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Carpetgrass Seedhead Suppression with Plant Growth Regulators

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Abstract. Field studies were conducted in south Louisiana to identify plant growth regulators that suppress carpetgrass (*Axonopus affinis* Chase.) seedhead development. In an initial study, best results were obtained with sethoxydim (0.11 kg·ha⁻¹) and sulfometuron methyl (0.6 kg·ha⁻¹), which reduced seedhead development by 88% and 86%, respectively, compared to untreated plots 21 days after treatment. Sulfometuron methyl caused unacceptable carpetgrass injury, however. Evaluation of seven sethoxydim application levels between 0 and 0.34 kg a.i./ha showed that carpetgrass seedhead number and elongation rate declined with increasing sethoxydim amount [SEEDHEAD NUMBER (m⁻²) = 515 - 1340 (kg), R² = 0.82; ELONGATION (cm) = 25.3 - 151 (kg) + 276 (kg²), R² = 0.77]. Carpetgrass seedhead production was restricted up to 6 weeks after sethoxydim (0.17 and 0.22 kg·ha⁻¹) application. Chemical names used: (2-[1-(ethoxymino)butyl]-5-[2-ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one) (sethoxydim); (2-[[[4,6-dimethyl-2-pyrimidinyl]amino]carbonyl]amino]sulfonyl]benzoic acid) (sulfometuron methyl).

Carpetgrass is used as a low-maintenance turfgrass along the gulf coast of the United States and is prolific in low, wet areas with heavy soils (Hitchcock, 1950). One factor limiting more extensive carpetgrass use is its tendency to form unsightly seedheads that can measure up to 70 cm long. Carpetgrass has a relatively slow vegetative growth rate, but frequent mowing is required to remove seedheads that quickly elongate above the foliar canopy.

Eight to 9 months of warm weather in southern Louisiana allow for prolific growth of warm-season turfgrasses. Since mowing costs can amount to 80% of the carpetgrass maintenance budget, the possibility of reducing expenses with plant growth regulators (PGRs) is attractive. PGRs have been evaluated extensively on cool-season turfgrasses and, to a limited extent, on warm-season species. Several PGRs reduced bahiagrass (*Paspalum notatum* Flugge) seedhead production, including glyphosate (Lewis et al., 1985; Wells and Constantin, 1986)

and sulfometuron methyl (Lewis et al., 1985; Link and Atkins, 1983; Willard and Currey, 1986). In Georgia (Johnson, 1989), centipedegrass [*Eremochloa ophiuroides* (Munro) Hack.] seedheads were suppressed >75% for 6 weeks by mefluidide at 0.6 kg·ha⁻¹. Mefluidide at 0.6 kg·ha⁻¹ also inhibited growth of common bermudagrass [*Cynodon dactylon* (L.) Pers.] seedheads by >70% in Oklahoma (Wu et al., 1976). Our study was conducted to determine the effects of PGRs on seedhead suppression of carpetgrass.

An initial investigation was conducted at Hammond, La., in 1985 to evaluate several PGRs for efficacy in carpetgrass seedhead inhibition. Before treatment, carpetgrass was maintained at a 6-cm height. Turf was growing on a Cahaba fine sandy loam soil. On 15 Apr., 49 kg N/ha was applied to the study area. Irrigation was applied to prevent drought stress.

PGRs evaluated at Hammond in 1985 were flurprimidol, mefluidide, glyphosate, sulfometuron methyl, and sethoxydim. Levels and formulations of PGRs are presented in Table 1. Treatments were applied 6 Aug. in 330 liter of water/ha at 240 kPa from a single-boom, CO₂-powered backpack sprayer. Plots measured 1.5 × 3 m and were arranged in a randomized complete-block design with four replications.

Data collected at Hammond included phy-

totoxicity and seedhead suppression. Phytotoxicity, defined as plant chlorosis, was determined visually on a 0 to 9 scale, where 0 = no turf yellowing, 3 = unacceptable chlorosis for a home lawn, and 9 = complete browning. Seedhead suppression was rated visually using a 0% to 100% scale where 0% = no seedhead suppression; 70% = acceptable seedhead suppression; and 100% = complete seedhead inhibition. Data were subjected to analysis of variance, and means were separated using Duncan's multiple range test.

Because sethoxydim provided >70% carpetgrass seedhead inhibition with minimal phytotoxicity at Hammond in 1985, an additional study was conducted at the Burden Research Plantation in Baton Rouge, La., in 1988 to evaluate multiple sethoxydim levels on seedhead development. Soil at Baton Rouge was an Olivier silt loam. Turf received 49 kg N/ha from a 25N-0P-15K fertilizer on 29 Apr. Irrigation was used only to prevent drought stress. Sethoxydim application amounts were 0, 0.03, 0.06, 0.11, 0.17, 0.22, and 0.34 kg·ha⁻¹. Treatments initially were applied 3 June, and sequential applications were made to the same plots on 19 July and 22 Aug. Turf was mowed to a 6-cm height before each application. Sethoxydim was diluted in 470 liter of water/ha and applied at 210 kPa using a CO₂-powered backpack sprayer. A non-ionic surfactant (Ortho X-77, Chevron Chemical Co., San Francisco, Calif.) was added to each treatment at 0.4% (v/v).

Data collected at Baton Rouge included turf quality, seedhead number/m², and seedhead elongation. Turf quality was rated visually on a 0 to 9 scale, where 0 = brown, open turf; 6 = acceptable turf quality for a home lawn; and 9 = exceptionally green, uniform turf. Seedhead numbers were obtained by randomly tossing a 20 × 20 cm template three times per plot and counting seedheads. Seedhead elongation was determined by tying string around two randomly selected seedheads per plot and measuring elongation over time.

Plots at Baton Rouge measured 1.5 × 1.5 m and were arranged in a randomized complete-block design with four replications. A general linear models procedure (SAS Institute, Cary, N.C.) was used to obtain regression functions defining effects of sethoxydim application level on carpetgrass quality and seedhead development.

Sethoxydim at 0.11 kg·ha⁻¹ and sulfometuron methyl at 0.6 kg·ha⁻¹ were the only PGRs that effectively suppressed carpetgrass seedheads at 21 days after treatment (DAT) at Hammond in 1985 (Table 1). By 49 DAT, seedhead control with sethoxydim was reduced to an unacceptable level, while sul-

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Fig. 1. Influence of sethoxydim application level on (top) carpetgrass turf quality 7 and 42 days after treatment (DAT); points represent the means of four replications. ($\circ$) = 7 DAT Quality = $4.8 + 15.8$ (kg sethoxydim) - 40.7 (kg sethoxydim) 2 , $R^2 = 0.42$; ($\square$) = 42 DAT Quality = $3.7 + 12.3$ (kg sethoxydim) - 20.4 (kg sethoxydim) 2 , $R^2 = 0.71$. (middle) Carpetgrass seedhead number; points represent the means of four observations collected on 14 July and 8 Aug. 1988 at Baton Rouge, La. Seedhead number (m^2) = $515 - 1340$ (kg sethoxydim), $R^2 = 0.82$. (bottom) Elongation of carpetgrass seedheads; numbers represent the means of four observations collected on 16 and 28 June, 3 and 11 Aug., and 9 Sept. 1988 at Baton Rouge, La. Elongation (cm) = $25.3 - 151$ (kg sethoxydim) + 276 (kg sethoxydim) 2 , $R^2 = 0.77$.

fometuron methyl continued to suppress seedheads.

Other researchers reported that mefluidide restricted seedhead production of bermudagrass (Wu et al., 1976). In our study, mefluidide suppressed carpetgrass seedheads between 50% and 60% when applied at 0.6 or 1.1 kg·ha $^{-1}$ and caused slight phytotoxicity at each level 21 DAT (Table 1).

Flurprimidol application resulted in significant but poor (<25%) seedhead inhibition (Table 1). Flurprimidol is generally ineffective as a seedhead suppressant. Slight, unacceptable seedhead inhibition by flurprimidol in our study may have been a secondary effect resulting from reduced plant growth and vigor.

Sulfometuron methyl caused an unacceptable level of carpetgrass phytotoxicity 21 DAT (Table 1). Glyphosate-treated turf also had high phytotoxicity ratings at 21 DAT, which was not unexpected since glyphosate is commonly used as a nonselective herbicide. Significant turf injury could result if sprayer patterns overlapped slightly. Although sulfometuron methyl and glyphosate suppress carpetgrass seedheads, potential for phytotoxicity may reduce their feasibility for turf use.

In Florida, sethoxydim at 0.11 kg·ha $^{-1}$, the same rate we used, suppressed bahiagrass seedheads for 52 days without reducing turf quality (Willard and Currey, 1986). Their results and ours warranted that sethoxydim be evaluated further to better define optimum application levels for carpetgrass seedhead suppression.

Carpetgrass was of relatively poor aesthetic quality throughout the study period at Baton Rouge in 1988. Quadratic functions best described carpetgrass quality response to increasing sethoxydim application level following the third application on 22 Aug. (Fig. 1, top). Turf response following the initial two applications was similar to that after the third. Seven DAT, best turf quality was observed in plots treated with 0.17 or 0.22 kg sethoxydim/ha. In plots where lower sethoxydim amounts were applied, seedheads had developed such that turf quality was reduced. Turf treated with 0.34 kg/ha had yellowed by 7 DAT and, therefore, received lower quality scores. At 42 DAT, best carpetgrass quality was observed in plots treated with 0.22 or 0.34 kg·ha $^{-1}$. Phytotoxicity had dissipated, turf had recovered, but seedhead development had resumed. Hence, the relatively low turf quality ratings at 42 DAT in plots treated with 0.22 or 0.34 kg·ha $^{-1}$ were due to the presence of numerous, tall seedheads.

Analysis of seedhead number and seedhead elongation data averaged over several dates through the summer indicated that both quantities declined with increasing sethoxydim level (Fig. 1, middle and bottom). Hence, sethoxydim inhibited development of new seedheads as well as growth of those present at the time of application.

These studies demonstrated that sethoxydim and sulfometuron methyl effectively inhibit carpetgrass seedhead development.

Table 1. Carpetgrass phytotoxicity and seedhead suppression 21 and 49 days after treatment (DAT) with plant growth regulators (PGR) indicated at Hammond, La. (PGRs applied 6 Aug. 1985).^z

PGR	Formulation ^y	Level (kg a.i./ha)	Phytotoxicity ^x		Seedheads ^w (% control)	
			21 DAT	49 DAT	21 DAT	49 DAT
Flurprimidol	50W	0.4	0.5 ef	0.0 b	6 f	10 g
		0.7	0.5 ef	0.0 b	16 e	25 f
		1.1	0.5 ef	0.0 b	16 e	10 g
		2.2	1.5 b-d	0.5 b	43 d	36 de
Mefluidide	2S	0.3	0.8 d-f	0.3 b	9 ef	35 e
		0.6	1.0 c-e	0.3 b	50 cd	50 c
		1.1	1.5 b-d	0.5 b	55 c	50 c
Sethoxydim	1.5E	0.06	0.8 d-f	0.0 b	66 b	50 c
		0.11	2.0 b	0.3 b	88 a	69 b
Sulfometuron methyl	75DF	0.6	3.3 a	1.3 a	86 a	85 a
Glyphosate	4E	0.1	1.8 bc	0.0 b	55 c	45 cd
Untreated control	---	---	0.0 f	0.0 b	0 f	0 g

^xMeans followed by the same letter in a column do not differ significantly according to Duncan's multiple range test ($P = 0.05$). Data are means of four observations.

^yW = wettable powder; S = solution; E = emulsion; DF = dry flowable.

^zPhytotoxicity was determined visually on a 0 to 9 scale, where 0 = no injury, 3 = unacceptable chlorosis for a home lawn, and 9 = complete browning.

^wSeedheads were rated visually on a 0% to 100% scale, where 0% = no seedhead suppression; 70% = acceptable seedhead suppression; and 100% = complete seedhead inhibition.

Sethoxydim applied at 0.11 to 0.22 kg·ha⁻¹ suppressed seedhead growth and development for up to 6 weeks following application. Sethoxydim use on carpetgrass should effectively lengthen time required between mowings.

Literature Cited

- Hitchcock, A.S. 1950. Manual of the grasses of the United States. Publ. 200, U.S. Dept. of Agr., Washington, D.C.
- Johnson, B.J. 1989. Response of centipedegrass (*Eremochloa ophiuroides*) to plant growth regulators and frequency of mowing. Weed Technol. 3:48-53.
- Lewis, W.M., J.M. DiPaola, W.B. Gilbert, and A.H. Bruneau. 1985. Growth retardant evaluations on tall fescue and bahiagrass roadsides. Agron. Abstr. p. 118.
- Link, M.L. and R.L. Atkins. 1983. Control and suppression of warm-season grasses to reduce mowing on highway rights-of-way. Proc. Southern Weed Sci. Soc. 36:310-312.
- Wells, D.W. and R.J. Constantin. 1986. Sequential applications of glyphosate for seedhead suppression of bahiagrass along highway rights-of-way. Proc. Southern Weed Sci. Soc. 39:367.
- Willard, T.R. and W.L. Currey. 1986. Herbicide programs for bahiagrass management on Florida highway rights-of-way. Proc. Southern Weed Sci. Soc. 39:149.
- Wu, Chu-huang, H.R. Meyers, and P.W. Santelman. 1976. Chemical retardation of bermudagrass turf. Agron. J. 68:949-952.