

CONTROL OF ANNUAL BLUEGRASS SEEDHEADS ON A GOLF COURSE PUTTING GREEN USING DMI FUNGICIDES AND PLANT GROWTH REGULATOR PRODUCTS, 2019

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This study was conducted at the Joseph Valentine Turfgrass Research Center in University Park, PA on annual bluegrass maintained as a golf putting green. Mowing was performed 5 times per week at a height of 0.100 in. Soil rootzone was a modified sandy loam with a pH of 7.2 and 1.4% organic matter. Individual plots measured 3 ft x 6 ft and were arranged as a randomized complete block design with four replications. Treatments were applied with a CO²-pressurized backpack sprayer at 40 PSI with a single TeeJet AI9508 EVS nozzle and calibrated to deliver 2.0 gallons of water per 1000 ft². All treatments were applied according to a growing degree day model with application dates listed in the tables. Percent seedhead was visually assessed on a 0 to 100 percent scale where 0 = no seedheads present and 100 = entire plot area covered with seedheads. Turf quality was visually rated using a 1 to 9 scale where 1 = entire plot area dead and 9 = optimum density and uniformity. Color was visually assessed on a 1 to 9 scale where 1 = entire plot brown or dead and 9 = optimum dark green color. Injury was visually assessed on a 0 to 5 scale where 0 = no injury observed, 2 = maximum level of acceptable injury and 5 = entire area brown or dead. All data were subjected to analysis of variance and means separated at $P \leq 0.05$ according to Fisher's Protected least significant difference test

Seedheads were first observed at the site in late April, peaked on 13 May and then steadily declined in all plots through the final rating date on 3 Jun. On 13 May, all DMI-treated plots had 93 to 95% seedheads present and was similar to the nontreated control (95%) (Table 1.). Plots treated with Primo + Proxy resulted in the greatest seedhead reduction on all rating dates and no differences were observed between initial applications on 200 or 300 GDD (Table 1.). No injury was observed (Table 2.). Few significant differences in turfgrass quality were observed during the trial (Table 3.) with plots treated with Primo + Proxy having greater turfgrass quality on rating dates on 6 May and later (Table 3.). Significant differences were observed in turfgrass color during the trial (Table 4.) with seedhead load being the primary factor in reducing color ratings (Table 1.)

Table 1. Seedheads on a *Poa annua* putting green following the application of DMI fungicides, 2019.

Treatment and rate per 1000ft ²		App Code ^y	Percent seedhead ^z					
			29 Apr	6 May	13 May	20 May	27 May	3 Jun
1	Propiconazole 200 GDD (32) 1.5 fl oz	AB	36.3 ab ^x	65.0 ab	93.8 a	71.3 a	39.5 ab	39.5 ab
2	Propiconazole 300 GDD (32) 1.5 fl oz	CD	41.3 ab	67.5 a	92.5 a	71.3 a	37.0 ab	37.0 ab
3	Triticonazole 200 GDD (32) 1.5 fl oz	AB	32.8 b	66.3 ab	93.8 a	68.8 ab	40.0 ab	40.0 ab
4	Triticonazole 300 GDD (32) 1.5 fl oz	CD	37.5 ab	63.8 ab	93.8 a	63.8 bc	37.0 ab	37.0 ab
5	Metconazole 200 GDD (32) 0.275 fl oz	AB	39.5 ab	67.5 a	95.0 a	65.0 abc	42.5 a	42.5 a
6	Metconazole 300 GDD (32) 0.275 fl oz	CD	38.8 ab	60.0 b	93.8 a	63.8 bc	36.3 ab	36.3 ab
7	Nontreated	-	41.3 ab	65.0 ab	95.0 a	61.3 c	41.3 ab	41.3 ab
8	Triadimefon 200 GDD (32) 0.375 fl oz	AB	38.8 ab	65.0 ab	95.0 a	63.8 bc	35.8 ab	35.8 ab
9	Triadimefon 300 GDD (32) 0.375 fl oz	CD	42.5 a	66.3 ab	93.8 a	62.5 bc	37.5 ab	37.5 ab
10	Tebuconazole 200 GDD (32) 0.85 fl oz	AB	37.5 ab	65.0 ab	93.8 a	65.0 abc	37.5 ab	37.8 ab
11	Tebuconazole 300 GDD (32) 0.85 fl oz	CD	37.5 ab	60.0 b	95.0 a	63.8 bc	35.0 b	35.0 ab
12	Primo 200 GDD (32) 0.125 fl oz	AB						
	Proxy 200 GDD (32) 5.0 fl oz	AB	13.8 c	11.0 c	11.0 c	9.0 d	5.8 c	5.8 c
13	Primo 300 GDD (32) 0.125 fl oz	CD						
	Proxy 300 GDD (32) 5.0 fl oz	CD	15.0 c	11.8 c	11.8 c	10.3 d	6.5 c	6.5 c

^z Percent seedhead was visually assessed on a 0 to 100 percent scale where 0 = no seedheads present and 100 = entire plot area covered in seedheads.

^y Treatments were applied on the following dates: A = 30 Mar, B = 12 Apr, C = 19 Apr, and D = 5 Apr.

^x Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ according to the Fisher's Protected least significant difference.

Table 2. Turfgrass Injury on a *Poa annua* putting green following the application of DMI fungicides, 2019.

Treatment and rate per 1000ft ²		App Code ^y	Injury ^z					
			29 Apr	6 May	13 May	20 May	27 May	3 Jun
1	Propiconazole 200 GDD (32) 1.5 fl oz	AB	0.0 a ^x	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
2	Propiconazole 300 GDD (32) 1.5 fl oz	CD	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
3	Triticonazole 200 GDD (32) 1.5 fl oz	AB	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
4	Triticonazole 300 GDD (32) 1.5 fl oz	CD	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
5	Metconazole 200 GDD (32) 0.275 fl oz	AB	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
6	Metconazole 300 GDD (32) 0.275 fl oz	CD	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
7	Nontreated	-	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
8	Triadimefon 200 GDD (32) 0.375 fl oz	AB	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
9	Triadimefon 300 GDD (32) 0.375 fl oz	CD	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
10	Tebuconazole 200 GDD (32) 0.85 fl oz	AB	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
11	Tebuconazole 300 GDD (32) 0.85 fl oz	CD	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
12	Primo 200 GDD (32) 0.125 fl oz	AB						
	Proxy 200 GDD (32) 5.0 fl oz	AB	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
13	Primo 300 GDD (32) 0.125 fl oz	CD						
	Proxy 300 GDD (32) 5.0 fl oz	CD	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a

^z Injury was visually assessed on a 0 to 5 scale where 0 = no injury observed, 2 = maximum level of acceptable injury for a putting green and 5 = entire area brown or dead.

^y Treatments were applied on the following dates: A = 30 Mar, B = 12 Apr, C = 19 Apr, D = 5 Apr, E = 19 Apr, F = 9 May, G = 9 Apr, H = 23 Apr, I = 30 May, J = 17 Apr, K = 1 May, and L = 9 May.

^x Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ according to the Fisher's Protected least significant difference.

Table 3. Turfgrass quality on a *Poa annua* putting green following the application of DMI fungicides, 2019.

Treatment and rate per 1000ft ²		App Code ^y	Quality ^z					
			29 Apr	6 May	13 May	20 May	27 May	3 Jun
1	Propiconazole 200 GDD (32) 1.5 fl oz	AB	7.0 a ^x	6.0 b	6.0 b	6.0 b	6.3 b	6.3 b
2	Propiconazole 300 GDD (32) 1.5 fl oz	CD	7.0 a	6.0 b	6.0 b	6.0 b	6.3 b	6.3 b
3	Triticonazole 200 GDD (32) 1.5 fl oz	AB	7.0 a	6.0 b	6.0 b	6.0 b	6.5 b	6.5 b
4	Triticonazole 300 GDD (32) 1.5 fl oz	CD	7.0 a	6.0 b	6.0 b	6.0 b	6.3 b	6.3 b
5	Metconazole 200 GDD (32) 0.275 fl oz	AB	7.0 a	6.0 b	6.0 b	6.0 b	6.5 b	6.5 b
6	Metconazole 300 GDD (32) 0.275 fl oz	CD	7.0 a	6.0 b	6.0 b	6.0 b	6.3 b	6.3 b
7	Nontreated	-	7.0 a	6.0 b	6.0 b	6.0 b	6.0 b	6.0 b
8	Triadimefon 200 GDD (32) 0.375 fl oz	AB	7.0 a	6.0 b	6.0 b	6.0 b	6.0 b	6.0 b
9	Triadimefon 300 GDD (32) 0.375 fl oz	CD	7.0 a	6.0 b	6.0 b	6.0 b	6.0 b	6.0 b
10	Tebuconazole 200 GDD (32) 0.85 fl oz	AB	7.0 a	6.0 b	6.0 b	6.0 b	6.0 b	6.0 b
11	Tebuconazole 300 GDD (32) 0.85 fl oz	CD	7.0 a	6.0 b	6.0 b	6.0 b	6.0 b	6.0 b
12	Primo 200 GDD (32) 0.125 fl oz	AB						
	Proxy 200 GDD (32) 5.0 fl oz	AB	7.0 a	7.0 a	7.0 a	7.0 a	7.5 a	7.5 a
13	Primo 300 GDD (32) 0.125 fl oz	CD						
	Proxy 300 GDD (32) 5.0 fl oz	CD	7.0 a	7.0 a	7.0 a	7.0 a	7.5 a	7.5 a

^z Quality was visually assessed on a 1 to 9 scale where 1 = entire plot brown or dead and 9 = optimum uniformity and density.

^y Treatments were applied on the following dates: A = 30 Mar, B = 12 Apr, C = 19 Apr, D = 5 Apr, E = 19 Apr, F = 9 May, G = 9 Apr, H = 23 Apr, I = 30 May, J = 17 Apr, K = 1 May, and L = 9 May.

^x Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ according to the Fisher's Protected least significant difference.

Table 4. Turfgrass color on a *Poa annua* putting green following the application of DMI fungicides, 2019.

Treatment and rate per 1000ft ²		App Code ^y	Color ^z					
			29 Apr	6 May	13 May	20 May	27 May	3 Jun
1	Propiconazole 200 GDD (32) 1.5 fl oz	AB	7.0 a	6.0 b	5.0 b	5.3 b	6.0 b	6.0 b
2	Propiconazole 300 GDD (32) 1.5 fl oz	CD	7.0 a	6.0 b	5.0 b	5.0 b	6.0 b	6.0 b
3	Triticonazole 200 GDD (32) 1.5 fl oz	AB	7.0 a	6.0 b	5.0 b	5.3 b	6.0 b	6.0 b
4	Triticonazole 300 GDD (32) 1.5 fl oz	CD	7.0 a	6.0 b	5.0 b	5.0 b	6.0 b	6.0 b
5	Metconazole 200 GDD (32) 0.275 fl oz	AB	7.0 a	6.0 b	5.0 b	5.0 b	6.0 b	6.0 b
6	Metconazole 300 GDD (32) 0.275 fl oz	CD	7.0 a	6.0 b	5.0 b	5.0 b	6.0 b	6.0 b
7	Nontreated	-	7.0 a	6.3 b	5.0 b	5.0 b	6.0 b	6.0 b
8	Triadimefon 200 GDD (32) 0.375 fl oz	AB	7.0 a	6.3 b	5.0 b	5.3 b	6.0 b	6.0 b
9	Triadimefon 300 GDD (32) 0.375 fl oz	CD	7.0 a	6.0 b	5.0 b	5.0 b	6.0 b	6.0 b
10	Tebuconazole 200 GDD (32) 0.85 fl oz	AB	7.0 a	6.3 b	5.0 b	5.3 b	6.0 b	6.0 b
11	Tebuconazole 300 GDD (32) 0,85 fl oz	CD	7.0 a	6.0 b	5.0 b	5.3 b	6.0 b	6.0 b
12	Primo 200 GDD (32) 0.125 fl oz	AB						
	Proxy 200 GDD (32) 5.0 fl oz	AB	7.0 a	6.8 a	7.0 a	7.0 a	7.5 a	7.5 a
13	Primo 300 GDD (32) 0.125 fl oz	CD						
	Proxy 300 GDD (32) 5.0 fl oz	CD	7.0 a	6.8 a	7.0 a	7.3 a	7.5 a	7.5 a

^z Color was visually assessed on a 1 to 9 scale where 1 = entire plot brown or dead and 9 = optimum dark green color.

^y Treatments were applied on the following dates: A = 30 Mar, B = 12 Apr, C = 19 Apr, D = 5 Apr, E = 19 Apr, F = 9 May, G = 9 Apr, H = 23 Apr, I = 30 May, J = 17 Apr, K = 1 May, and L = 9 May.

^x Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ according to the Fisher's Protected least significant difference.