Response of Bermudagrass and Zoysiagrass Cultivars to Dismiss South and Solitare Herbicides

Mike Richardson[1] and John McCalla[1]

Additional index words:
sulfentrazone, imazethapyr, quinclorac, phytotoxicity

Richardson, M. and J. McCalla. 2010. Response of bermudagrass and zoysiagrass cultivars to Dismiss South and Solitare herbicides. Arkansas Turfgrass Report 2009, Ark. Ag. Exp. Stn. Res. Ser. 579:155-159.

Photo by Mike Richardson

Injury from Dismiss South on a zoysiagrass cultivar.

Summary. New herbicide formulations that contain sulfentrazone have been recently introduced into the turfgrass industry and these may provide new options for controlling specific weed pests in warm-season grasses. The objective of the present study was to determine the tolerance of several bermudagrass and zoysiagrass cultivars to two herbicide formulations, Dismiss South and Solitare, containing sulfentrazone. Phytotoxicity was observed on all cultivars of bermudagrass and zoysiagrass, but zoysiagrass had higher injury levels than bermudagrass. In both species, injury was short-lived and was not evident at 4 weeks after treatment. In zoysiagrass, the *Zoysia matrella* cultivars tested were more sensitive to these two formulations than *Z. japonica* cultivars. Although some injury was observed with sulfentrazone formulations in bermudagrass and zoysiagrass, both species have enough tolerance to warrant their use in those situations where problematic weeds such as nutsedge or kyllinga are present.

Abbreviations: DAT, days after treatment

[1] University of Arkansas, Department of Horticulture, Fayetteville, Ark. 72701

There has been a continued decline in new herbicide chemistries in the turfgrass industry. As such, a recent trend in turfgrass weed control is the development of new formulations and combination products that can be used to cover a broad spectrum of weeds. Two new combination products being marketed by the FMC Corporation (Philadelphia, Pa.) are Dismiss® South and Solitare®. These combination products have suflentrazone as their primary active ingredient and then each has a secondary active ingredient, including imazethapyr in Dismiss® South and quinclorac in Solitare®.

Sulfentrazone is a postemergence herbicide that is classified as a protox inhibitor which acts on the chlorophyll synthesis pathway and ultimately disrupts membrane synthesis. In turfgrass systems, sulfentrazone has been primarily used to control sedges and some broadleaf weeds (Gardner, 2009). Early trials with sulfentrazone products indicated a relatively good tolerance of common bermudagrasses to this herbicide (Kopec and Gilbert, 2001); however, injury on improved bermudagrass cultivars has been reported (Bobby Walls, FMC, Inc., pers. comm.). The objective of the present study was to determine the tolerance of a large group of bermudagrass and zoysiagrass cultivars to two herbicide formulations that contained sulfentrazone.

Materials and Methods

These trials were conducted on the 2002 National Turfgrass Evaluation Program zoysiagrass and bermudagrass trials, which have been retained for such screening since the trials ended in 2007. The experimental areas were planted on 2 July 2002 at the University of Arkansas Agricultural Research and Extension Center in Fayetteville on a Captina silt-loam soil. The plot size for both the bermudagrass and zoysiagrass trials was 8 ft by 8 ft. and there were three replications of each cultivar. Other specifics regarding the establishment and maintenance of this trial have been described previously (Patton et al., 2008a; Patton et al., 2008b). Plots were maintained under simulated sports field conditions, with a mowing height of 0.75 inch, and monthly applications of 1.0 lb N/1000 ft^2 during the growing season.

Dismiss® South and Solitare® herbicides were band-applied (6 inch band) using a single flat-fan nozzle (TeeJet 110 015) and CO_2 as the propellant. Herbicide rates (lb. ai/acre) included 9.5 (0.29) , 12.4 (0.38), and 14.4 (0.45) fl. oz. Dismiss® South per acre, 20.8 (1.0) fl. oz. Solitare® per acre, and an untreated control. All herbicides were applied at 42 gpa on 2 July 2009. Phytotoxicity was rated at 4, 14, and 28 days after treatment (DAT) on a 1-9 scale, with 1 = no injury and 9 = dead turf. A rating of 5 would be equal to 50% herbicide injury.

Results and Discussion

Cultivar and herbicide both had a significant effect on phytotoxicity ratings in bermudagrass and zoysiagrass at 4 and 14 DAT, but there was no injury present on the 28 DAT observation date. In addition, there was a significant herbicide × cultivar interaction on zoysiagrass. As such, data are presented as this interaction.

In bermudagrass, there was no significant difference in phytotoxicity ratings between any of the Dismiss® South treatments at 4 DAT, but all Dismiss® South treatments had higher phytotoxicity ratings than Solitare® on that date (Table 1). At 14 DAT, the Solitare® treatment had slightly higher phytotoxicity than Dismiss® South treatments, which were not significantly different from the untreated control (Table 1). It should be noted that phytotoxicity was relatively minor with all treatments and on all observation dates and the level of injury would not be considered unacceptable in most turfgrass situations.

Cultivar also had a significant effect on phytoxicitiy ratings in bermudagrass, but was only significant at 4 DAT. Although there was a range of responses by various cultivars, the *C. transvaalensis* cultivar, Ashmore, was the most sensitive cultivar to these herbicides and had a significantly higher phytotoxicity rating than all other cultivars at 4 DAT (Table 2). However, by 14 DAT, there were no differences in any of the cultivars tested in this trial.

In zoysiagrass, more phytotoxicity was observed with these herbicides in comparison to ber-

mudagrass, but was only present up to the 14 DAT observation date (Table 3). By 28 DAT, there was no herbicide or cultivar effect on phytotoxicity ratings (data not shown). The range of injury was similar for all cultivars tested, generally ranging from a low of 2.0 up to a high of 5.0. For all herbicides and observations, there was also a significant difference between the *Zoysia matrella* and *japonica* cultivars, with the *Z. matrella* cultivars having more injury than the *Z. japonica* cultivars (Table 3).

Within each herbicide, there was some slight variability between cultivars, but there were a few cultivars that consistently had higher injury from these herbicides, including the *Z. matrella* cultivars, Cavalier, DALZ 0105, and Zorro, and the *Z. japonica* cultivars, DALZ 9604 and Palisades (Table 3). The commercially-available, seeded cultivars in this trial, Zenith and Compadre, had relatively good tolerance of these herbicides compared to other cultivars (Table 3).

In summary, certain cultivars of both bermudagrass and zoysiagrass appear to be more sensitive to sulfentrazone formulations, but most of the injury observed was relatively short-lived and would not preclude the use of these products.

Literature Cited

Gardner, D. S. 2009. New options for golf course weed control: Several products have been released in recent years that give superintendents new options for control of difficult weeds. Golf Course Manage. 77(2):p. 119-124.

Kopec, D. M., and J. J. Gilbert. 2001. Response of common bermudagrass turf to applications of sulfentrazone. Turfgrass Landscape Urban IPM Res. Summ. p. 95-99.

Patton, A., M. Richardson, D. Karcher, J. McCalla and J. Landreth. 2008a. 2002 NTEP bermudagrass trial – summary. Arkansas Turfgrass Report 2007, Ark. Ag. Exp. Stn. Res. Ser. 557:33-36.

Patton, A., D. Karcher, M. Richardson, J. McCalla and J. Landreth. 2008b. 2002 NTEP zoysiagrass trial – summary. Arkansas Turfgrass Report 2007, Ark. Ag. Exp. Stn. Res. Ser. 557:47-51.

Table 1. Phytotoxicity effects of Dismiss South and Solitare across 42 bermudagrass cultivars.

Herbicide	Rate	4 DAT[z]	14 DAT
	fl. oz. / acre	--------- phytotoxicity (1-9)[y] -------	
Dismiss South	9.5	2.1	1.0
Dismiss South	12.4	2.1	1.0
Dismiss South	14.4	2.0	1.1
Solitare	20.8	1.9	1.3
Untreated control		1.0	1.0
LSD (0.05)		*0.1*	*0.1*

[z] DAT – days after treatment.
[y] Phytotoxicity rated on a 1-9 scale with 1 = no injury and 9 = dead turf.

Table 2. Phytoxicity ratings of 42 bermudagrass cultivars, as affected by Dismiss South and Solitare.

Cultivar	4 DAT[z]	14 DAT
	---------- phytotoxicity (1-9)[y] ----------	
Arizona Common	1.7	1.0
Ashmore	2.7	1.0
Aussie Green	1.9	1.1
B-14	1.7	1.1
Celebration	1.5	1.0
CIS-CD5	1.7	1.0
CIS-CD6	1.7	1.1
CIS-CD7	1.8	1.0
Contessa	1.9	1.0
FMC-6	1.4	1.0
GN-1	1.5	1.1
La Paloma	1.8	1.0
Midlawn	2.1	1.2
Mohawk	1.9	1.0
MS- Choice	1.3	1.1
NuMex Sahara	1.9	1.0
OKC 70-18	2.0	1.3
Panama	1.7	1.0
Patriot	1.8	1.1
Premier	2.2	1.3
Princess 77	1.9	1.1
PST-R68A	2.0	1.0
Riviera	2.1	1.0
Southern Star	1.7	1.0
Sovereign	1.9	1.0
SR 9554	1.5	1.3
Sundevil II	2.0	1.0
Sunstar	2.2	1.1
SW1-1001	1.7	1.0
SW1-1003	1.9	1.0
SW1-1004	1.7	1.1
SW1-1014	1.7	1.1
SW1-1046	1.5	1.0
Tifsport	2.0	1.3
Tift_1	2.1	1.0
Tift_2	2.0	1.3
Tift_3	1.4	1.0
Tift_4	1.5	1.0
Tifway	2.1	1.1
Transcontinental	1.8	1.1
Veracruz	1.7	1.1
Yukon	2.0	1.4
LSD (0.05)	*0.4*	*ns*

[z] DAT – days after treatment.
[y] Phytotoxicity rated on a 1-9 scale with 1 = no injury and 9 = dead turf.

Table 3. Phytotoxicity of several herbicide treatments on 24 zoysiagrass cultivars.

		Dismiss (9.5 fl oz / acre)		Dismiss (12.4 fl oz / acre)		Dismiss (14.4 fl oz / acre)		Solitare (20.8 fl oz / acre)	
Cultivar		4 DAT[z]	14 DAT	4 DAT	14 DAT	4 DAT	14 DAT	4 DAT	14 DAT
		phytotoxicity (1-9)[y]							
6186	*Z. japonica*	2.7	2.3	2.3	2.0	2.7	2.3	3.0	2.7
BMZ 230	*Z. japonica*	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Chinese Common	*Z. japonica*	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.0
Compadre	*Z. japonica*	2.7	2.7	2.7	2.3	2.7	2.3	2.3	2.0
Crowne	*Z. japonica*	2.7	3.0	2.0	2.3	2.0	2.3	2.3	2.3
DALZ 0102	*Z. japonica*	3.7	3.7	3.0	2.7	3.0	2.7	4.0	3.7
DALZ 9604	*Z. japonica*	4.3	4.0	4.0	3.7	4.0	3.7	4.0	3.7
El Toro	*Z. japonica*	2.7	2.7	2.0	2.0	2.0	2.0	2.0	2.0
GN-2	*Z. japonica*	3.7	3.7	2.7	3.0	3.3	3.7	3.7	3.0
Himeno	*Z. japonica*	2.7	2.3	2.0	2.0	2.3	2.3	3.0	2.7
J-37	*Z. japonica*	3.3	2.7	2.7	3.0	3.0	3.0	3.3	3.0
Meyer	*Z. japonica*	2.3	2.0	2.3	2.7	2.0	2.3	2.3	2.3
Palisades	*Z. japonica*	4.0	3.7	3.7	3.3	4.0	3.7	3.7	3.3
PST-R7MA	*Z. japonica*	2.7	2.3	2.7	2.7	2.0	2.3	3.0	2.7
PST-R7ZM	*Z. japonica*	3.0	3.0	2.3	2.0	2.7	2.3	3.0	2.3
PZA 32	*Z. japonica*	2.3	2.0	2.3	2.7	2.3	2.7	2.7	2.7
PZB 33	*Z. japonica*	3.0	3.0	2.0	2.0	2.3	2.3	2.7	2.7
Zenith	*Z. japonica*	2.3	1.7	2.3	2.0	2.3	2.0	2.7	2.0
Cavalier	*Z. matrella*	4.7	4.3	4.0	4.0	4.0	4.0	4.3	4.3
DALZ 0101	*Z. matrella*	4.0	3.7	2.7	3.0	3.0	3.0	4.0	3.7
DALZ 0105	*Z. matrella*	5.0	4.0	4.0	4.0	4.7	4.3	4.3	4.3
DALZ 104	*Z. matrella*	4.0	3.3	3.3	3.0	3.3	3.3	3.0	3.0
Emerald	*Z. matrella*	3.7	3.0	3.3	3.7	3.3	3.3	4.0	3.7
Zorro	*Z. matrella*	4.3	4.3	3.3	3.7	3.7	4.0	4.7	4.7
LSD (0.05)		*0.9*	*1.2*	*0.8*	*0.9*	*0.7*	*0.8*	*1.0*	*0.9*
	Z. japonica	2.9	2.7	2.5	2.5	2.6	2.6	2.9	2.6
	Z. matrella	4.2	3.7	3.3	3.5	3.6	3.6	4.0	3.9
	P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

[z] DAT – days after treatment.
[y] Phytotoxicity rated on a 1-9 scale with 1 = no injury and 9 = dead turf.