Bermudagrass Control With Sequential Applications of Metamifop

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Introduction

Bentgrass (*Agrostis spp.)* is the most widely used turfgrass species for golf course putting greens in the United States. A dense growth habit and high heat tolerance make creeping bentgrass the most popular choice for turfgrass managers from northern climates to portions south of the transition zone. Bermudagrass encroachment is often a problem in the transition zone and further south due to the disruption in uniformity and aesthetics of bentgrass greens. Currently, few herbicide options exist for the efficient and effective control of bermudagrass infestations in bentgrass putting surfaces. High rates required by current options often exhibit unacceptable levels of creeping bentgrass phytotoxicity. Several experimental chemistries have recently been introduced that may be utilized for safe and effective control of bermudagrass in bentgrass putting greens.

Metamifop is an aryloxyphenoxy propionic acid herbicide that exhibits control of certain grass species through the inhibition of lipid biosynthesis. However, data describing the effects of metamifop on the control of bermudagrass is limited.

Objective

- To evaluate the efficacy of metamifop for the control of hybrid and common bermudagrass in a controlled environment.

Materials and Methods

- Experiments were conducted at the Texas Tech University Plant and Soil Science greenhouse facility in Lubbock, TX.
- 'Riviera' hybrid bermudagrass and 'Savannah' common bermudagrass were seeded at 244 kg ha^{-1} into 10.2 cm square pots containing a soilless potting media on August 26, 2011.
- Pots were allowed to mature in the greenhouse over a three month period.
- Prior to herbicide application bermudagrass was mowed to 0.6 cm with hand-held grass shearers.
- Treatments were arranged in a randomized complete block design with five replications.
- Herbicides were applied with a CO_2 backpack sprayer equipped with XR8004VS nozzles calibrated to deliver 375 L ha^{-1} at 221 kPa (Fig. 1A).
- Herbicide treatments were applied on December 1, 2011 and consisted of metamifop at 200, 300, 400, and 500 g ai ha^{-1}. A sequential application of each treatment was made on December 22, 2011. An untreated check was included for comparison.
- Visual ratings of percent bermudagrass control was recorded weekly on a scale of 0 (no control) to 100% (completely dead bermudagrass).
- Pots were cut to 0.6 cm three weeks after initial treatment (WAIT) (prior to sequential treatments), biomass was dried, and weighed. This procedure was conducted again three weeks after sequential treatments (Fig. 1B).
- Data were subjected to analysis of variance (ANOVA) using error partitioning appropriate to a split plot analysis in the general linear models procedure (PROC GLM) provided by SAS. The arcsine square root transformations of percent bermudagrass phytotoxicity and biomass data were also subjected to ANOVA, but were not different from non-transformed data; therefore, non-transformed data are presented. Means were separated using Fisher's Protected LSD test at the 0.05 probability level.

Materials and Methods

Figure 1A and 1B: Herbicide application and harvesting techniques.

Results

Table 1: Bermudagrass response to metamifop 3 WAIT in the greenhouse in Lubbock, TX.

Treatment	Rate (g ai ha^{-1})	----%Control---- 'Savannah'	'Riviera'	----Biomass (g)---- 'Savannah'	'Riviera'
Metamifop	200	8 bC[a]	36 bB	0.67 bB	0.36 bC
	300	96 aA	99 aA	0.03 cD	0.02 cD
	400	100 aA	98 aA	0.01 cD	0.01 cD
	500	100 aA	97 aA	0.01 cD	0.01 cD
Untreated Check	0	0 cC	0 cC	0.8 aA	0.56 aB

[a] Means within a column followed by the same lower case letter are not significantly different at the P≤0.05. Means within a row of paired columns followed by uppercase letters are not significantly different at P≤0.05.

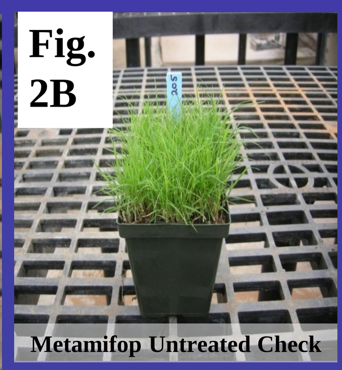
Table 2: Bermudagrass response to metamifop 6 WAIT in the greenhousein Lubbock, TX.

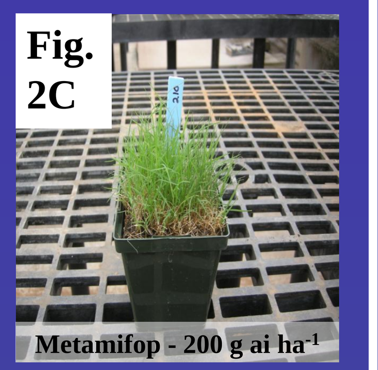
Treatment	Rate (g ai ha^{-1})	----%Control---- 'Savannah'	'Riviera'	----Biomass (g)---- 'Savannah'	'Riviera'
Metamifop	200	6 bC[a]	17 bB	0.48 bBC	0.44 bC
	300	100 aA	100 aA	0 cD	0 cD
	400	100 aA	100 aA	0 cD	0 cD
	500	100 aA	100 aA	0 cD	0 cD
Untreated Check	0	0 bC	0 cC	1.1 aA	0.8 aAB

[a] Means within a column followed by the same lower case letter are not significantly different at the P≤0.05. Means within a row of paired columns followed by uppercase letters are not significantly different at P≤0.05.

Results

Figure 2A – 2D: 'Savannah' bermudagrass response to metamifop 6 WAIT.





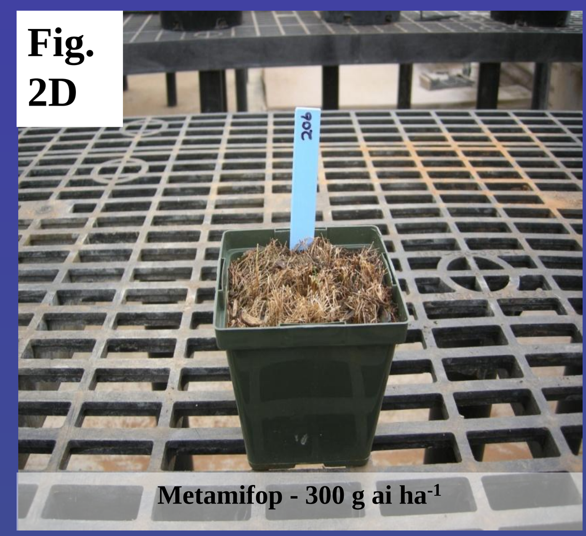
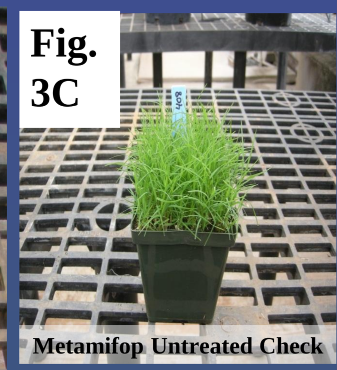
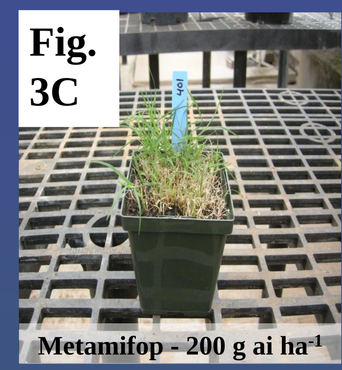
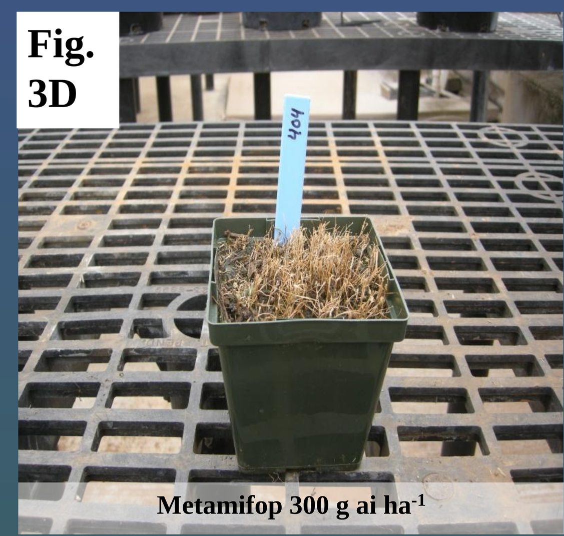


Figure 3A – 3D: 'Riviera' bermudagrass response to metamifop 6 WAIT.







Results

- The non-treated check pots exhibited 0% control and 0.56 to 0.8 g of biomass 3 WAIT, regardless of cultivar (Table 1).
- Metamifop at 300 to 500 g ai ha^{-1} exhibited 96 to 100% bermudagrass control 3 WAIT, regardless of cultivar (Table 1).
- Bermudagrass subjected to those same treatments only exhibited 0.01 to 0.03 g of biomass 3 WAIT, regardless of cultivar (Table 1).
- The 200 g ai ha^{-1} rate of metamifop exhibited only 8% control of 'Savannah' bermudagrass with 0.67 g of biomass collected, while 'Riviera' exhibited 36% control with 0.36 g of biomass collected 3 WAIT (Table 1).
- Sequential applications of metamifop at 300 to 500 g ai ha^{-1} completely controlled bermudagrass (100%) 6 WAIT, while a sequential application at 200 g ai ha^{-1} only controlled bermudagrass 6 to 17% 6 WAIT, regardless of cultivar (Table 2, Fig. 2A – 2D, Fig. 3A – 3D).

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