

Timing of Sequential Applications for Nutsedge Control in Turfgrass

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Abstract

Sequential applications of all of the ALS-inhibiting herbicides offered acceptable to excellent levels of nutsedge control in turf. Single applications generally provided nutsedge control for 2 to 6 weeks. Single applications of halosulfuron and flazasulfuron offered effective control for 2 weeks and less than 4 weeks. Effective nutsedge control by trifloxysulfuron and sulfosulfuron was observed at 31 days after treatment (DAT) and began to decline at 42 DAT. Sulfosulfuron at 0.094 lb a.i./A applied sequentially at either 4 or 6 weeks gave near complete nutsedge control at the end of the season at the end of September. A second application of trifloxysulfuron at 0.026 lb a.i./A at 4 or 6 weeks after a first application in mid-July resulted in controlling nutsedge better than 85% at the end of September. Flazasulfuron at 0.047 lb a.i./A applied sequentially at 6 weeks provided improving nutsedge control through the summer and resulted in near complete control at 95% at the end of September. Halosulfuron at 0.062 lb a.i./A showed only 65% control after the first application and a sequential application at 4 weeks improved control to 92% for only an additional 2 weeks and then control was less than acceptable at the end of the season. Imazaquin at 0.5 lb a.i./A gave less than acceptable but consistent control until sequential applications at both 4 and 6 weeks improved nutsedge control to acceptable levels.

Introduction

Purple nutsedge (*Cyperus rotundus*), the “world’s worst weed”, infests all turfgrasses whether highly maintained or not in the desert southwest or any other part of the world. The acetolactate synthase (ALS) inhibiting herbicides have been used to control nutsedge since their introductions beginning in the mid-1980’s. Imazaquin (Image*) and halosulfuron (SedgeHammer* formerly Manage*) were the first to be introduced. Trifloxysulfuron (Monument*) and sulfosulfuron (Certainty*) are the most recent introductions to the market and flazasulfuron is being developed for eventual commercialization. All of the product labels describe a need for a second application of the product because a single application is not sufficient for acceptable control. Suggested intervals range between 4 to 10 weeks after the first application that a second application be sprayed to adequately control nutsedge. Heavier populations of nutsedge may require more applications at shorter intervals compared to light infestations that may be controlled with fewer applications spaced longer apart. The objective of this experiment was to compare the efficacy of sequential applications of herbicide treatments at either 4 or 6 weeks following an initial application to control purple nutsedge in turf.

Materials and Methods

A small plot experiment was conducted at the Biltmore Country Club in a rough turf area heavily infested with purple nutsedge. The five herbicide treatment plots were established measuring 5 ft by 40 ft and replicated three times in a randomized block design. At the first timing of application on 18 July 2006, each treatment was sprayed

on the entire length of the 40 ft plot. At the second timing of application on 18 August at approximately 4 weeks after treatment of the first application, each treatment was sprayed on 15 ft of the front portion of the 40 ft that was previously sprayed. The third timing of application on 29 August at 6 weeks after treatment of the first application, each treatment was sprayed on another 15 ft of the once previously treated plot. Ten feet of the 40 ft plot remained as the once treated treatment replicate. All applications were made using a backpack CO₂ sprayer equipped with a hand-held boom. The boom consisted of three 8003 flat fan nozzles spaced 20 inches apart and pressurized to 30 psi. All sprays were applied in 30 gpa water and included a non-ionic surfactant, Latron CS-7 at 0.25% v/v. During the time of application on 18 July, the temperature was 86°F, clear sky, no winds, and the soil temperature at 2-in depth was 80°F. The common bermudagrass turf mowed at 1 to 2-in height was totally infested with purple nutsedge with approximately 30% of the area only consisting of nutsedge with no turf. The plot area was not mowed for 2 days prior to and 1 day following the initial application. The site was overhead sprinkler irrigated daily during the mornings and mowed weekly. The early sequential application, second timing at 4 weeks, was made on 18 August when the temperature was 80°F, with scattered clouds, a very slight breeze, and soil was moist at 72°F. The late sequential application, second timing at 6 weeks, was made on 29 August with air temperature at 78°F, clear sky, a very slight breeze, and soil was moist at 70°F. Purple nutsedge control was rated at regular intervals following each application until the start of fall overseeding on the site.

Results and Discussion

On 08 August, at 14 days after treatment of the first application timing (DAT-1) of all herbicides, flazasulfuron gave the greatest degree of nutsedge control at 92% (Table). Halosulfuron, trifloxysulfuron, and sulfosulfuron gave marginally acceptable control at 83 to 85% control and imazaquin offered less than acceptable control at 75%. On 18 August, at 31 DAT-1, trifloxysulfuron and sulfosulfuron activity improved and nutsedge control was 90%. Imazaquin treated nutsedge plots continued to show suppressed nutsedge. Halosulfuron and flazasulfuron activity declined and nutsedge control was not acceptable but suppressed. Halosulfuron applied once continued to show less activity at each rating date through the summer and resulted in less than 20% control at the end of the growing season at 56 to 63 DAT-1 on 12 and 19 September, respectively. Flazasulfuron activity also declined similar to halosulfuron and showed 20% control at 63 DAT-1. Imazaquin continued to show 70% control at 56 DAT-1 and then declined to 50% at 63 DAT-1. Trifloxysulfuron and sulfosulfuron offered acceptable control through 42 DAT-1 and then control declined. Trifloxysulfuron treated nutsedge plots were controlled almost 70% and appeared to be slightly better than sulfosulfuron and imazaquin treatments at about 50% at the end of the season. Single applications of halosulfuron and flazasulfuron offered effective control for two weeks and less than four weeks. Effective nutsedge control by trifloxysulfuron and sulfosulfuron was observed at 31 DAT-1 and began to decline at 42 DAT-1.

A sequential application of each herbicide at 31 DAT-1 or 4 weeks gave very good nutsedge control of better than 90% at 11 days after treatment of the early sequential application (DAT-2-early). Sulfosulfuron treatments continued to improve and near complete nutsedge control of 98% was observed at 32 DAT-2-early. Acceptable nutsedge control of better than 85% was observed for trifloxysulfuron and flazasulfuron. Imazaquin approached acceptable control at 82%. Halosulfuron activity declined at ratings observed at 25 and 32 DAT-2-early to only 62% control.

Following a late sequential application of each herbicide at 42 DAT-1 or 6 weeks, nutsedge control was better than 85%. Sulfosulfuron and flazasulfuron gave near complete nutsedge control of 95 to 98% at 21 DAT-2-late. Trifloxysulfuron and imazaquin provided better than acceptable control of 88% at the end of the season. Halosulfuron treated plots approached acceptable levels at 78% control.

Sulfosulfuron at 0.094 lb a.i./A applied in mid-July gave acceptable control for six weeks. A single application was not adequate for season-long (63 DAT-1) nutsedge control that was about 50%. A sequential application at either 31 or 42 DAT-1 (4 to 6 weeks) resulted in near complete nutsedge control at the end of the season at the end of September. Two applications spaced 31 days apart offered better than 90% nutsedge control at all rating dates. Slightly more nutsedge was present when the second application was made at 42 DAT-1. Sulfosulfuron effectively reduced nutsedge during the growing season with sequential applications spaced 4 to 6 weeks apart.

Trifloxysulfuron at 0.026 lb a.i./A gave marginally acceptable nutsedge control at 82% for six weeks and offered less than acceptable control of less than 70% at the end of the season with a single application. Second applications of trifloxysulfuron at 31 or 42 DAT-1 gave effective control of better than 90% for an additional 11 to 14 DAT. Similar to sulfosulfuron, at 42 DAT-1, more nutsedge was present at the second application and subsequent ratings were around 90% control at the end of the season. A second application of trifloxysulfuron at 4 or 6 weeks after a first application in mid-July resulted in controlling nutsedge better than 85% at the end of September.

Flazasulfuron and halosulfuron gave effective control for up to two weeks following a single application and declined through the season and neither was effective at 56 DAT-1. Flazasulfuron at 0.047 lb a.i./A applied sequentially at 42 DAT-1 provided improving nutsedge control through the summer and resulted in near complete control at 95% at the end of September. There was only 68% nutsedge control after the first application when the sequential treatment was made at 6 weeks. A sequential treatment at 4 weeks also resulted in offering acceptable control of 87% at the end of the season. Halosulfuron at 0.062 lb a.i./A showed only 65% control at 31 DAT-1 and a sequential application at 4 weeks improved control to 92% for only an additional 2 weeks and then control was less than acceptable at the end of the season. The sequential application at 6 weeks when nutsedge control was diminished to 43% gave marginally acceptable control for the remainder of the season.

Imazaquin at 0.5 lb a.i./A suppressed nutsedge at better than 70% control for most of the season with a single application. A sequential application at either 4 or 6 weeks after the first application resulted in providing better than 80% control at the end of the season.

Sequential applications of all of the ALS-inhibiting herbicides offered acceptable to excellent levels of nutsedge control in turf. Single applications generally provided nutsedge control for 2 to 6 weeks. Trifloxysulfuron and sulfosulfuron applied at 4 or 6 week intervals after an initial application provided continuous season-long acceptable to excellent nutsedge control. Both herbicides can be applied in mid-July and followed by another application at 6 weeks and offer season-long control. Flazasulfuron gave very good control for the initial 14 DAT-1 and then nutsedge control declined to less than acceptable until either sequential application gave acceptable control for the remainder of the season. Halosulfuron also gave acceptable control for 14 DAT-1 and then a sequential application at 4 weeks provided an additional couple of weeks of control. A sequential application of halosulfuron at 6 weeks did not give adequate nutsedge control. Additional applications of halosulfuron at shorter intervals could offer more consistent nutsedge control for the season. Imazaquin gave less than acceptable but consistent control until sequential applications at both 4 and 6 weeks improved nutsedge control to acceptable levels.

Acknowledgements

We thank Mr. Rick Stuart, golf course superintendent of the Biltmore Country Club, and his staff for their cooperation in allowing us to conduct the experiment and turf management of the test site on their golf course.

Table. Timing of sequential applications of herbicides for nutsedge control in turf

			Nutsedge Control (%)				
Treatment	Rate	Timing	8-Aug	18-Aug	29-Aug	12-Sep	19-Sep
Untreated check			0	0	0	0	0
halosulfuron	0.062	single	85	65	43	20	17
trifloxysulfuron	0.026	single	83	90	82	68	67
sulfosulfuron	0.094	single	83	90	85	57	48
imazaquin	0.5	single	75	77	77	70	50
flazasulfuron	0.047	single	92	78	68	37	20
halosulfuron	0.062	4 weeks			92	73	62
trifloxysulfuron	0.026	4 weeks			95	83	85
sulfosulfuron	0.094	4 weeks			95	93	98
imazaquin	0.5	4 weeks			90	85	82
flazasulfuron	0.047	4 weeks			95	82	87
halosulfuron	0.062	6 weeks				85	78
trifloxysulfuron	0.026	6 weeks				90	88
sulfosulfuron	0.094	6 weeks				95	98
imazaquin	0.5	6 weeks				88	88
flazasulfuron	0.047	6 weeks				88	95

LSD (p=0.05)

7.7 12.5 21 30.1 30.3

Application dates: 18 July, 18 and 29 August 2006.

Rating dates: 08 August = 14 DAT-1; 18 August = 31 DAT-1; 29 August = 42 DAT-1 and 11 DAT-2; 12 September = 56 DAT-1, 25 DAT-2, 14 DAT-3; 19 September = 63 DAT-1, 32 DAT-2, and 21 DAT-3

Figure 1. Comparison of herbicide efficacy with single applications

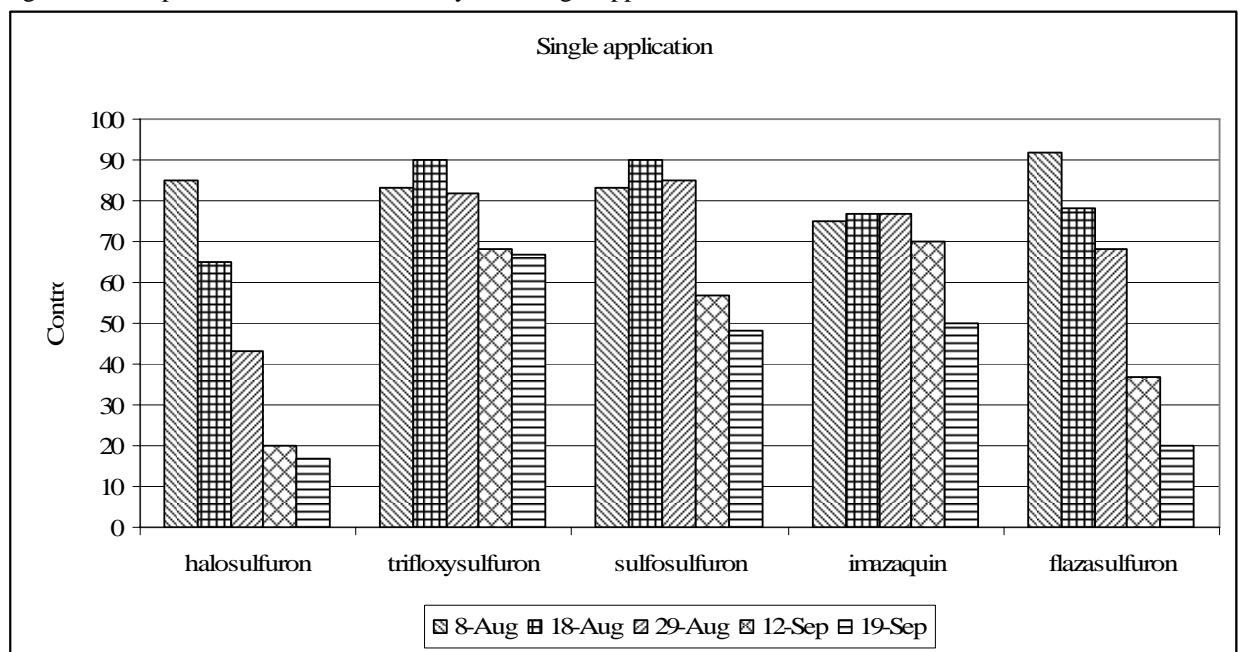


Figure 2. Comparison of herbicide efficacy with sequential applications at 4 weeks.

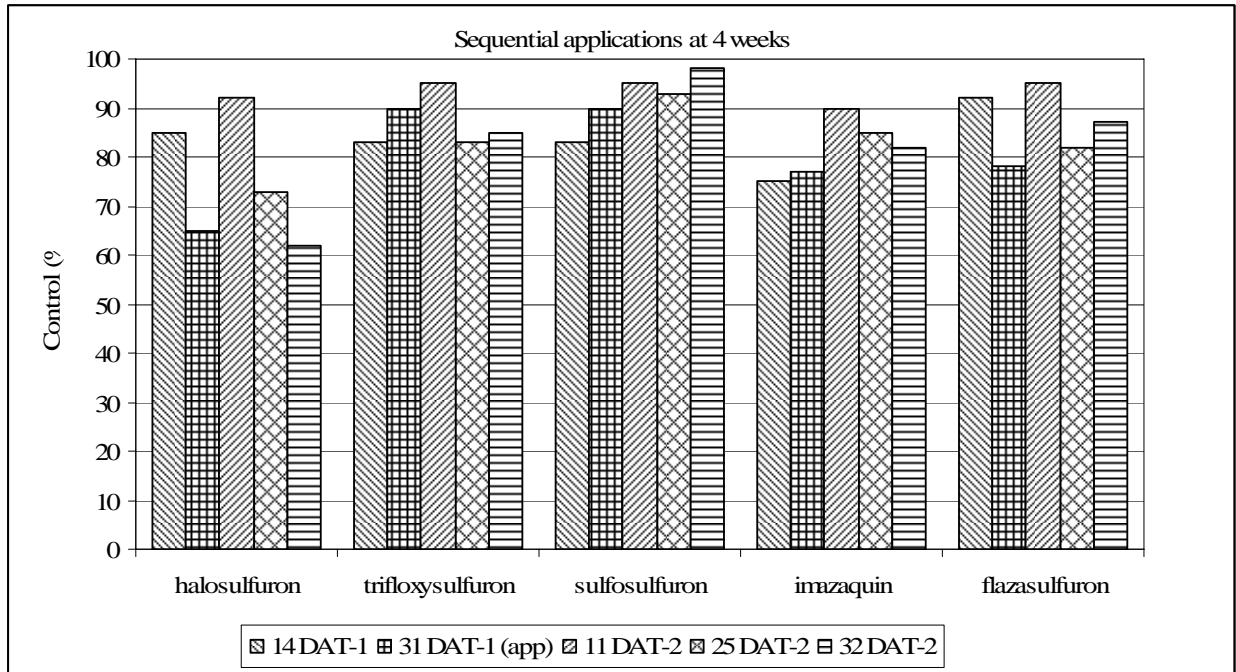


Figure 3. Comparison of herbicide efficacy with sequential applications at 6 weeks.

