

The Effect of Sulfonylurea (SU) Herbicides on Establishment of Seeded Bermudagrass when Applied to Remove Perennial Ryegrass Turf

Trent Murphree, Charlie Rodgers, Gabriel Towers, and Kai Umeda

Abstract

Higher SU herbicide rates provided more effective ryegrass removal that resulted in improved establishment of the seeded bermudagrass. In most instances in this study, the percent bermudagrass coverage increased as herbicide rates increased. Glyphosate was very effective in completely removing ryegrass non-selectively. Flazasulfuron at 0.018 lb ai/A eliminated 88% of the ryegrass. Observations also showed that foramsulfuron, rimsulfuron, and chlorsulfuron were effective in removing ryegrass. In plots where ryegrass had been eliminated, faster bermudagrass coverage in a greater area of the plot was achieved. The least amount of bermudagrass coverage occurred in the untreated plots. It appeared that most of the herbicides evaluated in this study were relatively safe on seeded Princess 77 bermudagrass since emergence and establishment occurred in all plots. The speed and degree of coverage in the plots increased due to efficacy of the herbicides in eliminating ryegrass prior to seeding.

Introduction

New SU herbicides can be used as a transitional aid to convert cool season turf to a warm season turfgrass during the spring. Cool season grasses such as perennial ryegrass are used to overseed bermudagrass every fall in the southern United States. One problem that exists in the spring is that ryegrass should be terminated to allow bermudagrass to grow properly. Termination of ryegrass may be done by mechanical, physical or chemical means. With new SU herbicides being used, chemical means are becoming more popular. Another development is the improvement of fine-textured seeded bermudagrass cultivars that are being used instead of sodding or sprigging to augment thin bermudagrass stands. Combining the practice of using SU herbicides to terminate ryegrass and seeding bermudagrass in the spring offers opportunities to improve bermudagrass turf sites. Questions remain regarding the safety of using SU herbicides before planting bermudagrass. This experiment was designed and conducted to compare the relative safety of the SU herbicides for ryegrass termination when applied at different timings before seeding bermudagrass.

Materials and Methods

Perennial ryegrass cv. Fairway Classic was planted on November 18, 2003 at 10 lbs/1000 sq ft into a fallow area containing no bermudagrass. The ryegrass was maintained at a mowing height of 0.5 inches and fertilized and irrigated regularly. Each herbicide treatment plot was 5 ft by 3 ft and was arranged in a randomized complete block design with three replications for each of four application dates at 28, 14, 7, and 2 days before planting (DBP). The

herbicide applications dates were May 6, 21, 27 and June 1, 2004. All herbicide applications were made with a CO₂ backpack sprayer equipped with a hand-held boom containing three 8002 flat fan nozzles spaced 20 inches apart. All of the herbicides were delivered in 103 gallons per acre of water at a speed of 3 miles per hour. All treatments also received a non-ionic surfactant at 0.25% v/v. A complete list of herbicides including non-SU herbicides that are used in common practice and their rates are listed in Table 1. Prior to planting bermudagrass, the entire ryegrass turf area was mowed at 0.375 inches and was then verticut in two cross directions. Bermudagrass cv. Princess 77 was seeded on June 3 at 1.0 lb/1000 sq ft with a Gandy drop-spreader. Ratings for percent ryegrass removal were taken at 2 and 4 weeks after treatment (WAT) and ratings for percent bermudagrass coverage were taken 3, 6, 9, and 12 weeks after planting (WAP).

Results

Perennial ryegrass removal by SU herbicides was not greater than 10% when rated 2 WAT (Table 1). At 4 WAT, flazasulfuron (Katana* proposed) at 0.018 lb ai/A eliminated 88% of the ryegrass. Observations also showed that foramsulfuron (Revolver*) at 0.054 lb ai/A, flazasulfuron at 0.018 lb ai/A, rimsulfuron (TranXit*) at 0.024 and 0.063 lb ai/A, and chlorsulfuron (Corsair*) at 0.138 lb ai/A all similarly removed nearly half of the ryegrass at 4 WAT. Glyphosate (Roundup*) reduced 88% of the ryegrass at 2 WAT and 100% was eradicated at 4 WAT. Trifloxysulfuron (Monument*), sulfosulfuron (Certainty* proposed), pronamide (Kerb*), and some of the SU products at the lower rates tested were less efficacious in removing ryegrass.

The percent bermudagrass coverage in each treatment plot for each spray date was analyzed and the average of all herbicide treatments showed increasing coverage from 3 WAP to 12 WAP. At 3 WAP, all herbicides applied at all timings of application had an average of less than 3% bermudagrass coverage (Figure 1). Between 6 and 12 WAP, the average bermudagrass coverage progressively increased in the plots for all of the treatments at the various timings from less than 20% to as high as 80% (Figure 1). At 12 WAP, bermudagrass coverage in all treatment plots ranged from 60 to 80% for all timings of application. For the 28 DBP application timing and when rated at 6 WAP, bermudagrass coverage of 73 and 88% was observed in plots treated with flazasulfuron at 0.047 lb ai/A and glyphosate, respectively (Table 2). In contrast, for herbicides applied at 14, 7, and 2 DBP and when rated 6 WAP, bermudagrass coverage was less than 42% (Tables 3,4,5). Across all application timings, plots treated with glyphosate and chlorsulfuron at 0.138 lb ai/A had the most bermudagrass coverage when rated 9 WAP (Tables 2,3,4,5). Among the SU herbicides, flazasulfuron at 0.047 lb ai/A, foramsulfuron at 0.054 lb ai/A, chlorsulfuron at both 0.046 lb ai/A and 0.138 lb ai/A, and metsulfuron (Manor*/Blade*) at 0.024 lb ai/A had the greatest bermudagrass coverage when rated 12 WAP for all application timings (Tables 2,3,4,5). In most instances in this study, percent bermudagrass coverage increased as herbicide rates increased.

Discussion and Conclusion

The higher rates of flazasulfuron, metsulfuron, foramsulfuron, and chlorsulfuron as well as the low rate of chlorsulfuron provided the greatest bermudagrass coverage in the plots at all of the herbicide application timings when compared to the other SU herbicides. The higher herbicide rates provided more effective ryegrass removal; therefore, resulting in improved establishment of the seeded bermudagrass. Glyphosate was very effective in completely removing ryegrass non-selectively and it could be used to convert from a cool season to warm season turfgrass. In instances where a more gradual conversion from cool season to warm season grasses is desired flazasulfuron, metsulfuron, chlorsulfuron and foramsulfuron could be utilized. In most instances in this study, competition from the ryegrass with germinating and emerging bermudagrass interfered with bermudagrass establishment. In plots where ryegrass had been eliminated, faster bermudagrass coverage in a greater area of the plot was achieved. The least amount of bermudagrass coverage occurred in the untreated plots. It appeared that the herbicides evaluated in this study were relatively safe on seeded Princess 77 bermudagrass since emergence and establishment occurred in all plots. The rate and degree of coverage in the plots increased due to efficacy of the herbicides in eliminating ryegrass prior to seeding.

Figure 1: Princess 77 Bermudagrass Coverage

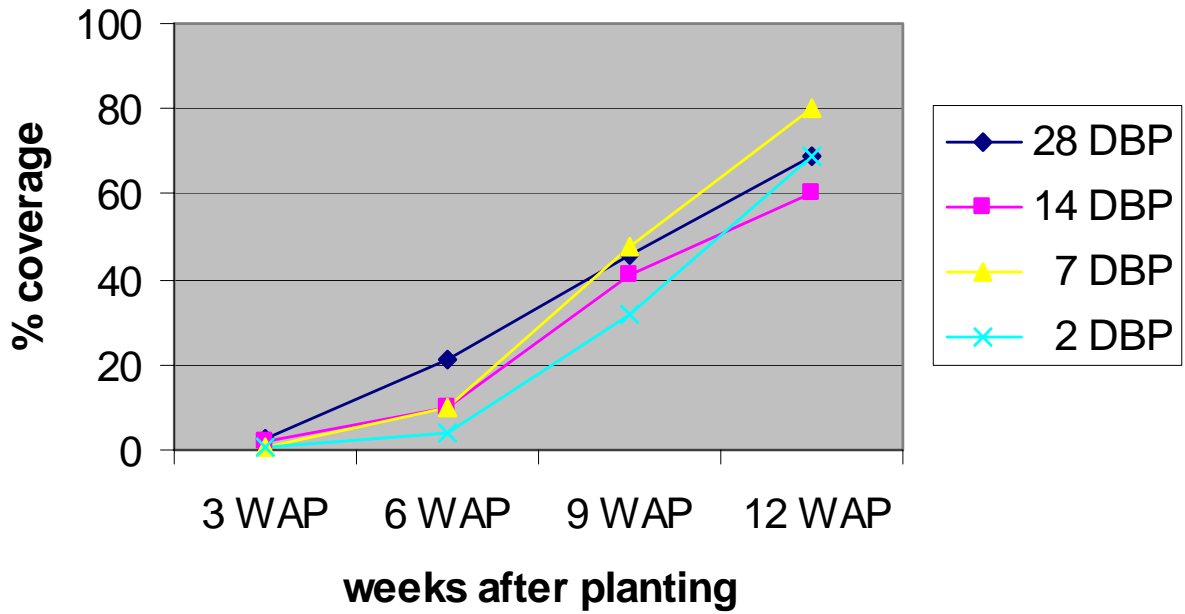


Table 1. Perennial ryegrass removal

Herbicide	Rate (lb ai/A)	2 WAT (% ryegrass removal)	4 WAT
foramsulfuron	0.019	10	23
foramsulfuron	0.054	10	43
trifloxysulfuron	0.0094	10	26
trifloxysulfuron	0.028	10	30
sulfosulfuron	0.065	10	13
sulfosulfuron	0.188	10	23
flazasulfuron	0.018	10	56
flazasulfuron	0.047	10	88
rimsulfuron	0.024	10	43
rimsulfuron	0.063	10	43
chlorsulfuron	0.046	10	33
chlorsulfuron	0.138	10	43
metsulfuron	0.0094	10	26
metsulfuron	0.024	10	36
halosulfuron	0.062	10	10
pronamide	1.0	10	20
glyphosate	1.5	88	100
untreated check	----	0	0
LSD (p=0.05)		4	14

Table 2. Bermudagrass cv. Princess 77 tolerance to herbicides applied 28 DBP and rated at 3, 6, 9, and 12 WAP

Herbicide	Rate	3 WAP	6 WAP	9 WAP	12 WAP
	(lb ai./A)		(% bermudagrass coverage)		
Foramsulfuron	0.019	0	1	11	27
foramsulfuron	0.054	3	23	53	83
trifloxysulfuron	0.0094	1	3	13	50
trifloxysulfuron	0.028	2	6	27	78
sulfosulfuron	0.065	0	3	12	40
sulfosulfuron	0.188	0	3	9	55
flazasulfuron	0.018	3	47	93	97
flazasulfuron	0.047	8	73	97	100
rimsulfuron	0.024	2	20	50	77
rimsulfuron	0.063	2	48	83	93
chlorsulfuron	0.046	3	20	63	87
chlorsulfuron	0.138	3	24	91	97
metsulfuron	0.0094	2	6	32	67
metsulfuron	0.024	2	10	62	83
halosulfuron	0.062	0	2	8	30
pronamide	1.0	2	4	17	58
glyphosate	1.5	11	88	98	100
untreated check	----	0	1	10	23
LSD (p=0.05)		4	27	30	24

Table 3. Bermudagrass cv. Princess 77 tolerance to herbicides applied 14 DBP and rated at 3, 6, 9, and 12 WAP

Herbicide	Rate	3 WAP	6 WAP	9 WAP	12 WAP
	(lb ai./A)		(% bermudagrass coverage)		
foramsulfuron	0.019	0	2	11	25
foramsulfuron	0.054	2	6	53	75
trifloxysulfuron	0.0094	0	3	12	23
trifloxysulfuron	0.028	1	5	17	40
sulfosulfuron	0.065	0	4	18	45
sulfosulfuron	0.188	0	6	20	43
flazasulfuron	0.018	2	9	55	77
flazasulfuron	0.047	2	23	70	88
rimsulfuron	0.024	1	4	18	43
rimsulfuron	0.063	2	17	47	58
chlorsulfuron	0.046	1	10	53	78
chlorsulfuron	0.138	4	33	95	100
metsulfuron	0.0094	3	10	48	72
metsulfuron	0.024	2	13	57	90
halosulfuron	0.062	0	6	17	43
pronamide	1.0	2	14	37	65
glyphosate	1.5	7	13	99	100
untreated check	---	0	2	7	17
LSD @ 0.05		2	NS	29	30

Table 4. Bermudagrass cv. Princess 77 tolerance to herbicides applied 7 DBP and rated at 3, 6, 9, and 12 WAP

Herbicide	Rate	3 WAP	6 WAP	9 WAP	12 WAP
	(lb ai/A)		(% bermudagrass coverage)		
foramsulfuron	0.019	1	8	37	82
foramsulfuron	0.054	1	14	83	100
trifloxysulfuron	0.0094	0	4	17	65
trifloxysulfuron	0.028	0	5	17	67
sulfosulfuron	0.065	0	4	18	60
sulfosulfuron	0.188	0	7	35	82
flazasulfuron	0.018	1	9	50	91
flazasulfuron	0.047	1	18	85	100
rimsulfuron	0.024	0	4	20	62
rimsulfuron	0.063	1	4	33	80
chlorsulfuron	0.046	1	12	82	100
chlorsulfuron	0.138	2	12	85	100
metsulfuron	0.0094	1	8	70	93
metsulfuron	0.024	1	15	78	100
halosulfuron	0.062	1	5	17	63
pronamide	1.0	0	4	16	58
glyphosate	1.5	3	42	100	100
untreated check	----	0	3	13	28
LSD @ 0.05		1	8	15	21

Table 5. Bermudagrass cv. Princess 77 tolerance to herbicides applied 2 DBP and rated at 3, 6, 9, and 12 WAP

Herbicide	Rate	3 WAP	6 WAP	9 WAP	12 WAP
	(lb ai/A)		(% bermudagrass coverage)		
foramsulfuron	0.019	1	4	18	55
foramsulfuron	0.054	1	4	48	92
trifloxysulfuron	0.0094	0	2	7	28
trifloxysulfuron	0.028	0	2	9	52
sulfosulfuron	0.065	0	2	7	27
sulfosulfuron	0.188	1	4	27	70
flazasulfuron	0.018	0	2	12	57
flazasulfuron	0.047	1	6	73	99
rimsulfuron	0.024	0	4	22	68
rimsulfuron	0.063	0	5	42	85
chlorsulfuron	0.046	1	4	43	89
chlorsulfuron	0.138	1	5	77	97
metsulfuron	0.0094	1	5	35	88
metsulfuron	0.024	1	5	47	93
halosulfuron	0.062	0	2	14	57
pronamide	1.0	0	2	10	62
glyphosate	1.5	1	8	75	97
untreated check	----	0	3	6	30
LSD (p=0.05)		NS	NS	24	29