

Evaluation of Plant Growth Regulators on 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, plant growth regulators alone or in combination with a liquid fertilizer using color ratings, dollar spot (*Sclerotinia homoeocarpa*) incidence, 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 8 (SUMMER), and July 12, 2005 (28 DAT) 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). None of the treated or untreated turfgrass was rated below acceptable (7.0) during the study.

Turfgrass height was evaluated ten times during the study (Table 2). On the June 22nd rating date turfgrass treated with Trimmit alone or in combination and Primo Maxx alone had significantly lower height than untreated turfgrass. On the June 29th rating date turfgrass treated with Trimmit alone, Primo MAXX at the 11 oz/A rate, and Trimmit at 32 oz/A plus ECO-N (24-0-0) had significantly lower height than untreated turfgrass. On the July 20th rating date turfgrass treated with Trimmit combined with Primo Maxx alone or with ECO-N (24-0-0) had significantly lower height than untreated turfgrass. On the July 28th rating date turfgrass treated with Trimmit at 32 oz/A alone or combined with ECO-N (24-0-0) and Trimmit at 16 oz/A plus Primo MAXX plus ECO-N (24-0-0) had significantly lower height than untreated turfgrass. On the August 4th rating date turfgrass treated with Trimmit alone, Primo MAXX alone, Trimmit at 16 oz/A plus ECO-N (24-0-0), and Primo MAXX at 11 oz/A plus ECO-N (24-0-0) had significantly lower height than untreated turfgrass. On this date turfgrass treated with Banner MAXX had significantly higher height than untreated turfgrass. Finally, on the August 17th rating date turfgrass treated with Trimmit at 16 oz/A plus Primo MAXX plus ECO-N (24-0-0) had significantly higher height than untreated turfgrass.

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Turfgrass fresh clipping weights were collected six times during the study (Table 3). On the June 22nd rating date only turfgrass treated with ECO – N (24-0-0) had significantly more fresh clipping weight than untreated turfgrass. On the June 29th rating date turfgrass treated with Trimmit at 32 oz/A and Trimmit at 16 oz/A plus Primo MAXX plus ECO-N (24-0-0) had significantly less fresh clipping weight than untreated turfgrass. On the July 12th rating date turfgrass treated with Trimmit at 32 oz/A plus ECO – N and Trimmit plus Primo MAXX had significantly more fresh clipping weight than untreated turfgrass. Finally, on the August 17th rating date turfgrass rebound was apparent on some of the treated turfgrass.

The percent dollar spot was rated five times during the study (Table 4). On three rating dates; July 14th, 20th, and August 4th turfgrass treated with Banner MAXX had significantly less dollar spot than untreated turfgrass. On the July 14th and August 4th rating dates turfgrass treated with Trimmit at 16 oz/A plus Primo MAXX plus ECO-N (24-0-0) had significantly less dollar spot than untreated turfgrass. Finally on the August 4th rating date turfgrass treated with ECON – N (24-0-0) had significantly more dollar spot than untreated turfgrass.

Table 1. Color ratings on a scale of 0-10 where 0 = brown, 7= acceptable, and 10 = dark green of PGR's applied to creeping bentgrass taken in 2005.

Treatment	Form	Rate OZ/A	Timing	6-15		6-29		7-12		7-28		8-17	
				6-22	7-7	7-20	8-4						
TRIMMIT	2SC	32	SUMMER/28 DAT	8.0	8.2	8.2	8.2	8.0	8.2	9.0	8.3	8.0	
TRIMMIT	2SC	16	SUMMER/28 DAT	8.2	8.7	8.7	8.5	8.3	8.5	8.8	8.7	8.0	
PRIMO MAXX	1MEC	11	SUMMER/28 DAT	8.3	8.3	8.8	8.7	8.3	8.5	9.2	8.8	8.0	
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	8.0	8.3	8.7	8.5	8.5	8.5	9.0	8.7	8.0	
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	9.0	9.0	8.7	8.3	8.2	8.5	9.0	8.5	8.0	
TRIMMIT	2SC	32	SUMMER/28 DAT	9.0	8.7	8.7	8.8	8.8	9.0	9.2	9.0	8.0	
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	8.0	8.8	8.2	8.0	8.2	8.2	8.8	8.0	8.0	
CHECK				8.3	8.5	8.5	8.2	8.3	8.7	8.8	8.7	8.0	
TRIMMIT	2SC	16	SUMMER/28 DAT	8.5	8.5	8.7	8.3	8.2	8.8	9.0	8.5	8.0	
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	8.5	8.7	8.7	8.7	8.7	8.8	8.8	8.7	8.0	
PRIMO MAXX	1MEC	11	SUMMER/28 DAT	8.5	8.7	8.7	8.7	8.7	8.8	8.8	8.7	8.0	
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	8.0	8.8	8.5	8.2	8.3	8.8	9.2	8.7	8.0	
BANNER MAXX	1.3L	88	SUMMER/28 DAT	8.2	8.0	8.3	8.8	8.7	8.7	9.3	9.0	8.0	
TRIMMIT	2SC	16	SUMMER/28 DAT	8.5	8.3	8.5	8.5	8.3	9.0	8.8	9.0	8.0	
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	8.5	8.3	8.5	8.5	8.3	9.0	8.8	9.0	8.0	
TRIMMIT	2SC	16	SUMMER/28 DAT	8.5	8.3	8.5	8.5	8.3	9.0	8.8	9.0	8.0	
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	8.5	8.3	8.5	8.5	8.3	9.0	8.8	9.0	8.0	
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	8.5	8.3	8.5	8.5	8.3	9.0	8.8	9.0	8.0	

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

Treatment	Form	Rate OZ/A	Timing	6-15 ¹		6-29		7-12		7-28		8-9	
				6-22	7-7	7-20	8-4	8-17					
TRIMMIT	2SC	32	SUMMER/28 DAT	0.36b	0.33d	0.35d	0.38a	0.38a	0.43de	0.42d	0.38e	0.43c	0.62ab
TRIMMIT	2SC	16	SUMMER/28 DAT	0.38ab	0.32d	0.38cd	0.39a	0.39a	0.45b-e	0.44bcd	0.42d	0.44c	0.63ab
PRIMO MAXX	1MEC	11	SUMMER/28 DAT	0.39ab	0.33d	0.38cd	0.37a	0.37a	0.45b-e	0.45bcd	0.42d	0.44c	0.61ab
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	0.39ab	0.35cd	0.41bc	0.38a	0.38a	0.44cde	0.45bcd	0.42d	0.44c	0.63ab
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	0.41ab	0.45a	0.44ab	0.38a	0.39a	0.50a	0.51ab	0.43cd	0.52a	0.61ab
TRIMMIT	2SC	32	SUMMER/28 DAT	0.39ab	0.34cd	0.38cd	0.38a	0.37a	0.42ef	0.41d	0.42d	0.42c	0.64ab
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	0.40ab	0.41ab	0.43ab	0.39a	0.39a	0.47a-d	0.50abc	0.46bc	0.48abc	0.58b
CHECK				0.39ab	0.35cd	0.41bc	0.40a	0.41a	0.48abc	0.44cd	0.41d	0.45bc	0.61ab
TRIMMIT	2SC	16	SUMMER/28 DAT	0.37ab	0.35cd	0.41abc	0.39a	0.39a	0.44cde	0.46bcd	0.42d	0.44c	0.59b
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	0.39ab	0.38bc	0.42abc	0.38a	0.38a	0.47a-d	0.53a	0.48ab	0.51ab	0.62ab
PRIMO MAXX	1MEC	11	SUMMER/28 DAT	0.42a	0.41b	0.46a	0.41a	0.40a	0.49ab	0.53a	0.49a	0.51ab	0.64ab
TRIMMIT	2SC	16	SUMMER/28 DAT	0.36b	0.34cd	0.38cd	0.37a	0.38a	0.41ef	0.46bcd	0.46bc	0.42c	0.66ab
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	0.37ab	0.35cd	0.41abc	0.39a	0.39a	0.44cde	0.46bcd	0.42d	0.44c	0.59b
TRIMMIT	2SC	16	SUMMER/28 DAT	0.39ab	0.38bc	0.42abc	0.38a	0.38a	0.47a-d	0.53a	0.48ab	0.51ab	0.62ab
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	0.42a	0.41b	0.46a	0.41a	0.40a	0.49ab	0.53a	0.49a	0.51ab	0.64ab
BANNER MAXX	1.3L	88	SUMMER/28 DAT	0.42a	0.41b	0.46a	0.41a	0.40a	0.49ab	0.53a	0.49a	0.51ab	0.64ab
TRIMMIT	2SC	16	SUMMER/28 DAT	0.36b	0.34cd	0.38cd	0.37a	0.38a	0.41ef	0.46bcd	0.46bc	0.42c	0.66ab
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	0.37ab	0.35cd	0.41abc	0.39a	0.39a	0.44cde	0.46bcd	0.42d	0.44c	0.59b
TRIMMIT	2SC	16	SUMMER/28 DAT	0.39ab	0.38bc	0.42abc	0.38a	0.38a	0.47a-d	0.53a	0.48ab	0.51ab	0.62ab
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	0.42a	0.41b	0.46a	0.41a	0.40a	0.49ab	0.53a	0.49a	0.51ab	0.64ab
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	0.42a	0.41b	0.46a	0.41a	0.40a	0.49ab	0.53a	0.49a	0.51ab	0.64ab
TRIMMIT	2SC	16	SUMMER/28 DAT	0.36b	0.34cd	0.38cd	0.37a	0.38a	0.41ef	0.46bcd	0.46bc	0.42c	0.66ab
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	0.37ab	0.35cd	0.41abc	0.39a	0.39a	0.44cde	0.46bcd	0.42d	0.44c	0.59b
TRIMMIT	2SC	16	SUMMER/28 DAT	0.39ab	0.38bc	0.42abc	0.38a	0.38a	0.47a-d	0.53a	0.48ab	0.51ab	0.62ab
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	0.42a	0.41b	0.46a	0.41a	0.40a	0.49ab	0.53a	0.49a	0.51ab	0.64ab
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	0.42a	0.41b	0.46a	0.41a	0.40a	0.49ab	0.53a	0.49a	0.51ab	0.64ab

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

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

Treatment	Form	Rate OZ/A	Timing	Weight					
				6-22 ¹	6-29	7-7	7-12	8-9	8-17
TRIMMIT	2SC	32	SUMMER/28 DAT	3.3c-f	5.1c	4.3a	10.0abc	7.2a	33.7cd
TRIMMIT	2SC	16	SUMMER/28 DAT	3.8c-f	7.1abc	5.8a	11.6abc	8.7a	41.7bcd
PRIMO MAXX	1MEC	11	SUMMER/28 DAT	2.7ef	6.8abc	5.4a	7.3bc	6.4a	33.9cd
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	5.1bcd	11.5ab	6.7a	7.4bc	7.1a	29.3cd
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	9.3a	12.6a	6.6a	10.1abc	8.4a	35.4cd
TRIMMIT	2SC	32	SUMMER/28 DAT	3.0def	6.7abc	6.3a	15.0ab	10.6a	63.3a
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT						
CHECK				9.4a	11.4ab	5.5a	6.8c	6.1a	24.4d
TRIMMIT	2SC	16	SUMMER/28 DAT	5.0b-e	8.7abc	6.9a	13.5abc	10.2a	42.8bc
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT						
PRIMO MAXX	1MEC	11	SUMMER/28 DAT	3.0def	8.2abc	6.7a	10.0abc	8.3a	37.0cd
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT						
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	5.5bc	11.6ab	7.4a	11.5abc	9.4a	39.6bcd
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT						
BANNER MAXX	1.3L	88	SUMMER/28 DAT	7.1b	8.1abc	6.6a	9.3abc	8.0a	32.7cd
TRIMMIT	2SC	16	SUMMER/28 DAT	2.2f	5.9bc	7.2a	16.5a	11.8a	55.3ab
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT						
TRIMMIT	2SC	16	SUMMER/28 DAT	2.3f	4.0c	5.0a	11.7abc	8.3a	45.6bc
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT						
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT						

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

Table 4. Percent dollar spot incidence on creeping bentgrass taken in 2005.

Treatment	Form	Rate OZ/A	Timing	% Dollar Spot				
				7-7 ¹	7-14	7-20	8-4	8-17
TRIMMIT	2SC	32	SUMMER/28 DAT	10.0a	13.3a-d	20.0ab	26.7abc	53.3ab
TRIMMIT	2SC	16	SUMMER/28 DAT	2.0ab	8.3cde	13.3abc	18.3cd	46.7b
PRIMO MAXX	1MEC	11	SUMMER/28 DAT	5.3ab	15.0abc	18.3ab	30.0abc	55.0ab
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	10.0a	21.7a	28.3a	38.3ab	71.7a
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT	10.0a	20.0ab	26.7a	41.7a	50.0ab
TRIMMIT	2SC	32	SUMMER/28 DAT	7.0ab	10.0b-e	20.0ab	18.3cd	50.0ab
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT					
CHECK				6.7ab	11.7a-d	21.7ab	25.0bcd	53.3ab
TRIMMIT	2SC	16	SUMMER/28 DAT	7.0ab	13.3a-d	18.3ab	20.0cd	50.0ab
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT					
PRIMO MAXX	1MEC	11	SUMMER/28 DAT	8.3ab	15.0abc	23.3ab	26.7abc	48.3ab
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT					
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT	5.3ab	11.7a-d	15.0abc	21.7cd	51.7ab
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT					
BANNER MAXX	1.3L	88	SUMMER/28 DAT	0.3b	0.3e	0.3c	2.0e	13.3d
TRIMMIT	2SC	16	SUMMER/28 DAT	5.3ab	10.0b-e	15.3abc	15.3cde	25.0cd
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT					
TRIMMIT	2SC	16	SUMMER/28 DAT	3.7ab	3.7de	8.3bc	8.3de	38.3bc
PRIMO MAXX	1MEC	6.5	SUMMER/28 DAT					
ECO-N (24-0-0)	2.2L	0.25 LB N/M	SUMMER/28 DAT					

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