

THE EFFECTS OF PRE-EMERGENCE APPLICATIONS OF SULFENTRAZONE HERBICIDE AND PERENNIAL RYEGRASS OVERSEEDING OF POA ANNUA INFESTATION OF WINTER TURF UNDER DESERT CONDITIONS

D. M. Kopec and J. J. Gilbert

Abstract

Poa annua or annual bluegrass is a cosmopolitan winter annual weed in turfgrass systems. A field test was conducted to evaluate the effects of sulfentrazone herbicide, both with and without the fall overseeding practice on bermudagrass in the desert. Sulfentrazone was applied three days before overseeding at 0.125, 0.187, 0.25, 0.375, 0.5 and 0.625 lbs./A. Percent *Poa* infestation levels were dramatically less on overseeded (perennial ryegrass added) turf throughout the entire test period than non-overseeded (dormant bermudagrass) turf. For non-overseeded turf, sulfentrazone provided a maximum of 74% weed control at November 1997, 68% in December, and 25% by March 1998 at the highest application rate of 0.625 lbs./A. For overseeded (perennial ryegrass) turf, the highest level of weed control was achieved for sulfentrazone at the 0.625 lbs./A rate, which was 68% in April. The practices of overseeding and sulfentrazone applications provided the greatest weed control, however, different rate/timing regimes should be investigated to increase efficiency.

Introduction

A field test was conducted to evaluate the herbicide sulfentrazone for pre-emergence efficiency for *Poa annua* control, at the time of overseeding bermudagrass with perennial ryegrass in the fall. Six rates of sulfentrazone, 0.125, 0.187, 0.25, 0.375, 0.5 and 0.625 lbs./A, were applied to both non-overseeded and overseeded bermudagrass turf in September 1997. The turf was overseeded on October 3, at the rate of 18 lbs./A seed/acre. Sulfentrazone was applied on September 30. Plots were evaluated for initial ryegrass establishment and turfgrass visual quality for two months after emergence. *Poa annua* control was evaluated on six dates from November 1997 to May 1998. Experimental design was a split plot (overseeding as the main plot and herbicide rates as the subplot) with eight replications. Visual estimates of percent plot *Poa annua* were assigned to all plots, including overseed only and non-overseed only controls, and used for an initial analysis of variance technique. Means of two control plots/replication were used to analyze treatment control effects in each rep. Percent weed control was calculated for overseeded turf, using an "overseed only" control, while percent weed control for non-overseeded turf used the values of the "non-overseed only" control.

Results And Discussion

Turf Establishment. Ryegrass establishment (as % plot ryegrass) was affected by sulfentrazone applications on October 31 and November 17, but not by or afterwards on 4545454550December 18. On the first evaluation date, mean percent ryegrass stand ranged between 55% to 58% for the 0.378, 0.5 and 0.625 lbs./A rates, while the overseed-only control

had a mean stand of 76%. By November 17, all plots had 95% or greater turf stand of perennial ryegrass, except for the sulfentrazone treatments of 0.5 and 0.625 lbs./A, which had roughly 92% cover. By December 1997, all plots were similar in ryegrass stand (93% to 97%) (data not shown).

Poa Annuua Control. Poa annua ratings were assigned to all plots on six dates from November 1997 through May 1998. For November and December 1997 (early season control), there was a significant affect of overseeding with perennial ryegrass, as well as from that of sulfentrazone. there was no interaction of the two. For November and December ratings, the Poa annua could not be detected within the overseed turf, but could be identified in the non-overseed (dormant bermudagrass) turf. The main effect of overseeding practice showed that non-overseeded plots (averaged over all herbicide rates) had mean plot scores of 8% and 37% weed infestation levels on November and December, respectively (Table 2).

Percent Poa control was determined in November and December among non-overseeded plots only, since the weed could not be identified within the overseeded plots at that time. For December and November, percent control of Poa ranged from 7% to 74% among sulfentrazone treated bermudagrass (non-overseeded) turf. Sulfentrazone at the highest rate of 0.625 lbs./A provided 74% and 68% control in November and December, respectively. Rates less than this were inconsistent for Poa control and ranged from 7% to 40% from 0.125 to 0.5 lbs./A across both of these months (Table 1).

For the months of January and March 1998, there was significant main effects for the herbicide and the overseed (turf surface), with no interaction of the two. For the months of April and May, only the overseed (turf surface) main effect was significant. The overall effect of herbicide (sulfentrazone) and the herbicide x overseed interaction were both nonsignificant. This demonstrated lack of late season control of Poa annua, regardless of the overseeding effect and that physical overseeding (addition or perennial ryegrass) had a large affect on suppression of Poa annua.

When averaged over all herbicide rates, non-overseeded turf (dormant bermudagrass) had 65% and 80% percent weed infestation, while overseeded turfs had 10% weed infestation in both January and March 1998, respectively (Table 2).

When averaged across both turf surfaces, percent Poa infestation ranged from 24% to 41% control and from 35% to 49% control in January and March, respectively. The highest rate of sulfentrazone (0.625 lbs./A) had the least amount of actual infestation (25% and 35% in January and March, respectively), but these levels would be inadequate for acceptable commercial performance.

For non-overseeded turf (dormant bermudagrass only), percent weed control ranged from 10% to 45% for January and from 1% to 20% in March, respectively. Sulfentrazone at rates at less than 0.625 lbs./A were inconsistent for rate response. Again, percent control at the highest rate tested 0.625 lbs./A was inadequate for commercial acceptability.

Among overseeded turf (perennial ryegrass), percent weed control ranged from 0% to 59% in both January and March 1998. Percent control here was based on the overseeded/no herbicide plot means as the correct background control. Again, adequate weed control was not achieved, even when overseeding competition was added from the perennial ryegrass overseeding.

For the final two evaluations, only the overseeding practice effect was significant for actual plot weed infestation levels (April and May 1998). When averaged overall herbicide treatment levels, percent turf infested with Poa was 70% and 53% for non-overseeded turf and 16% and 9% for overseeded (perennial ryegrass) turf in April and May, respectively (Table 2). Among sulfentrazone treated plots, percent plot infestation levels ranged from 40% to 46% weed cover in April, and from 27% to 33% weed cover in May. April would be peak expression for Poa and after flowering would decline in May.

Among non-overseeded turf (dormant bermudagrass), percent weed control ranged from 0% to only 6% for sulfentrazone treated plots in April and from 0% to 19% in May (Table 2). Again, the herbicide main effect was not significant. Among overseeded (perennial ryegrass) turf, percent weed control ranged from 0% to a maximum of 59% for sulfentrazone at the 0.625 lbs./A rate in April, and from 0% to 36% in May. The response was not rate dependent at rates less than 0.5 lbs./A

Interaction means for the actual amounts of Poa annua infestation levels listed in Table 2 show the effect that overseeding had on actual infestation levels of percent plot annua. While the highest applied rate of sulfentrazone (0.625 lbs./A) had the least amount of weeds, these levels would not be acceptable for commercial use. These results are the extension of including both non-overseed (dormant bermudagrass) and overseeded (perennial ryegrass) turfs with herbicide treatments (with respective controls).

Previous studies on this site in 1996-1997 were performed on overseeded plots only, where non-overseeded areas on plot borders showed mixed results. Therefore, it was decided to proceed with the treatment structure incorporated here. In the 1996-1997 test, percent Poa annua control was greater, when all plots were overseeded. It should also be noted that weed pressure was greater in 1997-1998.

Poa annua is notorious for competition with desirable turfgrass species, especially when mowed closely, irrigated and fertilized regularly. While competition from ryegrass was noticeably demonstrated here, the increased actual amounts of Poa annua in dormant bermudagrass was not offset by sulfentrazone alone, nor was sulfentrazone effective with overseeding for control/suppression of Poa annua in winter turfs at any rate below 0.625 lbs./A.

Table 1. Mean percent plot Poa percentages¹ for the main effect of overseeding practice. University of Arizona, 1997-1998.

MAIN EFFECT	LEVEL	NOV 97 ²	DEC 97 ²	JAN 98	MAR 98	APR 98	MAY 98
OVERSEED ³	yes	NT ⁴	NT ⁴	10 ^B	10 ^B	16 ^B	9 ^B
	no	8	32	65 ^A	81 ^A	70 ^A	53 ^A

¹Percent plot weed infestation of *Poa annua* (0-100%). Values are mean of 8 replications, and are averaged over all sulfentrazone herbicide application treatments. Letters denote statistical difference between treatments, DNMR test, P=0.05.

²No visible Poa in overseeded (perennial ryegrass) plots in November and December 1997.

³Overseeding practice. Yes = overseeded with perennial ryegrass. No = dormant bermudagrass.

⁴Non detectable.

Table 2. Percent plot *Poa annua*¹ and percent weed control² of overseeded³ and non-overseeded turfgrass after treatments of sulfentrazone⁴. University of Arizona, 1997-1998. Percent *Poa annua* plot cover, followed by percent weed control (in parenthesis).

Turf Composition	Herb Rate lbs. AI/A	November 1997	December 1997	January 1998	March 1998	April 1998	May 1998
Non-overseed	0	15 --	43 --	80 --	89 --	73 --	57 --
Overseed	0	0 --	0 --	14 --	14 --	20 --	9 --
Non-overseed	0.125	7 (49)	24 (40)	57 (30)	74 (17)	70 (5)	46 (19)
Overseed	0.125	0 (0)	0 (0)	11 (19)	10 (34)	17 (0)	10 (0)
Non-overseed	0.187	8 (28)	36 (13)	70 (11)	88 (0)	74 (0)	56 (0)
Overseed	0.187	0 (0)	0 (0)	11 (0)	11 (0)	14 (4)	9 (1)
Non-overseed	0.25	9 (35)	35 (22)	69 (14)	80 (10)	71 (3)	51 (10)
Overseed	0.25	0 (0)	0 (0)	10 (21)	8 (29)	16 (0)	8 (23)
Non-overseed	0.375	13 (19)	39 (8)	70 (11)	88 (1)	70 (3)	52 (7)
Overseed	0.375	0 (0)	0 (0)	11 (30)	12 (5)	16 (0)	10 (13)
Non-overseed	0.5	6 (60)	33 (25)	66 (16)	80 (9)	69 (5)	57 (2)
Overseed	0.5	0 (0)	0 (0)	9 (25)	7 (22)	16 (18)	9 (0)
Non-overseed	0.625	2 (73)	13 (68)	45 (45)	66 (26)	68 (6)	47 (15)
Overseed	0.625	0 (0)	0 (0)	5 (57)	5 (59)	11 (36)	7 (12)
Test Mean ⁵	% Plot <i>Poa</i>	4	16	38	45	43	31
Test Mean	% Control Overseed only ²	NA ⁷	NA	25	19	2	6
LSD Value	% Control Overseed only ²	NA	NA	NS ⁸	NS	NS	NS
Test Mean	% Control Non-overseed ²	44	29	21	11	3	9
LSD Value ⁶	% Control Non-overseed ²	NS ⁸	NS	26	16	NS	NS

¹Percent plot of *Poa annua* , 0-100%. Values are the mean of eight replications.

²Percent weed control for overseed plots = (1-TRT/REP control mean of overseeded turf) *100.

Percent weed control for non-overseeded turf = (1-TRT/REP control mean of non-overseed turf) *100.

³Turf overseeded on September 30, 1997, seeding rate of 18 lbs./1000 ft².

⁴Sulfentrazone applied on October 3, 1997.

⁵Mean of all treatments on each date for % plot *Poa* infestation (0-100%).

⁶LSD value = least significant difference mean separation statistic.

⁷NA = Not applicable. Overseed plots with no visible *Poa*, November and December 1997.

⁸NS = Nonsignificant treatment effect, no LSD value used.