

Seedhead Suppression in Greens Height Annual Bluegrass and Annual Bluegrass/Creeping Bentgrass

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Introduction

The study was conducted on two sites, a mature stand of annual bluegrass (*Poa annua*) and a mature stand of 'Penncross' creeping bentgrass (*Agrostis stolonifera*) and annual bluegrass mixed sward at the Valentine Turfgrass Research Center, Penn State University, University Park, PA. The objective of the studies were to determine if selected materials applied in the spring could suppress annual bluegrass seedhead populations under simulated golf course greens conditions.

Methods and Materials

Treatments were applied to both studies on 12 April (50GDD Base 10C), and 29 April 2015 (14 DAT) using a three foot CO₂ powered boom sprayer calibrated to deliver 40 gpa using one, flat fan, TP9504EVS nozzle at 40 psi (Figure 1). The initial treatment was applied at the pre-boot stage of growth of the annual bluegrass.

Test site #1 consisted of approximately 95 percent annual bluegrass and 5 percent creeping bentgrass at the initiation of the study (Figure 2). Test site #2 consisted of approximately 45 percent annual bluegrass and 55 percent creeping bentgrass at the initiation of the study (Figure 3). Both areas were mowed at 0.125 inches three times a week with a reel mower. The studies were randomized complete block designs with three replications.

Turfgrass seedhead populations were visually evaluated for the percent seedhead coverage in order to evaluate the test material's ability to suppress annual bluegrass seedheads. Turfgrass was irrigated on an as needed basis to prevent moisture stress.

Data was analyzed with ARM 8.5.0 using Duncan's New MRT at the 0.5 percent significant level.

Results and Discussion

Note that all tables with an "a" designator is the site that was an annual bluegrass simulated green and tables with a "b" designator is the site that was a mixed sward, annual bluegrass and creeping bentgrass simulated green.

Phytotoxicity was evaluated four times during the study (Table 1a and 1b). No unacceptable phytotoxicity was found on the annual bluegrass simulated green. No unacceptable phytotoxicity was observed on any rating date except for 1 May on the mixed sward site. On the 1 May rating date only turfgrass treated with Primo + Proxy + MST-1401 and MST-1404, Primo + Proxy + MST-1407 and MST-1404 and Primo + Proxy + urea had acceptable, almost no, phytotoxicity.

Turfgrass color was rated two times during the study (Table 2a and 2b). No treated turfgrass in either study had any unacceptable color during the study.

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Quality was evaluated three times during the study (Table 3a and 3b). Quality is a function of color, percent seedhead populations and phytotoxicity ratings. During the study quality was found to be below acceptable on both sites for some treatments. This is to be expected as there was some phytotoxicity and annual bluegrass seedheads present during the study.

Annual bluegrass seedhead populations were rated four times during the study (Table 4a and 4b). On the annual bluegrass simulated green on the 1 May rating date all treated turfgrass significantly reduced the annual bluegrass seedheads. By the last rating date, there were no significant differences found when compared to non-treated turfgrass. In contrast, on the last rating date, 20 May, on the mixed sward sight, all treated turfgrass had significantly fewer annual bluegrass seedheads when compared to on-treated turfgrass.

In conclusion, having two slightly different sites on the same research facility has proved interesting. It should be noted that the annual bluegrass only site was very difficult to get seedhead suppression data evaluations. This most likely contributed to not having any significant differences in the seedhead coverage data. It appears that the addition of the numbered compounds have contributed to the annual bluegrass seedhead suppression. Additional research evaluating timing and rate structures will assist in finding the best possible scenario to suppress annual bluegrass seedheads.

Table 1a. Evaluations of an annual bluegrass at green height for phytotoxicity, where 1 = no phytotoxicity, 3 = acceptable, and 10 = dead turf in 2015. Treatments were applied on April 12 and 29, 2015.

Treatment	Rate oz/M	Timing	(-----Phytotoxicity-----)			
			4/21	5/1	5/13	5/20
UNTREATED CHECK			1.0	1.0	1.0	1.0
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	1.7	1.0	1.0
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	1.7	1.0	1.0
MST-1401	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	1.3	1.0	1.0
MST-1407	1					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	1.3	1.0	1.0
MST-1414	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	2.3	1.0	1.0
UREA	0.003 lb N/M					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	1.3	1.0	1.0
MST-1401	2					
MST-1404	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	2.0	1.0	1.0
MST-1407	1					
MST-1404	2					

Table 1b. Evaluations of an annual bluegrass and creeping bentgrass mix at greens height for phytotoxicity, where 1 = no phytotoxicity, 3 = acceptable, and 10 = dead turf in 2015. Treatments were applied on April 12 and 29, 2015.

Treatment	Rate oz/M	Timing	(-----Phytotoxicity-----)			
			4/21	5/1	5/13	5/20
UNTREATED CHECK			1.0	1.3	1.0	1.0
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	5.3	1.0	1.0
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	5.3	1.0	1.0
MST-1401	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	6.0	1.0	1.0
MST-1407	1					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	5.3	1.0	1.0
MST-1414	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	2.7	1.0	1.0
UREA	0.003 lb N/M					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	2.3	1.0	1.0
MST-1401	2					
MST-1404	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	1.0	1.7	1.0	1.0
MST-1407	1					
MST-1404	2					

Table 2a. Color ratings taken on a scale of 0 to 10 where 0 = brown turf, 7 = acceptable, and 10 = dark green of an annual bluegrass simulated green in 2015. Treatments were applied on April 12 and 29, 2015.

Treatment	Rate oz/M	Timing	(-----Color -----)	
			5/13	5/20
UNTREATED CHECK			6.7	7.0
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	7.3	7.3
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	7.7	7.7
MST-1401	2			
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	7.3	7.7
MST-1407	1			
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	7.7	7.3
MST-1414	2			
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	7.3	7.7
UREA	0.003 lb N/M			
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	7.7	7.3
MST-1401	2			
MST-1404	2			
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	7.7	7.3
MST-1407	1			
MST-1404	2			

Table 2b. Color ratings taken on a scale of 0 to 10 where 0 = brown turf, 7 = acceptable, and 10 = dark green of an annual bluegrass, creeping bentgrass simulated green in 2015. Treatments were applied on April 12 and 29, 2015.

Treatment	Rate oz/M	Timing	(-----Color -----)		
			5/1	5/13	5/20
UNTREATED CHECK			7.0	7.0	8.0
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	9.0	9.0	9.0
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	9.0	9.0	9.0
MST-1401	2				
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	9.0	9.0	9.0
MST-1407	1				
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	9.0	9.0	9.0
MST-1414	2				
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	9.0	9.0	9.0
UREA	0.003 lb N/M				
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	9.0	9.0	9.0
MST-1401	2				
MST-1404	2				
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	9.0	9.0	9.0
MST-1407	1				
MST-1404	2				

Table 3a. Quality ratings taken on a scale of 1 to 9 where 1 = dead turf, 7 = acceptable, and 9 = highest quality of an annual bluegrass simulated green in 2015. Treatments were applied on April 12 and 29, 2015.

Treatment	Rate oz/M	Timing	(-----Quality-----)	
			5/13	5/20
UNTREATED CHECK			5.7	6.0
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.3	6.3
PROXY	5			
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	5.7	7.0
PROXY	5			
MST-1401	2			
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.3	7.2
PROXY	5			
MST-1407	1			
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.7	6.7
PROXY	5			
MST-1414	2			
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.7	7.3
PROXY	5			
UREA	0.003 lb N/M			
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.7	6.5
PROXY	5			
MST-1401	2			
MST-1404	2			
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.7	7.7
PROXY	5			
MST-1407	1			
MST-1404	2			

Table 3b. Quality ratings taken on a scale of 1 to 9 where 1 = dead turf, 7 = acceptable, and 9 = highest quality of an annual bluegrass, creeping bentgrass simulated green in 2015. Treatments were applied on April 12 and 29, 2015.

Treatment	Rate oz/M	Timing	(-----Quality-----)		
			5/1	5/13	5/20
UNTREATED CHECK			9.0	6.0	6.0
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.3	7.5	9.0
PROXY	5				
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.0	7.8	9.0
PROXY	5				
MST-1401	2				
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.0	6.7	6.3
PROXY	5				
MST-1407	1				
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.0	7.2	8.7
PROXY	5				
MST-1414	2				
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.7	7.5	8.7
PROXY	5				
UREA	0.003 lb N/M				
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.7	7.2	9.0
PROXY	5				
MST-1401	2				
MST-1404	2				
PRIMO MAXX	5 fl oz/a	50GDD/14DAT	6.7	7.0	7.5
PROXY	5				
MST-1407	1				
MST-1404	2				

Table 4a. Annual bluegrass seedhead coverage ratings of an annual bluegrass simulated green taken in 2015. Treatments were applied on April 12 and 29, 2015.

Treatment	Rate oz/M	Timing	(-----% Seedhead Coverage ¹ -----)			
			4/21	5/1	5/13	5/20
UNTREATED CHECK			0.0 a	23.3 a	97.0 a	76.7 a
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	5.0 b	85.0 a	60.0 a
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	0.0 b	66.7 a	40.0 a
MST-1401	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	3.3 b	55.0 a	40.0 a
MST-1407	1					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	1.7 b	81.7 a	43.3 a
MST-1414	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	0.0 b	73.3 a	41.7 a
UREA	0.003 lb N/M					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	0.0 b	80.0 a	68.3 a
MST-1401	2					
MST-1404	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	0.0 b	78.3 a	30.0 a
MST-1407	1					
MST-1404	2					

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

Table 4b. Annual bluegrass seedhead coverage ratings of an annual bluegrass, creeping bentgrass simulated green taken in 2015. Treatments were applied on April 12 and 29, 2015.

Treatment	Rate oz/M	Timing	(-----% Seedhead Coverage ¹ -----)			
			4/21	5/1	5/13	5/20
UNTREATED CHECK			0.0 a	0.0 a	88.3 a	75.0 a
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	0.0 a	33.3 bc	8.3 c
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	0.0 a	25.0 c	15.0 c
MST-1401	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	0.0 a	38.3 bc	15.0 c
MST-1407	1					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	0.0 a	53.3 bc	13.3 c
MST-1414	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	0.0 a	35.0 bc	10.0 c
UREA	0.003 lb N/M					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	0.0 a	43.3 bc	8.3 c
MST-1401	2					
MST-1404	2					
PRIMO MAXX PROXY	5 fl oz/a 5	50GDD/14DAT	0.0 a	0.0 a	61.7 ab	30.0 b
MST-1407	1					
MST-1404	2					

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





*Figure 3: Overview of the mixed bentgrass and annual bluegrass simulated green test area.
Photo taken 5/13/2015.*