

# Seedhead Suppression of Annual Bluegrass on a Putting Green

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## Introduction

This study was conducted on a mixed stand of creeping bentgrass (*Agrostis stolonifera*) and annual bluegrass (*Poa annua*) at the Penn State Blue Golf Course in State College, PA. The objective of the study was to evaluate selected growth regulators, with and without adjuvants, for the seedhead suppression of annual bluegrass.

## Methods and Materials

This study was a randomized complete block design with three replications, and a plot size of 21 ft<sup>2</sup>. Treatments were applied on April 14 (FB), April 19 (BT), May 5 (3 WAT), and May 10, 2005 (3 WAT), respectively, using a three-foot CO<sub>2</sub> powered boom sprayer calibrated to deliver 40 gpa using two 11004 flat fan nozzles at 40 psi.

Full bloom of Forsythia (*Forsythia x intermedia*) occurred April 13, 2005. At this time 49 growing degree days had been accumulated when using a base of 50. Boot stage of the annual bluegrass was observed April 18, 2005. Non treated test areas within the test site revealed approximately 100% coverage of annual bluegrass seedheads.

The site was maintained using cultural practices for irrigation, mowing, and fertilization that would be typical for a putting green.

## Results and Discussion

Color was rated twice during the study (Table 1). On the April 20<sup>th</sup> rating date, turfgrass treated with Proxy plus Primo MAXX plus Bayleton, Embark T/O (FB), Proxy plus Cutless (BT), Proxy plus Trimmit (BT), and Trimmit alone had unacceptable color. On the April 28<sup>th</sup> rating date, turfgrass treated with Proxy plus Primo MAXX plus Bayleton, Embark T/O (FB), Embark T/O (BT), Embark T/O plus Ferromec (FB), Embark T/O plus MacroSorb Foliar at 4 oz/M (BT), and Cutless alone again had unacceptable color.

Phytotoxicity was rated three times during the study (Table 2). On the May 4<sup>th</sup> rating date, turfgrass treated with Embark T/O (BT), Embark T/O plus Ferromec (FB), Embark T/O plus MacroSorb Foliar at 4 and 8 oz/M (BT), Embark T/O plus CoRon (BT), Embark T/O plus Quelant Amino Green (BT), and Trimmit alone, had unacceptable phytotoxicity.

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On the May 12<sup>th</sup> rating date, turfgrass treated with Embark T/O (BT), Embark T/O plus Ferromec (FB), Embark T/O plus MacroSorb Foliar at 4 and 8 oz/M (BT), Embark T/O plus MacroSorb Foliar at 4 oz/M plus Ferromec (BT), Embark T/O plus CoRon (BT) Embark T/O plus Quelant Amino Green (BT), and Embark T/O plus Quelant FE plus Quelant Amino Green (BT) had unacceptable phytotoxicity. By the May 20<sup>th</sup> rating date, no unacceptable phytotoxicity was found.

Turfgrass quality was rated twice during the study (Table 2). Quality, as a function of color, phytotoxicity, and seedhead suppression, varied among treated and non-treated turfgrass on both rating dates.

Seedhead suppression was rated twice during the study (Table 3). On the May 20<sup>th</sup> rating date, turfgrass treated with Proxy plus Primo MAXX plus Quelant Amino Green, Proxy plus Cutless plus CoRon, Proxy plus Trimmit plus CoRon, and Primo MAXX alone was not significantly different than non-treated turfgrass. Although not significantly different from the remaining treated turfgrass, turfgrass treated with Embark T/O (BT), Embark T/O plus Ferromec (BT), Embark T/O plus MacroSorb Foliar at 4 and 8 oz/M (BT), Embark T/O plus MacroSorb Foliar at 4 oz/M plus Ferromec (BT), Embark T/O plus CoRon (BT), Embark T/O plus Quelant Amino Green (BT), and Embark T/O plus Quelant FE at 2 and 3 oz/M plus Quelant Amino Green (BT) provided more than 80% seedhead suppression.

**Table 1.** Color ratings of an annual bluegrass/creeping bentgrass putting green on a scale of 0 to 10 where 0 = brown, 7 = acceptable, and 10 = dark green in 2005.

Treatment	Form	Rate oz/M	Timing	Color	
				4/20	4/28
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	7.2	8.8
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	7.8	9.0
BXPI	L	6	FB/3 WAT		
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	6.8	6.7
BAYLETON	50WP	1	FB/3 WAT		
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	8.8	9.7
SIGNATURE	80WG	4	FB/3 WAT		
EMBARK T/O	0.2SL	40 OZ/A	FB	6.8	6.5
EMBARK T/O	0.2SL	40 OZ/A	BT	7.3	6.8
EMBARK T/O	0.2SL	40 OZ/A	FB	7.2	6.3
FERROMECC	L	5	FB		
EMBARK T/O	0.2SL	40 OZ/A	BT	8.7	9.3
FERROMECC	L	5	BT		
EMBARK T/O	0.2SL	40 OZ/A	BT	7.2	6.5
MACROSORB FOLIAR	L	4	BT		
EMBARK T/O	0.2SL	40 OZ/A	BT	7.3	7.0
MACROSORB FOLIAR	L	8	BT		
EMBARK T/O	0.2SL	40 OZ/A	BT	8.7	9.3
MACROSORB FOLIAR	L	4	BT		
FERROMECC	L	5	BT		
EMBARK T/O	0.2SL	40 OZ/A	BT	8.7	8.7
MACROSORB FOLIAR	L	8	BT		
FERROMECC (15-0-0)	L	5	BT		
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	BT/3 WAT	7.3	8.5
MACROSORB FOLIAR	L	4	BT/3 WAT		
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	BT/3 WAT	7.0	8.2
MACROSORB FOLIAR	L	8	BT/3 WAT		
EMBARK T/O	0.2SL	40 OZ/A	BT	7.0	7.3
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT		
EMBARK T/O	0.2L	40 OZ/A	BT	7.7	7.0
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT		
PROXY+PRIMO MAXX	2SL	3/0.125	BT/3 WAT	7.2	8.2
CHECK				7.8	8.5
PROXY+PRIMO MAXX	2SL/1MEC	3/0.125	BT/3 WAT	8.2	9.5
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT/3 WAT		
PROXY+PRIMO MAXX	2SL/1MEC	3/0.125	BT/3 WAT	8.5	9.5
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT/3 WAT		
PROXY	2SL	5	BT	6.7	7.7
CUTLESS	50W	0.25 LB/A	BT		
PROXY	2SL	5	BT	7.0	8.5
CUTLESS	50W	0.25 LB/A	BT		
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT		
PROXY	2SL	5	BT	7.3	8.3
CUTLESS	50W	0.25 LB/A	BT		
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT		
PROXY	2SL	5	BT	6.8	7.7
TRIMMIT	2SC	6 OZ/A	BT		
PROXY	2SL	5	BT	7.3	8.0
TRIMMIT	2SC	6 OZ/A	BT		
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT		
PROXY	2SL	5	BT	7.8	8.0
TRIMMIT	2SC	6 OZ/A	BT		
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT		
TRIMMIT	2SC	6 OZ/A	BT	6.7	7.0
CUTLESS	50W	0.25 LB/A	BT	7.0	6.8
PROXY	2SL	5	BT	7.3	7.7
PRIMO MAXX	1MEC	0.125	BT	7.3	7.7
EMBARK T/O	0.2SL	20 OZ/A	BT	7.2	7.5
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	BT/3 WAT		
EMBARK T/O	0.2SL	40 OZ/A	BT	8.0	8.3
QUELANT FE	L	2	BT		
QUELANT AMINO GREEN (18-3-1)	1.8L	3	BT		
EMBARK T/O	0.2SL	40 OZ/A	BT	8.0	8.3
QUELANT FE	L	3	BT		
MACROSORB FOLIAR	L	2	BT		

**Table 2.** Ratings of phytotoxicity of an annual bluegrass/creeping bentgrass putting green on a scale of 0 to 10 where 0 = complete phytotoxicity, 7 = acceptable, and 10 = no phytotoxicity in 2005.

Treatment	Form	Rate oz/M	Timing	-----Phytotoxicity-----		
				5/4	5/12	5/20
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	10.0	8.3	7.3
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	10.0	9.3	8.3
BXPI	L	6	FB/3 WAT			
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	7.8	7.3	7.7
BAYLETON	50WP	1	FB/3 WAT			
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	10.0	9.3	8.3
SIGNATURE	80WG	4	FB/3 WAT			
EMBARK T/O	0.2SL	40 OZ/A	FB	7.3	8.0	8.7
EMBARK T/O	0.2SL	40 OZ/A	BT	6.2	6.0	7.0
EMBARK T/O	0.2SL	40 OZ/A	FB	6.5	7.0	8.3
FERROMECE	L	5	FB			
EMBARK T/O	0.2SL	40 OZ/A	BT	7.2	6.7	8.3
FERROMECE	L	5	BT			
EMBARK T/O	0.2SL	40 OZ/A	BT	6.0	5.7	7.7
MACROSORB FOLIAR	L	4	BT			
EMBARK T/O	0.2SL	40 OZ/A	BT	6.3	6.2	8.0
MACROSORB FOLIAR	L	8	BT			
EMBARK T/O	0.2SL	40 OZ/A	BT	9.0	6.3	7.3
MACROSORB FOLIAR	L	4	BT			
FERROMECE	L	5	BT			
EMBARK T/O	0.2SL	40 OZ/A	BT	7.5	7.2	8.0
MACROSORB FOLIAR	L	8	BT			
FERROMECE (15-0-0)	L	5	BT			
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	BT/3 WAT	9.7	8.7	8.3
MACROSORB FOLIAR	L	4	BT/3 WAT			
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	BT/3 WAT	9.0	8.5	7.7
MACROSORB FOLIAR	L	8	BT/3 WAT			
EMBARK T/O	0.2SL	40 OZ/A	BT	6.3	6.0	8.3
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT			
EMBARK T/O	0.2L	40 OZ/A	BT	6.0	5.7	7.3
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT			
PROXY+PRIMO MAXX	2SL	3/0.125	BT/3 WAT	9.7	9.7	9.7
CHECK				10.0	10.0	10.0
PROXY+PRIMO MAXX	2SL/1MEC	3/0.125	BT/3 WAT	9.7	10.0	10.0
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT/3 WAT			
PROXY+PRIMO MAXX	2SL/1MEC	3/0.125	BT/3 WAT	9.7	10.0	10.0
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT/3 WAT			
PROXY	2SL	5	BT	8.0	9.7	9.3
CUTLESS	50W	0.25 LB/A	BT			
PROXY	2SL	5	BT	7.8	9.7	10.0
CUTLESS	50W	0.25 LB/A	BT			
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT			
PROXY	2SL	5	BT	9.3	10.0	10.0
CUTLESS	50W	0.25 LB/A	BT			
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT			
PROXY	2SL	5	BT	9.3	9.7	9.3
TRIMMIT	2SC	6 OZ/A	BT			
PROXY	2SL	5	BT	9.0	9.0	9.0
TRIMMIT	2SC	6 OZ/A	BT			
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT			
PROXY	2SL	5	BT	9.3	10.0	8.3
TRIMMIT	2SC	6 OZ/A	BT			
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT			
TRIMMIT	2SC	6 OZ/A	BT	6.3	8.0	9.0
CUTLESS	50W	0.25 LB/A	BT	7.3	8.3	8.3
PROXY	2SL	5	BT	9.3	10.0	9.7
PRIMO MAXX	1MEC	0.125	BT	8.5	8.7	9.3
EMBARK T/O	0.2SL	20 OZ/A	BT	7.3	7.3	8.0
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	BT/3 WAT			
EMBARK T/O	0.2SL	40 OZ/A	BT	7.2	6.7	8.3
QUELANT FE	L	2	BT			
QUELANT AMINO GREEN (18-3-1)	1.8L	3	BT			
EMBARK T/O	0.2SL	40 OZ/A	BT	8.3	7.7	8.7
QUELANT FE	L	3	BT			
MACROSORB FOLIAR	L	2	BT			

**Table 3.** Ratings of the quality and percent seedhead suppression of an annual bluegrass/creeping bentgrass putting green in 2005.

Treatment	Form	Rate oz/M	Timing	(--Quality <sup>1</sup> --)		(--%Suppression <sup>2</sup> --)	
				5/4	5/20	5/4	5/20
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	7.7	7.7	56.1a-e	67.7a-e
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	7.2	6.7	42.8a-f	51.9a-e
BXP1	L	6	FB/3 WAT				
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	7.8	7.3	79.4a	67.7a-e
BAYLETON	50WP	1	FB/3 WAT				
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	FB/3 WAT	7.2	7.8	40.0a-f	63.0a-e
SIGNATURE	80WG	4	FB/3 WAT				
EMBARK T/O	0.2SL	40 OZ/A	FB	7.5	7.5	70.6abc	64.8a-e
EMBARK T/O	0.2SL	40 OZ/A	BT	6.5	7.7	38.9a-f	82.0abc
EMBARK T/O	0.2SL	40 OZ/A	FB	7.0	7.3	79.4a	78.3a-d
FERROMECC	L	5	FB				
EMBARK T/O	0.2SL	40 OZ/A	BT	6.7	8.5	47.2a-f	90.6a
FERROMECC	L	5	BT				
EMBARK T/O	0.2SL	40 OZ/A	BT	6.3	8.0	53.9a-f	84.4abc
MACROSORB FOLIAR	L	4	BT				
EMBARK T/O	0.2SL	40 OZ/A	BT	7.2	8.2	66.1a-d	84.4abc
MACROSORB FOLIAR	L	8	BT				
EMBARK T/O	0.2SL	40 OZ/A	BT	6.8	7.3	32.8a-f	80.2a-d
MACROSORB FOLIAR	L	4	BT				
FERROMECC	L	5	BT				
EMBARK T/O	0.2SL	40 OZ/A	BT	7.0	8.0	46.7a-f	79.1a-d
MACROSORB FOLIAR	L	8	BT				
FERROMECC (15-0-0)	L	5	BT				
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	BT/3 WAT	7.0	7.7	35.0a-f	55.6a-e
MACROSORB FOLIAR	L	4	BT/3 WAT				
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	BT/3 WAT	6.0	7.0	18.9b-f	55.6a-e
MACROSORB FOLIAR	L	8	BT/3 WAT				
EMBARK T/O	0.2SL	40 OZ/A	BT	6.3	8.2	49.4a-f	83.9abc
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT				
EMBARK T/O	0.2L	40 OZ/A	BT	6.3	8.0	45.6a-f	86.8abc
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT				
PROXY+PRIMO MAXX	2SL	3/0.125	BT/3 WAT	6.7	6.7	28.9a-f	48.1a-e
CHECK				6.0	6.0	0.0f	0.0f
PROXY+PRIMO MAXX	2SL/1MEC	3/0.125	BT/3 WAT	6.7	7.0	22.8b-f	42.1cde
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT/3 WAT				
PROXY+PRIMO MAXX	2SL/1MEC	3/0.125	BT/3 WAT	7.2	6.8	45.0a-f	36.5def
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT/3 WAT				
PROXY	2SL	5	BT	6.8	6.3	47.8a-f	47.9a-e
CUTLESS	50W	0.25 LB/A	BT				
PROXY	2SL	5	BT	7.5	6.3	64.4a-d	32.3ef
CUTLESS	50W	0.25 LB/A	BT				
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT				
PROXY	2SL	5	BT	7.3	7.0	51.7a-f	65.1a-e
CUTLESS	50W	0.25 LB/A	BT				
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT				
PROXY	2SL	5	BT	7.5	6.7	58.9a-d	47.1a-e
TRIMMIT	2SC	6 OZ/A	BT				
PROXY	2SL	5	BT	7.0	6.0	34.4a-f	33.9ef
TRIMMIT	2SC	6 OZ/A	BT				
CORON (28-0-0)	2.9L	0.2 LB AI/M	BT				
PROXY	2SL	5	BT	7.5	7.7	41.7a-f	46.0a-e
TRIMMIT	2SC	6 OZ/A	BT				
QUELANT AMINO GREEN (18-3-1)	1.8L	0.2 LB AI/M	BT				
TRIMMIT	2SC	6 OZ/A	BT	6.8	7.0	73.9ab	46.6a-e
CUTLESS	50W	0.25 LB/A	BT	7.0	7.0	52.2a-f	60.8a-e
PROXY	2SL	5	BT	7.0	7.0	36.1a-f	37.0def
PRIMO MAXX	1MEC	0.125	BT	6.2	6.7	12.2def	44.2b-e
EMBARK T/O	0.2SL	20 OZ/A	BT	6.8	7.8	37.2a-f	78.8a-d
PROXY+PRIMO MAXX	2SL/1MEC	5/0.125	BT/3 WAT				
EMBARK T/O	0.2SL	40 OZ/A	BT	6.3	8.3	2.8ef	88.6ab
QUELANT FE	L	2	BT				
QUELANT AMINO GREEN (18-3-1)	1.8L	3	BT				
EMBARK T/O	0.2SL	40 OZ/A	BT	6.5	8.5	16.7c-f	80.2a-d
QUELANT FE	L	3	BT				
MACROSORB FOLIAR	L	2	BT				

1 – Rating scale: 0 = worst quality, 7 = acceptable, and 10 = best quality.

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