HORTSCIENCE 27(8):898-899. 1992.

Buffalograss Tolerance to Postemergence Herbicides

Lambert B. McCarty and Daniel L. Colvin
Department of Environmental Horticulture, University of Florida, Institute of Food and Agricultural Sciences, Fifield Hall, Box 110670, Gainesville, FL 32611-0670

Additional index words. *Buchloe dactyloides,* turf, weed control

Abstract. **Buffalograss [*Buchloe dactyloides* (Nutt.) Engelm.] is a turfgrass species traditionally adapted to low-rainfall areas that may incur unacceptable weed encroachment when grown in higher rainfall areas such as Florida. An experiment was performed to evaluate the tolerance of two new buffalograss cultivars, 'Oasis' and 'Prairie', to postemergence herbicides commonly used for grass, broadleaf, and sedge weed control. Twenty to 40 days were required for each cultivar to recover from treatment with asulam, MSMA, and sethoxydim (2.24, 2.24, and 0.56 kg-ha-l, respectively). Other herbicides used for postemergence grass weed control (metsulfuron, quinclorac, and diclofop at 0.017, 0.56, and 1.12 kg·ha^{-1}, respectively) did not cause unacceptable buffalograss injury. Herbicides used for postemergence broadleaf weed control, triclopyr, 2,4-D, sulfometuron, dicamba (0.56, 1.12, 0.017, and 0.56 kg·ha^{-1}, respectively), and a three-way combination of 2,4-D + dicamba + mecoprop (1.2 + 0.54 + 0.13 kg·ha^{-1}), caused 20 to 30 days of unacceptable or marginally acceptable turfgrass quality, while 20 days were required for 'Prairie' buffalograss to recover from atrazine treatments. 'Oasis' buffalograss did not fully recover from 2,4-D or 2,4-D + dicamba + mecoprop through 40 days after treatment. Herbicides used for postemergence sedge control, bentazon and imazaquin, caused slightly reduced, but acceptable, levels of turf quality in both cultivars throughout the experiment. Chemical names used: 6-chloro-N-ethyl-N'-(1-methylethyl)-1,3,5-triazine-2,4-diamine (atrazine); methyl[(4-aminophenyl)sulfonyl]carhamate (asulam); 3-(1-methylethyl)-(1H)-2,1,3-benzothiadiazin-4(3H)-one 2,2-dioxide (bentazon); 3,6-dichloro-2-methoxybenzoic acid (dicamba); (±)-2-[4-(2,4-dichlorophenoxy)phenoxy]propanoic acid (diclofop); 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-quinolinecarboxylic acid (imazaquin); (±)-2-(4-chloro-2-methylphenoxy)propanoic acid (mecoprop); 2-[[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino]sulfonyl]benzoic acid (metsulfuron); monosodium salt of methylarsonic acid (MSMA); 2-[1-(ethoxyimino)butyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one(sethoxydim); 2-[[[[(4,6-dimethylethyl-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]benzoic acid (sulfometuron); [(3,5,6-trichloro-2-pyridinyl)oxy]acetic acid (triclopyr); (2,4-dichlorophenoxyl)acetic acid (2,4-D); 3,7-dichloro-8-quinolinecarboxylic acid (quinclorac).**

Buffalograss is a warm-season, stoloniferous turfgrass native to the Great Plains of North America from Montana to Mexico (Duble, 1989). Desirable buffalograss characteristics include excellent drought resistance and the ability to produce acceptable turf in subhumid and semiarid regions that received an average annual rainfall of 300 to 560 mm. These characteristics have created interest in the possibility of growing buffalograss outside its native habitat, in areas that are facing increasing water shortages. A low water-requiring and aesthetically acceptable turfgrass would be ideal for low-maintenance areas such as roadsides, golf course roughs, utility rights-of-way, and playgrounds.

Researchers, however, have noted that when buffalograss is maintained under management regimes that are more intense than the natural adaptation of the grass, problems may occur (Duble, 1989; Riordan, 1991). If buffalograss is overwatered, overfertilized, or exposed to excessive traffic, stand density and vigor are often reduced, leading to open niches where weeds can easily become established. Currently, extensive breeding efforts are concentrated on producing improved varieties that tolerate intensive maintenance practices and much traffic. 'Prairie' and 'Oasis' are two recently released buffalograss cultivars that exhibit improved turf quality, recuperative potential, and extended fall greenness (Riordan, 1991). These cultivars likely will be used successfully outside the Great Plains in states east of the Mississippi River. To our knowledge, no research has been conducted on buffalograss concerning its tolerance to postemergence herbicides. Given the possibility of buffalograss having greater weed invasion problems when grown outside the Great Plains, research was conducted at the Univ. of Florida to determine the tolerance of 'Prairie' and 'Oasis' buffalograss to currently used postemergence herbicides for grass, broadleaf, and sedge weed control.

Experiments were conducted near Bradenton, Fla., at a commercial sod production farm on a Myakka fine sand (sandy, siliceous, hyperthermic Typic Psammaquets). Buffalograss was maintained at a moderate to high maintenance level with a mowing height of 3.8 cm, N (sources varied) applications of 49 kg·ha^{-1} every 6 to 8 weeks, and irrigation to prevent drought stress. Mature 'Prairie' and 'Oasis' buffalograss were subjected to the herbicide treatments listed in Table 1. Experiments involving the two cultivars were initiated in June 1991, and the test was repeated in Aug. 1991 on an adjacent site. Herbicides were applied with a CO_2-powered backpack sprayer calibrated to deliver 187 liters·ha^{-1}. Crop-oil concentrate was added at 1.25% (v/v) to all treatments, except for those commercial formulations with premixed oil. Plots measuring 3 x 3 m were arranged in a randomized complete-block design with four replicates.

Buffalograss quality following application of herbicides was assessed visually using a 1 to 9 scale, where best turf was rated 9 and 6.5 was considered the minimum acceptable turf quality level in terms of turf color, shoot density, and uniformity. Data were subjected to analysis of variance to test for interactions within and between experiments, cultivars, and herbicide treatments. Treatment means were separated by Waller-Duncan's k = 100 t test at P = 0.05.

Cultivar interactions were significant; however, experiment interactions were not. Therefore, data were separated by cultivar and combined over experiments.

'Oasis'. Unacceptable turf quality 10 days after treatment (DAT) followed application of asulam, dicamba, sethoxydim, sulfometuron, triclopyr, 2,4-D, and the three-way combination of 2,4-D + dicamba + mecoprop (Table 1). Turf was unaffected at this time by bentazon, diclofop, and metsulfuron treatments. Turf quality at 20 DAT was acceptable for all treatments, except sethoxydim, sulfometuron, triclopyr, and 2,4-D + dicamba + mecoprop. Asulam- and 2,4-D-treated turf was marginally (6.5-6.9) acceptable at 20 DAT. Turfgrass quality at 30 DAT was acceptable for all treatments, except for 2,4-D and 2,4-D + dicamba + mecoprop. Although acceptable, triclopyr-treated turf exhibited marginal phytotoxicity at 30 DAT. At 40 DAT, buffalograss had recovered to acceptable levels, except for those plots treated with 2,4-D and 2,4-D + dicamba + mecoprop.

'Prairie'. Buffalograss quality 10 DAT was reduced, relative to the control, by all treatments except the bentazon, imazaquin, metsulfuron, and quinclorac treatments (Table 1). At 10 DAT, turf quality was unacceptable for plots treated with 2,4-D, asulam, atrazine, dicamba, MSMA, sethoxydim, sulfometuron, and 2,4-D + dicamba + mecoprop. At 20 DAT, unacceptable turf quality was present on plots treated with asulam, sethoxydim, and sulfometuron, with only marginal quality exhibited by turf treated with

Received for publication 13 Dec. 1991. Accepted for publication 27 Mar. 1992. Florida Agr. Expt. Sta. J. series no. R-02045. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.

Table 1. Quality rating of 'Oasis' and 'Prairie' buffalograss at given day after treatment (DAT) with selected herbicides.

		Quality rating[z]							
		Oasis				Prairie			
	Application rate	DAT							
Herbicide	(kg·ha⁻¹)	10	20	30	40	10	20	30	40
Bentazon	2.24	8.1	8.4	7.8	7.8	8.1	8.3	7.8	7.7
Metsulfuron	0.017	7.9	8.2	7.6	7.6	7.8	8.0	7.4	7.9
Quinclorac	0.56	7.5	7.6	7.6	7.8	7.6	7.9	7.9	8.1
Imazaquin	0.42	7.3	7.8	7.9	7.9	7.6	7.9	7.9	7.9
Mecoprop	1.12	6.9	7.6	7.8	7.6	7.1	7.9	7.6	7.8
Diclofop	1.12	7.7	7.9	7.7	7.8	7.1	7.9	7.8	7.9
Triclopyr	0.56	5.8	6.4	6.9	7.3	6.8	6.9	7.4	7.7
2,4-D	1.12	6.2	6.9	5.9	6.4	6.4	6.9	7.3	7.4
Asulam	2.24	6.3	6.8	7.4	7.9	6.4	5.6	7.5	7.9
MSMA	2.24	6.9	7.7	8.0	8.0	6.2	7.6	7.6	8.2
2,4-D +	1.12								
dicamba +	0.54								
mecoprop	0.13	4.1	4.8	4.8	4.5	6.0	6.5	7.0	7.4
Atrazine	2.24	7.5	7.8	8.1	7.9	5.8	7.1	7.3	7.6
Sulfometuron	0.017	6.3	5.6	7.6	7.8	5.8	5.8	7.4	8.1
Dicamba	0.56	5.7	7.2	7.9	7.8	5.5	6.9	7.4	7.6
Sethoxydim	0.56	6.3	5.8	7.2	7.4	4.6	3.8	6.4	6.8
Untreated	---	8.3	8.3	8.1	8.0	8.0	8.1	8.0	8.0
MSD (0.05)[y]		0.6	0.7	0.5	0.6	0.6	0.6	0.4	0.4

[z]Rated visually on a scale of 1 to 9, where 9 = best turf and 6.5 = minimum acceptability.
[y]MSD = minimum significant difference according to the Waller-Duncan k ratio *t* test; data are the means of two separate experiments with four observations per experiment.

triclopyr, 2,4-D, dicamba, and 2,4-D + dicamba + mecoprop. None of the other treatments had reduced turf quality at an unacceptable level 20 DAT. Turf quality 30 DAT was acceptable for all treatments except sethoxydim. By 40 DAT, buffalograss quality was acceptable for all treatments. Herbicide treatments providing ratings similar to the untreated turf at this time included asulam, atrazine, bentazon, dicamba, diclofop, imazaquin, MSMA, mecoprop, metsulfuron, quinclorac, and sulfometuron. The lowest quality ratings were observed where sethoxydim had been applied.

Little previous research dealing with buffalograss tolerance to herbicides has been conducted. Studies investigating the effects of selective herbicides used for broadleaf weed control on buffalograss seed germination showed suppression by 4-amino-3,5,6-trichlore-2-pyridinecarboxylic acid (picloram) and triclopyr at rates higher than 1.1 kg·ha⁻¹ and by 2,4,5-T at 9.0 kg·ha⁻¹ (Huffman and Jacoby, 1984). In the same study, clopyralid at rates up to 9.0 kg·ha⁻¹ had no influence on buffalograss germination. Butler et al. (1985) noted that application of 2,4-D (1.1, 2.2, and 4.5 kg·ha⁻¹) and dicamba (0.6,1.1, 2.2, and 4.5 kg·ha⁻¹) to mature buffalograss reduced turf quality through 40 DAT. Buffalograss treated with high rates of these herbicides did not recover through 70 days.

In this study, herbicides used for postemergence grass weed control (MSMA, asulam, and sethoxydim) induced initial moderate to severe damage on 'Prairie' and 'Oasis' buffalograss. MSMA was less injurious than asulam and sethoxydim. 'Oasis' recovered from MSMA treatment quicker than 'Prairie'. However, by 40 DAT, both cultivars had recovered from these herbicides to acceptable levels, although only marginally acceptable for 'Prairie'. Diclofop, also used for selective annual grass control, caused little phytotoxicity on either variety throughout the experiment. Herbicides used for broadleaf weed control (McCarty, 1992) exhibited varying levels and duration of turf damage. Initial unacceptable damage to both buffalograss varieties followed applications of triclopyr, 2,4-D, sulfometuron, dicamba, and the three-way combination of 2,4-D + dicamba + mecoprop. By 30 DAT, both cultivars recovered from these herbicides to acceptable levels, except for 2,4-D and 2,4-D + dicamba + mecoprop in 'Oasis'. Treatment with other herbicides used for postemergence broadleaf and sedge weed control (atrazine, imazaquin, and bentazon) did not reduce turf quality to an unacceptable level throughout the experiments with either cultivar. Both of them exhibited acceptable tolerance to metsulfuron and quinclorac, two relatively new herbicides with postemergence grass and broadleaf weed control activity. However, turf treated with sulfometuron, which is in the same herbicide family as metsulfuron, did not recover to an acceptable level until 30 DAT.

Literature Cited

Butler, J.D., D.D. Minner, and J.D. Fry. 1985. Weed control in buffalograss *(Buchloe dactyloides* (Nutt.) Engehm.). Agron. Abstr. p. 114.

Duble, R.L. 1989. Southern turfgrasses: Their management and use. TexScape, College Station, Texas. p. 75-79.

Huffman, A.J. and P.W. Jacoby, Jr. 1984. Effects of herbicides on germination and seedling development of three native grasses. J. Range Mgt. 37:40-43.

McCarty, L.B. 1992. Weed identification and control for turfgrass managers. Univ. of Florida Extension Circ. OH-86.

Riordan, T. 1991. Buffalograss. Grounds Maintenance 26(2):12-14.