PREVENTIVE CONTROL OF BROWN PATCH ON A CREEPING BENTGRASS RESEARCH PUTTING GREEN WITH VARIOUS NUFARM FUNGICIDES

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INTRODUCTION

Brown patch (caused by the pathogen *Rhizoctonia solani*) is a common disease of golf course putting greens throughout Pennsylvania and many areas of the United States. Although there are several cultural management practices that can assist in reducing disease severity, the use of protective chemicals often is necessary to control the disease to acceptable levels during periods favorable for growth of the pathogen. The objective of this study was to assess the ability of various commercially available fungicide to suppress the disease.

MATERIALS & METHODS

This one-year field study was initiated at the Valentine Turfgrass Research Center located in University Park, PA. Soil was a loamy sand that was capped with a 4" layer of USGA sand with a pH of 7.2 and 1.8% organic matter. Turfgrass used for the fungicide evaluation was a 4-year old stand of 'Penn A-4' creeping bentgrass. The area was maintained as a golf course putting green and mowed five times per week to a height of 0.110 inch. All fungicide treatments were applied with a CO_2 pressurized (40 psi) sprayer equipped with an air-induction flat fan nozzle (TeeJet, AI9508EVS) calibrated to deliver 2.0 gal of water 1000 ft^{-2}. Treatments were initiated on 2 Jun and re-applied according to the application schedule. All treatments and application dates are listed in the data tables.

Plots measured 3 ft x 6 ft and were arranged in a randomized complete block design with four replications. Brown patch severity was visually assessed by estimating the disease severity on a

Figure 1. Disease pressure on an A-4 creeping bentgrass green at the Valentine Turfgrass Research Center, 2016.

0 to 100% scale where 0 = no disease present and 100 = entire plot area affected by disease. Red leaf spot (caused by a *Dreschlera* sp.) severity was assessed by estimating the disease severity on a 0 to 100% scale where 0 = no disease present and 100 = entire plot area affected by disease. Dollar spot (caused by the pathogen *Sclerotinia homoeocarpa*) was assessed by counting the number of infection centers within each plot. Turfgrass quality and/or color were also visually rated on a 1 to 9 scale where 1 = entire plot brown or dead and 9 = optimum greenness and/or density. All data were subjected to analysis of variance and means were separated at $P \leq 0.05$ according to Fisher's Protected least significant difference test.

RESULTS & DISCUSSION

Brown patch (BP) was observed at the site on 29 Jun. Disease pressure increased very slowly through Jul and peaked on 17 Aug. On 17 Aug, all treatments had similar percent BP (0-7%)

and were all lower than the nontreated control plots (54% BP) (Table 1).

Dollar spot and red leaf spot were observed at the site on 10 and 29 Jun, respectively. Severity for both diseases was low and no differences among treatments were observed on any rating date (Tables 2 and 3).

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Table 1. Brown patch severity on a creeping bentgrass/annual bluegrass putting green following the application of various products, 2016.

		Brown patch[z]		
Treatment and rate per 1000 ft^2	Application code[y]	29 Jun	20 Jul	17 Aug
1 S-2200 0.31 fl oz	ABCDEF	0 a[x]	0 a	1 b
2 S-2200 0.28 fl oz	ABCDEF	0 a	0 a	0 b
3 Tourney 0.37 oz	ABCDEF	0 a	0 a	0 b
4 Tourney 0.28 oz	ABCDEF	0 a	0 a	0 b
5 Tourney 0.28 oz + S-2200 0.28 fl oz	ABCDEF	0 a	0 a	0 b
6 Emerald 0.13 oz	ABCDEF	2 a	0 a	0 b
7 Banner Maxx 1.0 fl oz	ABCDEF	0 a	0 a	7 b
8 Nontreated	-	0 a	5 a	54 a

[z] Brown patch (BP) was visually assessed on a 0 to 100% scale where 0 = no disease present and 100 = entire plot area affected by BP.

[y] Treatments were applied on the following dates: A = 2 Jun, B= 16 Jun, C = 30 Jun, D = 14 Jul, E = 29 Jul, and F = 11 Aug.

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

Table 2. Dollar spot severity on a creeping bentgrass/annual bluegrass putting green following the application of various products, 2016.

Treatment and rate per 1000 ft^2	Application code[y]	Dollar spot[z]			
		10 Jun	29 Jun	20 Jul	17 Aug
1 S-2200 0.31 fl oz	ABCDEF	0.0 a[x]	0.0 a	0.0 a	0.0 a
2 S-2200 0.28 fl oz	ABCDEF	0.5 a	0.0 a	0.0 a	0.0 a
3 Tourney 0.37 oz	ABCDEF	0.3 a	0.0 a	0.0 a	0.0 a
4 Tourney 0.28 oz	ABCDEF	0.5 a	0.0 a	0.0 a	0.0 a
5 Tourney 0.28 oz + S-2200 0.28 fl oz	ABCDEF	0.0 a	0.0 a	0.0 a	0.0 a
6 Emerald 0.13 oz	ABCDEF	0.5 a	0.0 a	0.0 a	0.5 a
7 Banner Maxx 1.0 fl oz	ABCDEF	0.0 a	0.0 a	0.0 a	0.0 a
8 Nontreated	-	0.0 a	0.0 a	0.0 a	0.0 a

[z] Dollar spot severity was assessed by counting the number of infection centers per plot.

[y] Treatments were applied on the following dates: A = 2 Jun, B= 16 Jun, C = 30 Jun, D = 14 Jul, E = 29 Jul, and F = 11 Aug.

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

Table 3. Red leaf spot severity on a creeping bentgrass/annual bluegrass putting green following the application of varous products, 2016.

Treatment and rate per 1000 ft^2	Application code[y]	Red leaf spot[x]
		29 Jun
1 S-2200 0.31 fl oz	ABCDEF	0.0 a[x]
2 S-2200 0.28 fl oz	ABCDEF	0.0 a
3 Tourney 0.37 oz	ABCDEF	0.0 a
4 Tourney 0.28 oz	ABCDEF	0.0 a
5 Tourney 0.28 oz + S-2200 0.28 fl oz	ABCDEF	0.0 a
6 Emerald 0.13 oz	ABCDEF	0.0 a
7 Banner Maxx 1.0 fl oz	ABCDEF	0.0 a
8 Nontreated	-	0.5 a

[z] Red leaf spot (RLS) was visually assessed on a 0 to 100% scale where 0 = no disease present and 100 = entire plot area affected by RLS.

[y] Treatments were applied on the following dates: A = 2 Jun, B= 16 Jun, C = 30 Jun, D = 14 Jul, E = 29 Jul, and F = 11 Aug.

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

Table 4. Quality on a creeping bentgrass/annual bluegrass putting green following the application of various products, 2016.

	Treatment and rate per 1000 ft^2	Application	Quality[z] 10 Jun	29 Jun	20 Jul	17 Aug
1	S-2200 0.31 fl oz	ABCDEF	8.0 a[x]	8.0 a	8.0 a	8.0 a
2	S-2200 0.28 fl oz	ABCDEF	8.0 a	8.0 a	8.0 a	8.0 a
3	Tourney 0.37 oz	ABCDEF	8.0 a	8.0 a	8.0 a	7.8 a
4	Tourney 0.28 oz	ABCDEF	8.0 a	8.0 a	8.0 a	8.0 a
5	Tourney 0.28 oz + S-2200 0.28 fl oz	ABCDEF	8.0 a	7.8 a	8.0 a	8.0 a
6	Emerald 0.13 oz	ABCDEF	8.0 a	8.0 a	8.0 a	7.5 ab
7	Banner Maxx 1.0 fl oz	ABCDEF	8.0 a	8.0 a	8.0 a	7.5 ab
8	Nontreated	-	8.0 a	8.0 a	8.0 a	7.0 b

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

[y] Treatments were applied on the following dates: A = 2 Jun, B= 16 Jun, C = 30 Jun, D = 14 Jul, E = 29 Jul, and F = 11 Aug.

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

Table 5. Color on a creeping bentgrass/annual bluegrass putting green following the application of various products, 2016.

	Treatment and rate per 1000 ft^2	Application	Color[z] 10	29	20	17
1	S-2200 0.31 fl oz	ABCDEF		8.0 a	8.0 a	8.0 a
2	S-2200 0.28 fl oz	ABCDEF	8.0	8.0 a	8.0 a	8.0 a
3	Tourney 0.37 oz	ABCDEF	8.0	8.0 a	7.8 a	8.0 a
4	Tourney 0.28 oz	ABCDEF	8.0	8.0 a	8.0 a	8.0 a
5	Tourney 0.28 oz + S-2200 0.28 fl oz	ABCDEF	8.0	8.0 a	7.8 a	8.0 a
6	Emerald 0.13 oz	ABCDEF	8.0	8.0 a	8.0 a	8.0 a
7	Banner Maxx 1.0 fl oz	ABCDEF	8.0	8.0 a	8.0 a	7.0 b
8	Nontreated	-	8.0	8.0 a	7.8 a	6.3 c

[z] Color was visually assessed on a 1 to 9 scale where 1 = entire plot brown and 9 = optimum greenness.

[y] Treatments were applied on the following dates: A = 2 Jun, B= 16 Jun, C = 30 Jun, D = 14 Jul, E = 29 Jul, and F = 11 Aug.

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