-2 T	26 a	22 bcd	80 a	98 a
5	Tenacity 6.0 fl oz/A	3-4 L	14 a	12 cde	70 ab	93 a
6	Tenacity 8.0 fl oz/A	3-4 L	10 a	8 de	39 c	98 a
7	Tenacity 6.0 fl oz/A	1-2 T	17 a	1 e	1 d	47 b
8	Tenacity 8.0 fl oz/A	1-2 T	34 a	0 e	1 d	52 b
9	Untreated	-	24 a	43 a	82 a	96 a
10	Untreated	-	25 a	29 ab	82 a	95 a

[z] Percent of crabgrass was assessed visually on a linear 0 to 100% scale where 0= no crabgrass present, and 100 = entire plot covered with crabgrass.

[y] Treatments were applied on 8 Jun (3 to 4 leaf stage) and 15 Jun (1 to 2 tiller stage).

[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 4. Turfgrass and crabgrass injury and percent clover following applications of various rates of Tenacity and SA-0230101 for the early postemergent control of crabgrass, Site B.

	Treatment and rate per 1000 sq ft	Application Code[w]	Turf injury[z] 14 Jun	% Clover[y] 14 Jun	Crab injury[x] 18 Jun	Crab injury[x] 28 Jun
1	SA-0230101 1.5 lb/A.....	3-4 L	1.8 ab[v]	42 a	1.8 bc	0.0 e
2	SA-0230101 2.3 lb/A.....	3-4 L	1.8 ab	49 a	1.0 cd	0.3 de
3	SA-0230101 1.5 lb/A.....	1-2 T	0.0 c	62 a	2.3 bc	1.0 cd
4	SA-0230101 2.3 lb/A.....	1-2 T	0.0 c	42 a	2.5 ab	2.0 b
5	Tenacity 6.0 fl oz/A	3-4 L	2.8 a	32 a	3.0 a	1.5 bc
6	Tenacity 8.0 fl oz/A	3-4 L	1.8 ab	63 a	3.0 a	1.5 bc
7	Tenacity 6.0 fl oz/A	1-2 T	0.8 bc	63 a	0.3 de	4.0 a
8	Tenacity 8.0 fl oz/A	1-2 T	0.0 c	47 a	0.5 de	4.0 a
9	Untreated	-	0.0 c	62 a	0.0 e	0.5 de
10	Untreated	-	0.3 c	47 a	0.5 de	0.8 cde

[z] Turfgrass injury was rated on a 0 to 5 scale where 0 = no injury, ≥ 3 = unacceptable injury, and 5 = brown or dead.

[y] Percent of clover was assessed visually on a linear 0 to 100% scale where 0 = no clover present, and 100 = entire plot covered with clover.

[x] Crabgrass injury was rated on a 0-5 scale where 0 = no injury and 5 = all crabgrass brown or dead.

[w] Treatments were applied on 8 Jun (3 to 4 leaf stage) and 15 Jun (1 to 2 tiller stage).

[v] 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.