Control of Bermudagrass with Graminicides in Libya

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ABSTRACT

This study was carried out to evaluate the efficacy of the graminicides cycloxydim, fenoxaprop-ethyl, fluazifop-butyl, haloxyfop ethoxyethyl, and sethoxydim in controlling bermudagrass *(Cynodon dactylon)* in a citrus field. The experiment was conducted in the year 1990 and 1991 in Ibn-Zaidoun Station of The Agricultural Research Centre, Tripoli, Libya.

Emphasis was on the effect of these herbicides on the viability of the weed rhizomes, and the determination of shoot regrowth.

The foliage of bermudagrass plants treated with the graminicides exhibited yellowing and dryness. These phytotoxic symptoms appeared 10 days after herbicides applications and progressively increased.

Significant weed control was observed in the two years from all of the graminicides. In 1990, however, cycloxydim (0.25kg ai/ha) fluazifop-butyl (0.50kg ai/ha and haloxyfop-ethoxyethyl (0.25kg ai/ha) controlled bermudagrass better than fenoxapropethyl (0.25kg ai/ha) or sethoxydim (2.00kg ai/ha).

Rhizome viability was significantly reduced in 1990. This reduction occurred in all plots treated with graminicides except the sethoxydim treatment. In the second year, this effect was observed in the plots treated with cycloxydim, fluazifop-butyl, haloxyfop, and sethoxydim.

INTRODUCTION

Bermudagrass is one of the most serious weeds of the grass family. It represents a problem for 40 crops in over 80 countries (11). The weed is a creeping perennial grass which reproduces primarily by vegetative rhizomes and stolons, and due to its highly competitive nature, it reduces crop yields and harvest efficiency (8). In addition, decayed rhizomes of bermudagrass are phytotoxic to other plants (4).

Chemical control of bermudagrass using graminicides has been studied (3, 5, 7, 9, 12). The control of bermudagrass was more than 90% when sethoxydim or fluazifop-butyl were applied at 0.84kg ai/ha (8). The same control was achieved when sethoxydim was applied twice at a rate of 0.45kg ai/ha (10). Haloxyfop-methyl provided 95 to 100% control of bermudagrass at 0.56kg ai/ha (8).

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In Libya, bermudagrass is usually controlled manually or mechanically. Sometimes, glyophosate is used in non-crop land or orchard fields (1).

The graminicides cycloxydim and haloxyfop-ethoxyethyl were recently registered for control of grass weeds in broadleaf crops (2). However, these herbicides and others have not been locally evaluated for the control of bermudagrass.

The objective of this study was to investigate the effect of cycloxydim, haloxyfop-ethoxyethyl, fluazifop-butyl, sethoxydim, and fenoxaprop-ethyl on bermudagrass, especially, their effects on the viability of the rhizomes.

Table 1 – Effect of different graminicides on control of bermudagrass in 1990 and 1991

Treatment	Rate kg ai/ha	% Control*	
		1990	1991
Untreated	-	0	0
Cycloxydim	0.25	85	82.5
Fenoxaprop-ethyl	0.25	57.5	24.4
Fluazifop-butyl	0.50	71	76.9
Haloxyfop-ethoxyethyl	0.25	77.5	78.9
Sethoxydim	2.00	58.8	76.3
LSD (0.05)		16.8	7.7
CV		19.1%	9.0%

* Control rating in both years was performed 16 days after treatment application.

MATERIALS AND METHODS

The experiment was conducted at Ibn-Zaidoun Station of Agricultural Research Center, Tripoli, Libya in the year 1990 and 1991.

A field of citrus trees infested heavily with bermudagrass at the flowering stage was used for the two experiments. The field was plowed and irrigated before regrowth of the shoots of bermudagrass and throughout the course of the experiments. Uniforme regrowth of bermudagrass plants was established from the rhizomes. A randomized complete block design was used in each year with four replicates and six treatments. The plot size was 2 by 3 meters. Both experiments were performed in the same field but in two different locations.

Commercially formulated emulsifiable concentrates of cycloxydim (100g/l) haloxyfop-ethoxyethyl ester (125g/l), and fenoxaprop-ethyl (120g/l), each at 0.25kg ai/ha; fluazifop-butyl (125g/l) at 0.50kg ai/ha. and 2.0kg ai/ha sethoxydim (200g/l) were applied with a knapsac hand-compression sprayer which delivers 400 l/ha. An untreated plot was also included in each replicate. When the herbicides were applied, most of the plants were at 2 to 6 leaf stage with some growth variations, i.e, some

plants within each plot were at flowering stages. In 1990, the herbicides were applied on Sept. 10, and on Sept, 24, in 1991.

Visual ratings of percent control in both years were made 16 days after herbicides applications using a scale of 0 to 100, with 0 = no control and 100 = total control or no growth.

In order to evaluate the effect of the graminicide treatments on the viability of the rhizomes, the plants in each plot were tilled after 23 days in 1990 and after 26 days in 1991 from herbicide applications. The plots were then watered as necessary to enhance regrowth from viable rhizomes. In both years regrowth in some plots took place after one month.

The regrown shoots were dried in the oven for 24hr, and dry weight was determined and expressed as kg/m^2. The viability of bermudagrass rhizomes was expressed in terms of dry weight of the shoots.

Data obtained from visual ratings of the treated plots and dry weight of the shoots were subjected to analysis of variance and the least significant difference test at 0.05 level of probability.

RESULTS AND DISCUSSION

In both years, 10 days after applications of treatments; all treated plots exhibited phytotoxicity on the foliage of bermudagrass plants. Yellowing and dryness of the leaves were the major symptoms. These symptoms progressively increased, and were more pronounced in the plots treated with cycloxydim, fluazifop-butyl and haloxyfop-ethoxyethyl than fenoxaprop-ethyl of sethoxydim.

In both years, all herbicidal treatments significantly controlled bermudagrass (Table 1). However, the treatments 0.05kg ai/ha cycloxydim or haloxyfop-ethoxyethyl and 0.50kg ai/ha fluazifop-butyl were more effective than 0.25kg ai/ha fenoxaprop-ethyl. The control with cycloxydim, haloxyfop-ethoxyethyl, and fluazifop-butyl was 85, 77.5 and 71% in 1990, and 82.5, 78.9 and 76.9% in 1991, respectively. The study of Grosjean and Strathmann (6) using higher rates of cycloxydim (0.50kg ai/ha) and fluazifop-P-butyl (0.75kg ai/ha) gave 91 and 92% control of bermudagrass, respectively.

Application of 2.0kg ai/ha sethoxydim in 1990 controlled 58.8% of bermudagrass. This effect of sethoxydim was not different from that obtained with 0.25kg ai/ha fenoxaprop-ethyl (57.7%). On the other hand, the same treatment of sethoxydim in 1991 controlled 76.3% of bermudagrass. This percent of weed control was higher than that obtained from fenoxapropethyl (24.4%), and essentially equals that observed from the other herbicides.

The discrepancy in percent control of bermudagrass from sethoxydim in the two years of the study was mainly due to the differences in the plant stage during herbicide spraying. Flowering stage of bermudagrass was predominant in the plots of 1990 experiment, and is expected to tolerate wethoxydim treatments.

The experiment conducted in 1990 showed significant reduction in the rhizome viability in all herbicide treatments except in the plots treated with 2.0kg ai/ha

sethoxydim (Table 2). This reduction, however, was more pronounced in the plots treated with 0.25kg ai/ha cycloxydim or haloxyfop-ethyl. The dry weight of the shoots harvested from the plots treated with these herbicides was 0.016, 0.026 and 0.046kg/m^2, respectively.

The viability of bermudagrass rhizomes in the experiment of 1991 was generally decreased significantly due to the application of the graminicides (Table 2). The dry weight of the weed shoots was 0.005, 0.006, and 0.006kg/m^2 in the plots treated with cycloxydim, fluazifop-butyl, haloxyfop-ethoxyethyl and sethoxydim, respectively. No effect on the viability was observed in the plots treated with fenoxaprop-ethyl. The study of Hicks and Jordan (8), showed that regrowth of the shoots of bermudagrass from rhizomes was significantly reduced when fluazifop-butyl, sethoxydim and haloxyfop methyl were allowed to remain on the plant foliage for a period exceeding 6hrs. Their study also showed variations in season-long control of bermudagrass with graminicides.

Table 2 – Effect of different graminicides on the viability of bermudagrass rhizomes

Treatment	Rate kg ai/ha	Regrowth* dry weight of shoots/m^2	
Year		**1990**	**1991**
Untreated	-	0.124	0.089
Cycloxydim	0.25	0.016	0.005
Fenoxaprop-ethyl	0.25	0.078	0.088
Fluazifop-butyl	0.50	0.046	0.006
Haloxyfop-ethoxyethyl	0.25	0.026	0.006
Sethoxydim	2.00	0.098	0.026
LSD (0.05)		0.032	0.037
CV		33.19%	34.45%

* Regrowth of bermudagrass shoots was used as a function of rhizome viability.

This study implied that wheither we use the graminicides cycloxydim, haloxyfop-ethoxyethyl or fluazifop-butyl to control bermudagrass in orchard fields in the coastal area of Tripoli, the effect will be the same. Moreover, application of these herbicides will control the weed for one season. Subsequent tillage following herbicide spraying is also recommended to suppress short growth of bermudagrass.

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