

Evaluation of Plant Growth Regulators and Other Materials Applied to Fairway Height Creeping Bentgrass

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Introduction

This study was conducted on a mature stand of creeping bentgrass (*Agrostis stolonifera*) and annual bluegrass (*Poa annua*) at the Valentine Turfgrass Research Center, Penn State University, University Park, Pa. The objective of the study was to determine the efficacy of a fungicide, herbicide, and plant growth regulators alone or in combination with a liquid fertilizer using color ratings, measurements of plant height, and fresh weight foliar yield.

Methods and Materials

This study was a randomized complete block design with three replications. Treatments were applied on June 7 (SUMMER), June 23 (2 WAT) and July 12, 2005 (4 WAT) using a three foot CO₂ powered boom sprayer calibrated to deliver 40 gpa using two, flat fan, 11004 nozzles at 40 psi. The test site was maintained similar to that of a golf course fairway with respect to irrigation, fertilization and mowing. Turfgrass height was measured using a Turfcheck 1 prism.

Results and Discussion

Turfgrass color was rated nine times during the study (Table 1). Only on the first rating date, June 15th, was unacceptable turfgrass color found following the application of Velocity at 45 g ai/A or greater.

Turfgrass height was rated ten times during the study (Table 2). On the June 15th rating date, turfgrass treated with Trimmit plus Rubigan at 1.5 oz/M, Trimmit plus 18-3-1 (fertilizer), and Velocity at 60 g ai/A had significantly lower height than untreated. On the June 22nd rating date, turfgrass treated with Trimmit plus Rubigan at 0.75 oz/M with or without 18-3-1, Trimmit plus Rubigan at 1.5 oz/M plus 18-3-1, Trimmit plus 18-3-1, and Trimmit plus Banner MAXX had significantly lower height than untreated. On the June 30th rating date, turfgrass treated with Trimmit in any combination had significantly lower height than untreated. On the July 7th rating date, turfgrass treated with Trimmit plus Rubigan at 1.5 oz/M and Trimmit plus Banner MAXX had significantly lower height than untreated. On the July 12th rating date, turfgrass treated with Trimmit plus banner MAXX had significantly lower height than untreated.

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On the July 28th rating date, turfgrass treated with Trimmit in any combination and Cutless at 12 oz/A alone had significantly lower height than untreated. On the August 4th rating date, turfgrass treated with Trimmit plus Rubigan at 0.75 oz/M had significantly lower height than untreated. On the August 9th rating date, turfgrass treated with Trimmit plus Rubigan at 0.75 oz/M, Trimmit plus Rubigan at 1.5 oz/M with and without 18-3-1, and Trimmit plus 18-3-1 had significantly lower height than untreated. Finally, on the August 17th rating date, turfgrass treated with Trimmit plus 18-3-1 had significantly higher height than untreated.

Turfgrass fresh clipping weight was taken eight times during the study (Table 3). On the June 22nd rating date, turfgrass treated with Trimmit in any combination had significantly less fresh clipping weight than untreated. On the June 30th rating date, turfgrass treated with Trimmit plus Banner MAXX had significantly less fresh clipping weight than untreated. On the July 12th rating date, turfgrass treated with Trimmit plus Rubigan at 1.5 oz/M plus 18-3-1 had significantly more fresh clipping weight than untreated. On the July 20th and August 9th rating dates, turfgrass treated with Velocity at the 30 and 45 g ai/A rate had significantly more fresh clipping weight than untreated. Finally, on the August 17th rating date, turfgrass treated with Trimmit plus Rubigan at 0.75 oz/M plus 18-3-1 had significantly more fresh clipping weight than untreated.

Table 2. Height ratings (in inches) of materials applied to creeping bentgrass taken in 2005.

Treatment	Form	Rate lb ai/A	Timing	Height				
				6-15	6-22	6-30	7-7	7-12
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.40c-f	0.36de	0.37bc	0.39ab	0.39a-d
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.40c-f	0.35e	0.37bc	0.40ab	0.40abc
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT					
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.38ef	0.37b-e	0.37bc	0.38bc	0.40abc
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.40c-f	0.36cde	0.37bc	0.41ab	0.42ab
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT					
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.39def	0.36cde	0.37bc	0.40ab	0.39a-d
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT					
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT	0.44abc	0.41ab	0.43a	0.42a	0.40abc
CHECK				0.46a	0.41ab	0.41ab	0.42a	0.43a
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT	0.44abc	0.39a-e	0.41ab	0.41ab	0.40abc
VELOCITY	80WP	30 G A/A	JUNE/2 WAT	0.41c-f	0.41ab	0.39ab	0.39abc	0.39a-d
VELOCITY	80WP	45 G A/A	JUNE/2 WAT	0.39def	0.42a	0.38abc	0.40ab	0.38bcd
VELOCITY	80WP	60 G A/A	JUNE/2 WAT	0.37f	0.38a-e	0.39abc	0.39abc	0.37cd
CUTLESS	50W	12 OZ/A	JUNE/4 WAT	0.43a-d	0.38a-e	0.41ab	0.41ab	0.42ab
CUTLESS	50W	12 OZ /A	JUNE/4 WAT	0.45ab	0.39a-d	0.41ab	0.41ab	0.40abc
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT					
CUTLESS	50W	12 OZ/A	JUNE/4 WAT	0.41b-f	0.40abc	0.41ab	0.40ab	0.39a-d
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.42a-e	0.36cde	0.34c	0.36c	0.36d
BANNER MAXX	1.3L	44 FL OZ/A	JUNE/4 WAT					

1 - Means followed by same letter do not significantly differ (P= 0.05 Duncan's New MRT)

Table 2 (continued). Height ratings (in inches) of materials applied to creeping bentgrass taken in 2005.

Treatment	Form	Rate lb ai/A	Timing	Height				
				7-20	7-28	8-4	8-9	8-17
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.43b	0.41efg	0.42c	0.41d	0.64abc
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.43b	0.43c-f	0.44abc	0.43bcd	0.66ab
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT					
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.44b	0.37g	0.45abc	0.40d	0.63a-d
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.43b	0.39efg	0.44abc	0.41d	0.67ab
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT					
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.43b	0.39efg	0.46abc	0.41d	0.69a
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT					
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT	0.52a	0.52a	0.49ab	0.51a	0.62bcd
CHECK				0.48ab	0.49ab	0.49ab	0.48abc	0.60bcd
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT	0.46b	0.48abc	0.46abc	0.48abc	0.57d
VELOCITY	80WP	30 G A/A	JUNE/2 WAT	0.48ab	0.49ab	0.47abc	0.49ab	0.59bcd
VELOCITY	80WP	45 G A/A	JUNE/2 WAT	0.48ab	0.49ab	0.48abc	0.48abc	0.58cd
VELOCITY	80WP	60 G A/A	JUNE/2 WAT	0.49ab	0.49ab	0.51a	0.47abc	0.61bcd
CUTLESS	50W	12 OZ/A	JUNE/4 WAT	0.46ab	0.42d-g	0.48abc	0.43bcd	0.59bcd
CUTLESS	50W	12 OZ /A	JUNE/4 WAT	0.48ab	0.47a-d	0.47abc	0.48abc	0.63a-d
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT					
CUTLESS	50W	12 OZ/A	JUNE/4 WAT	0.47ab	0.44b-e	0.46abc	0.46a-d	0.63a-d
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	0.44b	0.38fg	0.44bc	0.42cd	0.59bcd
BANNER MAXX	1.3L	44 FL OZ/A	JUNE/4 WAT					

1 - Means followed by same letter do not significantly differ (P= 0.05 Duncan's New MRT)

Table 3. Fresh clipping weight (grams) of materials applied to creeping bentgrass taken in 2005.

Treatment	Form	Rate lb ai/A	Timing	Fresh Clipping Weight ¹				
				6-22	6-30	7-7	7-12	7-20
TRIMMIT	2SC	0.4	JUNE/4 WAT	3.93d	5.07cde	3.9ab	6.9ab	7.4e
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	4.20d	5.90cde	4.6ab	8.1ab	7.2e
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT					
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	4.67cd	4.47de	4.2ab	5.6ab	7.3e
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	4.33d	6.43cde	6.3ab	9.5a	9.9de
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT					
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	3.90d	6.10cde	5.5ab	8.6ab	8.4e
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT					
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT	10.90a	13.43a	7.2a	5.2ab	20.9ab
CHECK				8.47ab	9.10a-d	4.8ab	3.8b	14.7b-e
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT	8.77ab	9.47abc	5.2ab	4.3b	20.1abc
VELOCITY	80WP	30 G A/A	JUNE/2 WAT	9.40ab	8.57bcd	5.4ab	5.1ab	24.0a
VELOCITY	80WP	45 G A/A	JUNE/2 WAT	9.00ab	8.77bcd	5.5ab	4.4b	24.8a
VELOCITY	80WP	60 G A/A	JUNE/2 WAT	5.80bcd	6.60b-e	4.0ab	3.8b	18.5a-d
CUTLESS	50W	12 OZ/A	JUNE/4 WAT	8.13abc	9.33abc	5.3ab	3.7b	11.6cde
CUTLESS	50W	12 OZ /A	JUNE/4 WAT	6.33bcd	9.37abc	4.6ab	3.8b	10.9de
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT					
CUTLESS	50W	12 OZ/A	JUNE/4 WAT	8.53ab	11.20ab	6.1ab	5.9ab	13.3b-e
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT					
TRIMMIT	2SC	0.4	JUNE/4 WAT	3.50d	3.87e	2.8b	4.9ab	8.2e
BANNER MAXX	1.3L	44 FL OZ/A	JUNE/4 WAT					

1 - Means followed by same letter do not significantly differ (P= 0.05 Duncan's New MRT)

Table 3 (continued). Fresh clipping weight (grams) of materials applied to creeping bentgrass taken in 2005.

Treatment	Form	Rate lb ai/A	Timing	Fresh Clipping Weight ¹		
				8-4	8-9	8-17
TRIMMIT	2SC	0.4	JUNE/4 WAT	3.6bc	5.5e	22.2abc
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT			
TRIMMIT	2SC	0.4	JUNE/4 WAT	3.7bc	5.5e	35.6a
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT			
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT			
TRIMMIT	2SC	0.4	JUNE/4 WAT	2.4c	4.8e	22.2abc
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT			
TRIMMIT	2SC	0.4	JUNE/4 WAT	3.4bc	6.7de	27.6abc
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT			
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT			
TRIMMIT	2SC	0.4	JUNE/4 WAT	5.6abc	7.0de	32.9ab
18-3-1	1.8L	0.2 LB N/M	JUNE/4 WAT			
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT	7.9a	14.4ab	26.9abc
CHECK				4.8abc	9.8b-e	17.9bc
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT	6.6ab	13.4abc	20.7abc
VELOCITY	80WP	30 G A/A	JUNE/2 WAT	6.6ab	15.3a	20.8abc
VELOCITY	80WP	45 G A/A	JUNE/2 WAT	6.6ab	15.7a	18.7bc
VELOCITY	80WP	60 G A/A	JUNE/2 WAT	4.7abc	11.6a-d	17.2bc
CUTLESS	50W	12 OZ/A	JUNE/4 WAT	4.4bc	8.0cde	16.4c
CUTLESS	50W	12 OZ /A	JUNE/4 WAT	4.6bc	7.8de	17.6bc
RUBIGAN	1AS	0.75 FL OZ/M	JUNE/4 WAT			
CUTLESS	50W	12 OZ/A	JUNE/4 WAT	6.3ab	9.8b-e	22.2abc
RUBIGAN	1AS	1.5 FL OZ/M	JUNE/4 WAT			
TRIMMIT	2SC	0.4	JUNE/4 WAT	3.0c	5.6e	22.7abc
BANNER MAXX	1.3L	44 FL OZ/A	JUNE/4 WAT			

1 - Means followed by same letter do not significantly differ (P= 0.05 Duncan's New MRT)