

Zoysiagrass Tolerance to Granular Applications of Penoxsulam

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Introduction

This study was conducted on a mature stand of 'Zenith' zoysiagrass (*Zoysia japonica* Steud.) at the East Tennessee Research and Education Center (Knoxville, TN). The objective of this project was to evaluate the tolerance of 'Zenith' zoysiagrass to granular applications of penoxsulam while transitioning out of winter dormancy.

Methods and Materials

The test site was maintained similar to that of a golf course fairway with respect to irrigation, fertilization and mowing. This study was arranged in a randomized complete block design with four replications. Herbicide treatments were applied on 5 and 23 March 2009 to plots (10' x 5') using a CO₂ powered boom sprayer calibrated to deliver 30 gpa using four, flat-fan, 8002 nozzles at 18 psi, configured to provide a 5-ft spray swath.

Zoysiagrass injury was rated visually utilizing a 0 (no turf injury) to 100 % (complete kill) scale at 11, 25, 32, 46, and 60 days after initial treatment (DAIT). Zoysiagrass color was also rated on the same dates using a 1 (brown) to 9 (dark green) scale, with a score greater than 6 considered acceptable, at 32, 46, and 60 DAIT. Zoysiagrass green-up percentage was measured visually at 25, 32, 46, and 60 DAIT as well.

Quantitative assessments of zoysiagrass injury and color were made by assessing relative chlorophyll index (R840/R700) with a CM-1000 chlorophyll meter (Spectrum Technologies, E. Plainfield IL). Three sub-samples were used to calculate relative chlorophyll index means for each treatment on each rating date.

Results and Discussion

No treatment resulted in zoysiagrass injury in this study (Table 1). Zoysiagrass green-up values were greater than or equal to the untreated check on every rating date (Table 2). Penoxsulam applied on nitrogen containing fertilizers tended to yield higher color and chlorophyll index values than those that were applied on carriers without nitrogen fertilizer on most rating dates (Table 3, Table 4).

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Table 1. Zoysiagrass injury following applications of penoxsulam and other industry standards in 2009.

Treatment	Rate -per A-	Time -Growth-	Zoysiagrass Injury				
			11 DAIT	25 DAIT	32 DAIT	46 DAIT	60 DAIT
			-----%-----				
1. UNTREATED CHECK			0.0 a [†]	0.0 a	0.0 a	0.0 a	0.0 a
2. LOCKUP (0-0-7)	400 lb	DORMANT	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
3. LOCKUP (17-0-7)	400 lb	DORMANT	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
4. BONUS S	380 lb	DORMANT	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
5. ATRAZINE 0.76 (0-0-7)	530 lb	DORMANT	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
6. LEBANON (19-0-6)	400 lb	DORMANT	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
7. LOCKUP (0-0-7)	400 lb	50% GREEN-UP	N/A [‡]	0.0 a	0.0 a	0.0 a	0.0 a
8. LOCKUP (17-0-7)	400 lb	50% GREEN-UP	N/A	0.0 a	0.0 a	0.0 a	0.0 a
9. BONUS S	380 lb	50% GREEN-UP	N/A	0.0 a	0.0 a	0.0 a	0.0 a
10. ATRAZINE 0.76 (0-0-7)	530 lb	50% GREEN-UP	N/A	0.0 a	0.0 a	0.0 a	0.0 a
11. LEBANON (19-0-6)	400 lb	50% GREEN-UP	N/A	0.0 a	0.0 a	0.0 a	0.0 a

[†] Means followed by same letter do not significantly differ (P=.05 Duncan's New MRT)

[‡] N/A= not applied

Table 2. Zoysiagrass green-up following applications of penoxsulam and other industry standards in 2009.

Treatment	Rate -per A-	Time -Growth-	Zoysiagrass Green-Up			
			25 DAIT	32 DAIT	46 DAIT	60 DAIT
			-----%-----			
1. UNTREATED CHECK			65.0 f [†]	96.5 a	97.3 c	100.0 a
2. LOCKUP (0-0-7)	400 lb	DORMANT	67.5 def	97.0 a	98.5 abc	100.0 a
3. LOCKUP (17-0-7)	400 lb	DORMANT	81.3 a	97.5 a	100.0 a	100.0 a
4. BONUS S	380 lb	DORMANT	82.5 a	98.3 a	100.0 a	100.0 a
5. ATRAZINE 0.76 (0-0-7)	530 lb	DORMANT	66.3 ef	96.5 a	98.0 bc	100.0 a
6. LEBANON (19-0-6)	400 lb	DORMANT	78.8 ab	97.3 a	100.0 a	100.0 a
7. LOCKUP (0-0-7)	400 lb	50% GREEN-UP	70.0 cdef	97.0 a	98.5 abc	100.0 a
8. LOCKUP (17-0-7)	400 lb	50% GREEN-UP	72.5 bcde	98.0 a	99.5 ab	100.0 a
9. BONUS S	380 lb	50% GREEN-UP	73.8 bcd	99.0 a	100.0 a	100.0 a
10. ATRAZINE 0.76 (0-0-7)	530 lb	50% GREEN-UP	71.3 cdef	97.8 a	99.3 ab	100.0 a
11. LEBANON (19-0-6)	400 lb	50% GREEN-UP	76.3 abc	98.0 a	99.5 ab	100.0 a

[†] Means followed by same letter do not significantly differ (P=.05 Duncan's New MRT)

Table 3. Zoysiagrass color following applications of penoxsulam and other industry standards in 2009.

Treatment	Rate -per A-	Time -Growth-	Zoysiagrass Color		
			32 DAIT	46 DAIT	60 DAIT
			-----1 to 9-----		
1. UNTREATED CHECK			6.9 d [†]	6.3 d	6.2 e
2. LOCKUP (0-0-7)	400 lb	DORMANT	6.6 d	6.5 cd	6.5 d
3. LOCKUP (17-0-7)	400 lb	DORMANT	7.9 ab	7.6 ab	7.4 ab
4. BONUS S	380 lb	DORMANT	8.0 a	7.6 ab	7.4 ab
5. ATRAZINE 0.76 (0-0-7)	530 lb	DORMANT	6.6 d	6.5 cd	6.5 d
6. LEBANON (19-0-6)	400 lb	DORMANT	7.7 abc	7.5 ab	7.2 b
7. LOCKUP (0-0-7)	400 lb	50% GREEN-UP	6.7 d	6.5 cd	6.5 d
8. LOCKUP (17-0-7)	400 lb	50% GREEN-UP	7.4 c	7.7 ab	7.5 a
9. BONUS S	380 lb	50% GREEN-UP	7.6 abc	7.9 a	7.5 a
10. ATRAZINE 0.76 (0-0-7)	530 lb	50% GREEN-UP	6.9 d	6.9 c	6.8 c
11. LEBANON (19-0-6)	400 lb	50% GREEN-UP	7.5 bc	7.4 b	7.5 a

[†] Means followed by same letter do not significantly differ (P=.05 Duncan's New MRT)

Table 4. Zoysiagrass chlorophyll index following applications of penoxsulam and other industry standards in 2009.

Treatment	Rate -per A-	Time -Growth-	Zoysiagrass Chlorophyll Index			
			25 DAIT	32 DAIT	46 DAIT	60 DAIT
1. UNTREATED CHECK			118.3 d [†]	144.4 e	174.1 c	199.1 b
2. LOCKUP (0-0-7)	400 lb	DORMANT	117.2 d	147.3 e	185.0 c	205.8 b
3. LOCKUP (17-0-7)	400 lb	DORMANT	163.3 ab	232.6 a	271.2 ab	296.8 a
4. BONUS S	380 lb	DORMANT	168.9 ab	235.0 a	286.2 a	305.8 a
5. ATRAZINE 0.76 (0-0-7)	530 lb	DORMANT	115.1 d	137.1 e	174.6 c	193.8 b
6. LEBANON (19-0-6)	400 lb	DORMANT	154.2 b	220.6 ab	250.7 b	278.5 a
7. LOCKUP (0-0-7)	400 lb	50% GREEN-UP	124.7 cd	158.0 e	193.2 c	201.5 b
8. LOCKUP (17-0-7)	400 lb	50% GREEN-UP	127.6 cd	190.7 cd	270.1 ab	309.2 a
9. BONUS S	380 lb	50% GREEN-UP	133.0 c	197.3 bc	279.5 ab	301.6 a
10. ATRAZINE 0.76 (0-0-7)	530 lb	50% GREEN-UP	125.2 cd	166.3 de	200.7 c	226.1 b
11. LEBANON (19-0-6)	400 lb	50% GREEN-UP	136.3 c	206.8 abc	267.3 ab	295.2 a

[†] Means followed by same letter do not significantly differ (P=.05 Duncan's New MRT)