

# Sulfentrazone Effects on Purple Nutsedge

*D.M. Kopec and J.J. Gilbert*

## **Abstract**

*Sulfentrazone was applied to a highly infested purple nutsedge groundcover as either single or double combination (split) applications for initial evaluation for weed control during the summer of 1996. One time single applications at 0.125 lb. AI/A resulted in 15% or less control, from 10 to 64 days after treatment (DAT). Nutsedge control from 0.25 lb. and 0.38 lb. AI/A treatments were not significantly different from each other (ranging in 10% difference or less) but was greater than the low rate 0.125 lb. AI/A. Single applications of imazaquin and halsulfuron (at known label rates) had better control than sulfentrazone at the rates tested here when tested as single applications. Single applications at 0.50 lb. AI/A appear warranted for sulfentrazone. Split (multiple) applications greatly enhanced the activity of Sulfentrazone at the two higher split rate treatments, both which resulted in a total application of 0.50 lb. AI/A total. The 0.375/0.125 split application had slightly better control than the 0.250/0.250 split treatments. Split applications of imazaquin or halsulfuron at known label rates resulted in slightly higher control. All plots experienced re-growth. Based on these results, sulfentrazone does have activity against purple nutsedge. Additional treatments in a new and different rate structure appear warranted to increase initial control and longevity of effect.*

## **Introduction**

Purple nutsedge (*Cyperus rotundus*) is a trouble some and problematic perennial weed in turfgrass. Its prolific growth from various vegetative structures and tolerance to mowing pressure greatly contribute to this persistence. Selective chemical control is highly desirable from a cultural management standpoint.

A field trial was established to measure the affects of single and repeat applications of Sulfentrazone to highly infested mowed swards of purple nutsedge.

## **Materials and Methods**

A turfgrass rough on a municipal golf course was selected for a field trial to measure the effectiveness of activity of sulfentrazone on purple nutsedge from post emergence applications. Turf plots were 5x8" and consisted of 45%-95% purple nutsedge. Each plot was split in half to include the herbicide treated turf, while the remaining half remained untreated. This resulted in each plot having its own control check. Treatments included the following application rates in lbs. AI/A of the following materials. Sulfentrazone as a single application at the rates of 0.125 lb., 0.25 lb. and 0.375 lb. As split applications, Sulfentrazone was applied at 0.125/0.125 lb., 0.250/0.250 lb. and 0.375/0.125 lb AI/A combination. rates. Halsulfuron (Manage) was applied as 0.062 lb. AI/A single and 0.062/0.062 lb. AI/A split rate applications. Imazaquin (Image) was applied as a 0.050 lb. AI/A single and a 0.050/0.050 lb. AI/A split application. All treatments were replicated three times. All treatments were applied initially on June 17, 1996, with the second (split) application on July 23, 1996. Treatments were applied using a Co<sub>2</sub> backpack sprayer at 29 psi affixed to a 3 nozzle boom at 20 inch spacing using 8004 nozzles. The final delivery rate was 115 gallons per acre.

On nine occasions both halves of each the of the thirty plots were scored for visual percentage of living purple nutsedge. Percent control for each date was determined by the formula  $1 - (\% \text{ treated}/\% \text{ control}) \times 100$ . Data were subjected to the analysis of variance technique and LSD values were calculated for mean separation only when the P value for treatment effects was 0.05, or less.

## Results and Discussion

**Mean treatment responses for percent control are provided in Table 1.** There were four evaluation after the initial applications [10, 18, 25, 31 days after treatment (DAT/1)], and five evaluations after the respective second (split) applications were made [3, 8, 17, 28, 38 (DAT/2)].

### Single Application Results

There were five treatment regimes to observe after the initial application. Overall, there was slight activity from sulfentrazone at the lowest rate (0.125 lb.), which averaged between 9% to 16% from 10 to 31 DAT/1. At 10 DAT/1 there was no difference for the percent control between the three rates of sulfentrazone, which were slightly less than that of halsulfuron and imazaquin. There was no statistical difference for percent control between the 0.25 lb. and 0.375 lb. rates of sulfentrazone throughout the first month of post application evaluations. Control was about 20% greater for the 0.375 lb. rate at 18 and 25 DAT/1, but not at 31 DAT/1. Maximum control was first achieved at 31 DAT/1 from sulfentrazone from the single applications made on June 17. Both halsulfuron and imazaquin had greater amounts of control at 18, 25 and 31 DAT/1, compared to the sulfentrazone treatments at large. The level of control was 1.5 to 2 times greater for these products, when compared to sulfentrazone, across rates. Still, control was around 60% at maximum (for both halsulfuron and imazaquin) from a single application only. Mean separation values (for treatment mean separation) were quite large for the first four evaluation dates, and the overall of F-ratio statistic for the herbicide treatment effect was not statistically significant. This means that variation within a treatment was essentially equal to the variation between treatments.

### Split-application Results

The overall treatment effect was significant on all four evaluation dates after the second (split) application was made on July 22, 1996. With the application of the split application treatments, there were now ten application treatments in total (5 single and 5 split application treatments). Among the single (one time only) applied sulfentrazone treatments, there was essentially a carry over of effect for up to 53 days after the first application. The 0.125 lb. rate remained low (7-15% control), while the 0.25 lb. and 0.375 lb. rates of sulfentrazone did not exhibit clear cut differences in control between. Control from the single application of halsulfuron decreased with time, ending at 33% control on August 20, 1996. The imazaquin finished with just about the same level of control as halsulfuron from a one time single application at the 0.5 lb. rate.

The repeat applications of sulfentrazone enhanced chemical control. The low rate combination (0.125 lb./0.125 lb.) resulted in a brief control of 84% (31 July) which subsided to 33% for 9 August and 20 August.

The low percentage of control (8%) on 26 July for two of the sulfentrazone treatments can not be explained. Perhaps a lack of foliage (from mowing) before the second application, or minimal regrowth from underground growing points following treatment may have affected the amount of relative plant material for visual ratings.

Since the mode of uptake was/is not known for sulfentrazone, it is not possible to explain the increased activity at 8 days from the split application (8 DAT/2) among Sulfentrazone treated nutsedge. Maximum control was achieved for the sulfentrazone split application treatments on 31 July, which was not the case for halsulfuron or imazaquin which had greater absolute control towards the close of the test (generally).

The sulfentrazone treated turf which received two applications responded in order of the initial (first) application rate. The (0.375 lb./0.125 lb.) treatment had better control (generally) than the (0.250 lb./0.250 lb.) treatment. Both of these treatments resulted in a total of 0.50 lb. applied (from two applications). The highest levels of control were achieved by imazaquin and halsulfuron, which were about 10% higher (though non-significantly different) than the (0.375 lb./0.125 lb.) sulfentrazone treatment.

By the close of the experiment, regrowth was occurring on all plots to some extent. This is typical of purple nutsedge, since it is capable of re-growth from either shallow underground bulbils, or from nutlet meristems.

## Conclusion

1. Sulfentrazone provided low levels of purple nutsedge control from single applications.
2. Compared to the single applications of halsulfuron and imazaquin at previously established label (1x) rates, Sulfentrazone may need to be applied at a rate higher than 0.375 lbs. AI/A (or perhaps higher ?) to achieve an effect similar to the other chemicals.
3. Note, however, that neither of the single applications of halsulfuron or imazaquin never reached 70%. This level of performance would not fully satisfy weed control expectations in a commercial setting for this persistent and troublesome weed.
4. Sulfentrazone provided the highest level of weed control on purple nutsedge as a split (combination rate) treatment at (0.375/0.125 lbs.) AI/A. This particular treatment resulted in 93% control at 8 days after application.
4. From this data, it appears that sulfentrazone should be tested at the split application rates of (0.375/0.125), (0.375/0.250) and (0.375/0.375) lbs. AI/A.
5. In addition, since the “high up front” application rates of sulfentrazone [0.375 lb AI/A] for the split combination treatments provided the greatest amount of weed control, additional treatments of (0.50/0.125), (0.50/0.250), (0.50/0.375) and (0.50/0.50) lbs. AI/A should be tested under desert conditions to assess enhanced weed control with commercially available products which have established and known label rates.

Table1. Response of purple nutsedge to applications<sup>1</sup> of Sulfentrazone, Imazaquin and Halsulfuron made in 1996, University of Arizona.

Treatment <sup>2</sup>	rate ai/A	SINGLE APPLICATION				SINGLE & SPLIT APPLICATION			
		27-Jun 10DAT	5-Jul 18DAT	12-Jul 25DAT	18-Jul 31DAT	26-Jul 3DAT	31-Jul 8DAT	9-Aug 17DAT	20 28DAT
Sulfentrazone	0.125	9.0	13.3	6.9	15.5	7.7	4.2	16.3	11.1
Sulfentrazone	0.25	11.8	19.5	32.9	42.7	40.7	38.9	31.0	27.8
Sulfentrazone	0.375	10.8	26.7	26.7	36.0	8.3	40.0	21.7	13.3
Sulfentrazone	.125/.125	-	-	-	-	8.3	84.0	33.8	33.3
Sulfentrazone	.250/.250	-	-	-	-	70.4	81.6	63.6	58.2
Sulfentrazone	.375/.125	-	-	-	-	82.9	93.9	85.3	76.9
Halsulfuron	0.62	14.6	38.8	67.1	61.5	45.2	53.0	45.2	33.3
Halsulfuron	.62/.62	-	-	-	-	61.9	64.2	96.7	96.1
Imazaquin	0.5	21.4	33.8	49.7	63.8	38.3	32.9	40.0	37.0
Imazaquin	.5/.5	-	-	-	-	75.4	86.8	94.4	89.7
3)TEST MEAN		13.5	26.4	36.7	43.9	43.9	57.9	52.8	47.7
4) LSD VALUE		32.6	47.8	51.9	52.5	53.0	56.3	43.9	44.0
DAT #1 (initial trts appl'd)		10	18	25	31	39	44	53	64
DAT #2 (combination trts appl'd)						3	8	17	28

<sup>1</sup>Initial applications made June 17, 1996. Second (split) applications made July 23, 1996, for combination treatments only.

<sup>2</sup>Initial applications for identical products at the same identical initial rate appear as one value only.

<sup>3</sup> Test Mean = mean of all treatments on each evaluation date.

<sup>4</sup>LSD Value=LSD mean separation statistic. Differences between treatment means must be larger than the LSD value for true treatment differences to occur.