Comparison of Spring and Summer Herbicide Applications for Nutsedge Control in Turfgrass

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Abstract

Sulfosulfuron, imazaquin, and halosulfuron applied beginning in May exhibited a high degree of nutsedge control from August to the end of September. Late spring initiated applications of imazaquin, sulfosulfuron, and trifloxysulfuron gave consistent nutsedge control that was better than 85% for most of the rating dates through the summer. Halosulfuron and flazasulfuron tended to decline in nutsedge control efficacy about one month after applications. The summer timing series of three monthly applications that began in July showed that sulfosulfuron and trifloxysulfuron provided an average of better than 90% nutsedge control throughout the summer. Applications of all herbicides in May caused ryegrass injury. Halosulfuron applications initiated in May were marginally safer on overseeded ryegrass while providing a moderate degree of nutsedge control. Bermudagrass was very slow to recover and to achieve full cover in sulfosulfuron and imazaquin treated plots.

Introduction

Nutsedge populations in turfgrass will emerge in the early spring in March or April when temperatures begin to warm. It will grow through winter overseeded perennial ryegrass when bermudagrass is also just emerging from winter dormancy. Nutsedge will be present in turfgrass during the summer months through the overseeding process in the fall and then decline in the late fall when chilling temperatures prevail. As the "world's worst weed" purple nutsedge as a perennial weed continuously emerges from underground tubers during the spring through fall. The strategy to control purple nutsedge is to exhaust the tuber population in the soil. Many of the new ALS-inhibiting (acetolactate synthase enzyme for amino acid synthesis) herbicides are highly active in plants when they can be taken into the plant through the foliage or roots and can be translocated up or down through the plant. These herbicides can be effective in reducing nutsedge populations when applied in a timely manner to take advantage of the ability to translocate to tubers to inhibit the plants' reproductive capacities. A series of experiments was conducted to evaluate the timing of applications of herbicides to control purple nutsedge in turfgrass. The herbicides were halosulfuron (formerly Manage* and new brand name SedgeHammer*), imazaquin (Image*), trifloxysulfuron (Monument*), sulfosulfuron (Certainty*), and flazasulfuron (proposed name Katana*).

Materials and Methods

A series of small plot field experiments was conducted at the Palo Verde Country Club in Sun Lakes, AZ on common bermudagrass turf that was overseeded with perennial ryegrass during the fall of 2004. Purple nutsedge emerged in April in the ryegrass and herbicides were applied in one test beginning on 05 May 2005 then followed on 02 June, 06 July, and 03 August (Table 1). MSMA and halosulfuron treatments were applied on all four application dates and imazaquin and sulfosulfuron were applied only three times in May, July, and August. All

This is a part of the University of Arizona College of Agriculture 2006 Turfgrass and Ornamental Research Report, index at: http://cals.arizona.edu/pubs/crops/az1421/

treatments included a nonionic surfactant Latron CS-7 at 0.25% v/v. Treatments were initiated when the nutsedge was 0.5 to 0.75 inch above the ryegrass that was regularly mowed at approximately 1.0 inch height of cut. On 05 May, the air temperature was 74°F, sky clear, and there was a very slight breeze with soil temperature at the 1 to 2 inch depth at 64°F. On 02 June, the temperature was 79°F, overcast, and a breeze with soil temperature at 68°F. On 06 July, the temperature was 96°F, clear, and calm. The final application date was 03 August when monsoon rains occurred during the night before and temperature was only 70°F, cloudy, calm, and very humid. All applications were made with a backpack CO_2 sprayer pressurized to 30 psi and delivered 30 gpa water through a hand-held boom equipped with three 8003 flat fan nozzles spaced 20 inches apart. The experimental plots measured 5 ft wide by 10 ft long and each treatment was replicated four times in a randomized complete block design.

A second experiment was initiated on 02 June when bermudagrass began to transition back from winter dormancy and ryegrass was declining. The temperature was 79°F, overcast, a slight breeze, and soil temperature at 68°F. The second timing of application on 06 July, the temperature was 96°F, clear, and calm. The third application date was 03 August when monsoon rains occurred during the night before and temperature was only 70°F, cloudy, calm, and very humid. The fourth application was made on 12 September with temperature at 74°F, clear, and no wind.

The third experiment was initiated in early July when there was full cover bermudagrass and ryegrass was completely transitioned out from the turf. On 06 July, the temperature was 96°F, clear, and calm. The second application date was 03 August when monsoon rains occurred during the night before and temperature was only 70°F, cloudy, calm, and very humid. The last application was made on 01 September with temperature at 94°F, clear, and a slight breeze.

Visual observations were made at intervals following herbicide applications for nutsedge control and turfgrass quality. Data and means separation were analyzed for each timing of application but ratings between application dates were not statistically analyzed.

Results and Discussion

The early spring timing series of three or four monthly applications beginning in May exhibited a high degree of nutsedge control from August through the remainder of the season at the end of September. Sulfosulfuron, imazaquin, and halosulfuron applied in May initially gave less than acceptable control of less than 85% in May (Table 3). Halosulfuron provided less than acceptable control (~70%) at one month after applications in May and June. Imazaquin and sulfosulfuron applied in May showed a decline in nutsedge control to about 70% at 6 to 8 weeks after treatment (WAT) of the first application. Sulfosulfuron, imazaquin, and halosulfuron applied again in July and August provided effective nutsedge control at better than 93% for the remainder of the summer until fall overseeding. MSMA applied monthly for four months provided some nutsedge reduction of 83% at the end of the summer.

Applications of all herbicides in May caused ryegrass injury compared to the untreated check (Table 2). At about 1 WAT, MSMA, halosulfuron, sulfosulfuron, and imazaquin caused slight quality reduction but at about 4 WAT, imazaquin and sulfosulfuron reduced the ryegrass stand while MSMA and halosulfuron treated ryegrass appeared to less injured. At the end of June, spring transition caused ryegrass to be removed from the turf in the untreated check, MSMA, and halosulfuron treated plots and bermudagrass emerged from dormancy. Bermudagrass was very slow to recover and to achieve full cover in sulfosulfuron and imazaquin treated plots.

Late spring timing series of four monthly application initiated in June gave acceptable to very good nutsedge control from June through September (Table 4). Imazaquin, sulfosulfuron, and trifloxysulfuron gave consistent nutsedge control that was better than 85% for most of the rating dates through the summer. Halosulfuron and flazasulfuron tended to decline in nutsedge control efficacy about one month after applications. Several applications of MSMA were not effective in reducing nutsedge populations with treatments initiated in June.

The summer timing series of three monthly applications that began in July showed that sulfosulfuron and trifloxysulfuron provided an average of better than 90% nutsedge control throughout the summer until the end of September (Table 5). Halosulfuron, imazaquin, and flazasulfuron appeared to decline in providing effective

nutsedge control for longer than one month after each application. MSMA applied monthly late in the summer appeared to be slightly better in reducing nutsedge than applications that were initiated early in the season.

Sulfosulfuron applied three times in July, August, and September provided near complete control of nutsedge at rating dates in August and September. Sulfosulfuron monthly applications initiated in June also effectively reduced nutsedge with four applications. Three applications of sulfosulfuron in May, July, and August also gave 97% control of nutsedge at the end of September but winter overseeded ryegrass was rapidly removed and spring-emerging bermudagrass was severely delayed in transition.

Trifloxysulfuron applied three or four times during the summer was equally effective as sulfosulfuron by almost completely controlling nutsedge by 29 September.

Halosulfuron applied four times gave better than 93% control of nutsedge at the end of September while three applications gave 88% control. Halosulfuron declined in activity on nutsedge at about one month after each application. Halosulfuron applications initiated in May were marginally safe on overseeded ryegrass while providing a moderate degree of nutsedge control.

Imazaquin was similar to sulfosulfuron in giving better than 90% nutsedge control from August through September with three or four applications initiated in May or June. Three applications initiated in July resulted in giving less than acceptable control of 78% on 29 September.

Flazasulfuron performed similar to halosulfuron as it provided about one month of acceptable nutsedge control following three or four applications starting in June or July. Three applications were less effective than four that were initiated in June.

Acknowledgements

We thank Bill Todd, superintendent of Palo Verde Country Club where he and his staff provided and maintained the experimental test site.

Table 1. Application data

Date	5-May	2-Jun	6-Jul	3-Aug	1-Sep	12-Sep
Timings	Early spring	Early spring Late spring	Early spring Late spring Summer	Early spring Late spring Summer	Summer	Late spring
Air temperature (°F)	74	79	96	70	94	74
Wind speed (mph)	<3	<5	0	0	<5	0
Cloud cover	clear	overcast	clear	cloudy	clear	clear

Table 2. Spring applied herbicides effects on overseeded ryegrass

		Quality rating*			
Treatment	Rate	13-May	2-Jun	15-Jun	30-Jun
	lb AI/A				
untreated check		7.3	6.8	7.0	7.0
MSMA	3.0	4.8	5.8	3.8	6.0
halosulfuron	0.062	4.3	5.3	4.8	5.5
imazaquin	0.5	4.0	2.3	2.0	5.3
sulfosulfuron	0.094	3.8	1.0	1.0	3.0
LSD (p=0.05)		0.60	1.03	0.86	1.82

Rating scale of 1-9, 9 is best
Applications made on 05 May, 02 June, 06 July, and 03 August 2005

Table 3. Early spring timing of herbicides for nutsedge control in turfgrass

		Nutsedge control								
Treatment	Rate	13-May	2-Jun	15-Jun	30-Jun	18-Jul	3-Aug	17-Aug	31-Aug	29-Sep
	lb AI/A					%				
untreated check		0	0	0	0	0	0	0	0	0
MSMA	3	29	0	40	0	50	48	58	74	83
halosulfuron	0.062	83	73	91	68	89	91	98	95	93
imazaquin	0.5	80	83	70	70	78	91	96	94	94
sulfosulfuron	0.094	83	95	90	73	78	93	98	94	97
LSD (p=0.05)		6.2	6.6	15.4	15.4	7.6	14.2	26.9	12.1	5.1

Applications made on 05 May, 02 June, 06 July, and 03 August 2005

Table 4. Late spring timing of herbicides for nutsedge control in turfgrass

		Nutsedge control						
Treatment	Rate	15-Jun	30-Jun	18-Jul	3-Aug	17-Aug	31-Aug	29-Sep
	lb AI/A				%			
untreated check		0	0	0	0	0	0	0
MSMA	3.0	25	0	50	31	13	50	13
halosulfuron	0.062	93	88	94	79	95	89	94
imazaquin	0.5	85	86	84	89	96	91	94
sulfosulfuron	0.094	88	95	96	92	99	93	97
trifloxysulfuron	0.026	90	97	94	91	99	94	93
flazasulfuron	0.047	89	93	89	79	92	83	89
LSD (p=0.05)		7.2	6.0	5.9	15.4	15.2	20.5	16.5

Applications made on 02 June, 06 July, 03 August, and 12 September 2005

Table 5. Summer timing of herbicides for nutsedge control in turfgrass

		Nutsedge control					
Treatment	Rate	18-Jul	3-Aug	17-Aug	31-Aug	12-Sep	29-Sep
	lb AI/A				%		
untreated check		0	0	0	0	0	0
MSMA	3.0	28	61	28	79	74	66
halosulfuron	0.062	84	84	92	78	91	88
imazaquin	0.5	85	85	90	81	88	78
sulfosulfuron	0.094	85	93	99	94	99	97
trifloxysulfuron	0.026	81	90	94	85	95	96
flazasulfuron	0.047	84	75	93	64	89	74
LSD (p=0.05)		11.9	12.0	25.0	12.6	6.2	12.9

Applications made on 06 July, 03 August, and 01 September 2005