

Response of Common Bermudagrass Turf to Applications of Sulfentrazone

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Abstract

Sulfentrazone was applied in single applications at the rates of 0.125, 0.250 and 0.375 lbs. AI/A, and after 30 days in split rate combinations of 0.125/0.125, 0.250/0.250 and 0.125/0.375 lbs. AI/A. Turfgrass color scores were slightly diminished from sulfentrazone characterized by a lighter uniform color change on mowed common bermudagrass. The response was generally rate dependent. Imazaquin caused a light green turf to develop while halsulfuron had no effect. After the first application was made, sulfentrazone treated turfs exhibited leaf twisting/cupping effects at 3 and 7 days after treatment. The degree of effect was also rate dependent. To the lay person, twisting was noticeable only for a short time at the 0.375 lb. AI/A rate. At two weeks after treatment, there was a trace amount of leaf sheath necrosis at the base (older leaves) of common bermudagrass stolons. This was negligible and short lived. At the rates tested in this initial preliminary test, it appears that common bermudagrass seems to be tolerant of sulfentrazone.

Introduction

As part of an initial screening of any potential new herbicide, turfgrass tolerance is just as important as weed control spectrum and efficiency. The herbicide sulfentrazone was applied to established bermudagrass turf to measure the responses for turfgrass tolerance or intolerance to this compound.

Materials and Methods

An eighteen month old 100% stand of mowed common bermudagrass turf was selected to test different rates and application sequences of sulfentrazone herbicide for turfgrass tolerance at the Karsten Turfgrass Research Facility at the University of Arizona. The turf site was a 60x60 area of common bermudagrass (*Cynodon dactylon*) which was maintained at a 1.25 inch mowing height, mowed 3x weekly. The turf was irrigated to avoid moisture stress. Treatments included single applications of sulfentrazone at 0.125, 0.250 and 0.38 lbs. AI/A. A single application of imazaquin at 0.5 lb.AI/A and halsulfuron at 0.062 lbs.AI/A were also included. Split (repeat) applications treatments included sulfentrazone at (0.125 lb./0.125 lb.), (0.250 lb./0.250 lb.) and (0.375 lb./0.125 lb.AI/A) combinations. A repeat application of halsulfuron was also included (0.062 lb./0.062 lb.AI/A). All rates are noted hereafter in lbs. active ingredient per acre (AI/A). Initial treatments were applied on June 28, 1996. Treatments were applied using a Co₂ packback sprayer with a 3 nozzle boom at 20" spacing with 8004 nozzles at 28 psi. A final solution rate of 95 gallons per acre was achieved. A split (second) application was applied to the appropriate treatments on July 30, 1996. Each treatment appeared three times in randomized complete block design. Plots were rated for turfgrass color, % plot injury and degree of injury (cupping, twisting, leaf firing) on four evaluation dates. Data were subjected to the analysis of variance technique, and mean separation statistics were calculated using LSD values.

Results and Discussion

July 1, 1996 (3 DAT/1)

At 3 DAT/1 there were visible responses on common bermudagrass turf in terms of color, the degree of leaf twisting, and percent of the plot (0-100%) which exhibited these symptoms. Color scores ranged from a low of 4.0 (very light green) to 7.0 for the control plots. Sulfentrazone plots treated at the initial high rate of 0.375 lbs. had mean color scores of 4.0, showing a diminished but uniform color response to the herbicide. Sulfentrazone plots treated at 0.250 lbs. had an average score of 5.3, while the 0.125 lb. turf had a score of 5.8. Halsulfuron plots had a mean color score of 6.0, while imazaquin turf scored a mean of 5.0. Imazaquin is known for its potential to cause bermudagrass to turn light or even "apple green" after an application at the 1x label rate of 0.5 lb (Table 1).

Injury scores were assigned to plots indicating the degree of leaf twisting (cupping) which occurred from herbicide treatments using a progressive scale of 1-6 (1 = none, 6 = severe) (Table 2). Sulfentrazone at 0.375 lb. caused noticeable cupping with a mean score of 5.2. The 0.250 and 0.125 lb. rates followed with mean scores of 3.0 and 2.0, respectively. Imazaquin followed with slight twisting (1.7), followed by halsulfuron (1.3). The check had no visible cupping injury (1.0).

The percent plot injury (for twisting) was directly rated to the degree of injury (Table 2). Plots with the greater degree of injury had the larger proportion of the turf affected as well. Sulfentrazone treated turf at the 0.375, 0.250 and 0.125 lb. rates had percent plot injury values of 82%, 67% and 17%, respectively.

July 5, 1996 (7 DAT/1)

Color scores ranged from 4.0 to 7.7. The imazaquin now had the lowest mean color score of 4.0. Sulfentrazone at 0.375 lb. had a mean color score of 5.0, while the 0.250 and 0.125 lb. treated turf had mean color scores of 6.3 and 6.4, respectively. Halsulfuron plots were next with 7.2, followed by the control at 7.7 (Table 1).

Injury (leaf twisting) scores for treatments ranked almost identically with the former response at 3 DAT, but the symptoms were less severe at this time. For sulfentrazone turfs, the 0.375 lb. treatment still had the greatest degree and amount of leaf twisting (3.7, 33%), followed by the 0.250 lb. rate (2.2, 17%), and (2.0, 16%) for the 0.125 lb. rate. The imazaquin turf had the largest percent plot cover showing injury (mean = 33%) (Table 2)..

July 12, 1996 (14 DAT/1)

Turfgrass color scores ranged from 5.5 to 6.3. Sulfentrazone at the 0.375 lb. rate had a mean color of 5.5, while the other two rates had scores of 6.0 to 6.2, showing recovery. Although there was no significant effect due to chemical treatments for color, the halsulfuron treated plots had the best numerical mean color score of 6.7 (Table 1).

Leaf firing scores were assigned to plots on this date using a scale of 1.0 (none) to 6.0 (severe). Leaf firing is described as scorched leaf tips, or leaf sheaths (leaves which wrap around the stem). Upon close observation of the turf, some minimal scorching was evident (mostly as dead leaf sheaths on the bottom of the plant). The symptoms were not detrimental to the turf, however (Table 2).

Visual density scores were assigned to the turf. Plots exhibited normal density for bermudagrass mowed at the 1.25" mowing height. The exceptional response was that of imazaquin, which is known to have a short term plant growth regulation effect on common bermudagrass. Shorter internodes and the sudden release of growth when the PGR effect subsides can cause an increase in visual density (data not shown).

August 2, 1996 (35 DAT/1:3 DAT/2)

Visual differences in color occurred by 3 days after the second split applications were made. Mean color scores ranged from 3.7 to 7.0. The imazaquin treated turf had the lowest man score of 3.7, which turned a dull apple green immediately after the second application. All sulfentrazone turf which received a second application ranged from 5.0 to 5.7, which is acceptable with the low combination rate treatment (0.125 lb./0.125 lb.) having slightly better color than the other two sulfentrazone split application treatments. The differences here were subtle and non-significant, however. The halsulfuron treated turf had the darkest numerical color mean score of 7.0. Basically, this treatment and the apple green plots of imazaquin were the most discernable turfs for color (Table 1).

Leaf twisting or cupping was somewhat noticeable after the second (split) applications were made as well. The sulfentrazone treated turf was showing slight cupping, as scores ranged from 2.0 to 3.0 for all split application

treatments of this product. The effects on the turf were not excessively disturbing and would not be of concern to the lay person, or seriously jeopardize the turf (Table 2).

The amount of plot exhibiting the twisting/cupping was correlated with degree of twisting/cupping. These effects were again short lived and not disturbing to the turf.

Conclusions

1. Sulfentrazone was applied in single applications at the rates of 0.125, 0.250 and 0.375 lbs. AI/A, and after 30 days in split rate combinations of 0.125/0.125, 0.250/0.250 and 0.125/0.375 lbs. AI/A.
2. Turfgrass color scores were slightly diminished from sulfentrazone characterized by a lighter uniform color change on mowed common bermudagrass. The response was generally rate dependent.
3. Imazaquin caused a light green turf to develop while haloxyfuron had no effect.
4. After the first application was made, sulfentrazone treated turfs exhibited leaf twisting/cupping effects at 3 and 7 days after treatment. The degree of effect was also rate dependent. To the lay person, twisting was noticeable only for a short time at the 0.375 lb. AI/A rate.
5. At two weeks after treatment, there was a trace amount of leaf sheath necrosis at the base (older leaves) of common bermudagrass stolons. This was negligible and short lived.
6. At the rates tested in this initial preliminary test, it appears that common bermudagrass seems to be tolerant of sulfentrazone.

Table 1. Mean turfgrass color scores¹ of common bermudagrass after applications of sulfentrazone, halsulfuron and imazaquin herbicides. University of Arizona, Summer 1996.

Treatment ²	Rate lb. A/A	3 DAT/1 01 July	7 DAT/1 05 July	14 DAT/1 12 July	35 DAT/1:3 DAT/2 02 August
Sulfentrazone	0.125	5.8	6.4	6.0	6.0
Sulfentrazone	0.250	5.3	6.3	6.2	5.7
Sulfentrazone	0.375	4.0	5.0	5.5	5.7
Sulfentrazone	0.125/0.125	-	-	-	5.7
Sulfentrazone	0.250/0.250	-	-	-	5.0
Sulfentrazone	0.375/0.125	-	-	-	5.3
Halsulfuron	0.062	6.0	7.2	6.7	6.3
Halsulfuron	0.062/0.062	-	-	-	7.0
Imazaquin	0.50/0.50	5.0	4.0	6.0	3.7
Control		7.0	7.7	6.3	7.0
Test Mean ³		5.4	6.1	6.1	5.7
LSD Value ⁴		1.0	1.1	1.5	1.8

¹Values are means of three replications. Color scores 1-9 (1 = dead, 9 = best).

²Treatments applied on June 28, 1996. Second application July 30, 1996, split application treatments only.

³Test Mean = mean of all plots on that evaluation date.

⁴LSD Value = LSD mean separation statistic. Numerical difference between two treatment means must be larger than the LSD value for true treatment differences to occur.

Table 2. Degree of injury¹ and percent plot area² showing injury symptoms after applications of sulfentrazone, halsulfuron and imazaquin to common bermudagrass. University of Arizona, Summer 1996.

Treatment ³	Rate lbs. AI/A	-Type of injury and date of evaluation -					
		3 DAT/1 05 July Twisting % plot	7 DAT/1 12 July Firing % plot	14 DAT/1 02 August Twisting % plot	35 DAT/1:3 DAT/2 03 July Twisting % plot		
Sulfentrazone	0.125	2.0	2.0	2.0	4	1.0	0
Sulfentrazone	0.250	3.0	2.2	2.2	13	1.3	3
Sulfentrazone	0.375	5.2	3.4	2.3	11	1.0	0
Sulfentrazone	0.125/0.125	--	--	--	--	2.0	13
Sulfentrazone	0.250/0.250	--	--	--	--	3.0	28
Sulfentrazone	0.375/0.125	--	--	--	--	2.3	23
Halsulfuron	0.062	1.3	1.7	1.6	4	1.3	3
Halsulfuron	0.062/0.062	--	--	--	4	1.0	0
Imazaquin	0.50/0.50	1.7	3.0	1.0	0	1.0	0
Control		1.0	1.3	1.6	5	1.0	0
Test Mean ⁴		2.6	2.2	1.9	7	1.5	7
LSD Value ⁵		1.1	0.9	1.0	7	0.8	9

¹Injury scores 1-6 (1 = none, 4 = moderate, 6 = severe). Twisting = leaf twisting or cupping. Firing = leaf sheath necrosis and/or tip damage. Values are mean of three replications per treatment. Single application means before 02 August are mean of six replications before second applications were applied.

²% plot area = (0-100%).

³Treatments applied first on June 28, 1996. Respective second (split) applications applied on 30 July, 1996.

⁴Test mean = mean of all treatments on each evaluation date.

⁵LSD Value = LSD mean separation statistic. Numerical difference between two treatment means must be larger than the LSD value for true treatment differences to occur.