PREVENTIVE CONTROL OF SUMMER DISEASES ON A CREEPING BENTGRASS RESEARCH GREEN WITH VARIOUS AGBIOME FUNGICIDES

T. Lulis, C. Stephens, P. Rollo, D. Carroll, and J.E. Kaminski

Department of Plant Science
The Pennsylvania State University

INTRODUCTION

Brown Patch (caused by the pathogen *Rhizoctonia solani*) and dollar spot (caused by the pathogen *Sclerotinia homoeocarpa*) are common diseases of cool season grasses throughout Pennsylvania. 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 during periods favorable for growth of the respective pathogens. The objective of this study was to evaluate various commercially available and experimental fungicides for their ability to preventively suppress summer diseases.

Figure 1. Disease on an 'A-4' creeping bentgrass putting green at the Joseph Valentine Research Center in 2016.

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 (*Agrostis stolonifera*). 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 23 May and reapplied according to the application schedule. All treatments and application dates are listed in the data tables.

Plots measured 3 ft x 6 ft and arranged as a randomized complete block design with four replications. Brown patch (BP) severity was visually rated on a 0 to 100% scale where 0 = no disease symptoms present and 100 = entire plot area affected by brown patch. Dollar spot severity was assessed by counting the number of infection centers (DSIC) within each plot. Turfgrass quality and/or color were visually rated on a 1 to 9 scale where 1 = entire plot brown or dead and 9 = optimum greenness and/or density. Injury was rated on a 0 to 5 scale where 0 = no injury present and 5 = entire plot 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.

RESULTS & DISCUSSION

Brown patch was first observed at the site on 29 Jul. Disease pressure increased through Jul and disease pressure peaked on 12 Aug. On 29 Jun, plots treated with Iprodione (2.0 fl oz, 14-day), Howler (0.5 g/100ml, 7-day) + Capsil (6.0 fl oz, 7-day), and Howler (0.5 g/100ml, 7-day) + Iprodione (1.0 fl oz, 14-day) had less BP (1 to 3% BP) when compared to the nontreated control (14% BP) (Table 1). Under moderate BP pressure observed on 20 Jul, plots treated with Iprodione (2.0 fl oz, 14-day) and Howler (0.5 g/100ml, 7-day) + Capsil (6.0 fl oz, 7-day) had less percent BP when compared to all other treatments including the nontreated control. When plots were rated 4 wks after the final applications (i.e., Aug 12), no differences in percent BP were observed among all treatments.

Dollar spot and red leaf spot were observed at the site during the study, but disease pressure was low (Tables 2 and 3).

ACKNOWLEDGEMENTS

We thank AgBiome, the Pennsylvania Turfgrass Council, and the staff at the Joseph Valentine Turfgrass Research Facility for supporting this research.

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

Treatment and rate per 1000 ft^2	Application code[y]	Brown patch[z] 29 Jun	20 Jul	12 Aug
1 Iprodione 2 fl oz	ACEGI	1.3 b[x]	11.3 b	55.0 a
2 Howler 0.5 g per 100ml	ABCDEFGHI	3.3 b	15.0 b	55.0 a
Capsil 6 fl oz per 100 gal	ABCDEFGHI			
3 Howler 0.5 g per 100 ml	ACEGI	13.8 a	37.5 a	58.8 a
4 Companion 4 fl oz	ACEGI	11.3 a	47.5 a	47.5 a
5 Howler 0.5 g per 100 ml	ACEGI	1.3 b	22.5 a	47.5 a
Iprodione 1 fl oz	ACEGI			
6 Nontreated	-	13.8 a	35.0 a	52.5 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 = 23 May, B= 31 May, C = 7 Jun, D = 14 Jun, E = 21 Jun, F= 28 Jun, G= 5 Jul, H= 12 Jul, I= 19 Jul.

[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 putting green following the application of various products, 2016.

Treatment and rate per 1000 ft^2	Application	Dollar spot[z]			
		10 Jun	29 Jun	20 Jul	12 Aug
1 Iprodione 2 fl oz	ACEGI	0.0 a[x]	0.0 a	0.0 a	0.0 a
2 Howler 0.5 g per 100ml	ABCDEFGHI	0.0 a	0.3 a	0.3 a	3.0 a
Capsil 6 fl oz per 100 gal	ABCDEFGHI				
3 Howler 0.5 g per 100 ml	ACEGI	0.0 a	1.0 a	1.3 a	6.3 a
4 Companion 4 fl oz	ACEGI	0.0 a	0.8 a	1.0 a	2.5 a
5 Howler 0.5 g per 100 ml	ACEGI	0.0 a	0.8 a	0.0 a	3.5 a
Iprodione 1 fl oz	ACEGI				
6 Nontreated	-	0.0 a	2.0 a	0.5 a	2.8 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 = 23 May, B= 31 May, C = 7 Jun, D = 14 Jun, E = 21 Jun, F= 28 Jun, G= 5 Jul, H= 12 Jul, I= 19 Jul.

[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 putting green following the application of various products, 2016.

Treatment and rate per 1000 ft^2	Application	Red leaf spot[x]
		29 Jun
1 Iprodione 2 fl oz	ACEGI	3.8 a[x]
2 Howler 0.5 g per 100ml	ABCDEFGHI	3.3 a
Capsil 6 fl oz per 100 gal	ABCDEFGHI	
3 Howler 0.5 g per 100 ml	ACEGI	5.0 a
4 Companion 4 fl oz	ACEGI	5.0 a
5 Howler 0.5 g per 100 ml	ACEGI	3.3 a
Iprodione 1 fl oz	ACEGI	
6 Nontreated	-	0.0 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 = 23 May, B= 31 May, C = 7 Jun, D = 14 Jun, E = 21 Jun, F= 28 Jun, G= 5 Jul, H= 12 Jul, I= 19 Jul.

[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 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	12 Aug
1 Iprodione 2 fl oz	ACEGI	8.0 a[x]	7.3 a	8.0 a	7.0 a
2 Howler 0.5 g per 100ml	ABCDEFGHI	8.0 a	7.3 a	8.0 a	6.5 a
Capsil 6 fl oz per 100 gal	ABCDEFGHI				
3 Howler 0.5 g per 100 ml	ACEGI	8.0 a	7.0 a	7.8 a	6.3 a
4 Companion 4 fl oz	ACEGI	8.0 a	7.0 a	7.8 a	6.5 a
5 Howler 0.5 g per 100 ml	ACEGI	8.0 a	7.3 a	8.0 a	6.5 a
Iprodione 1 fl oz	ACEGI				
6 Nontreated	-	8.0 a	7.0 a	7.8 a	6.5 a

[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 = 23 May, B= 31 May, C = 7 Jun, D = 14 Jun, E = 21 Jun, F= 28 Jun, G= 5 Jul, H= 12 Jul, I= 19 Jul.

[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 putting green following the application of various products, 2016.

Treatment and rate per 1000 ft^2	Application	Color[z]			
		10 Jun	29 Jun	20 Jul	12 Aug
1 Iprodione 2 fl oz	ACEGI	8.0 a[x]	7.3 a	8.0 a	6.0 a
2 Howler 0.5 g per 100ml	ABCDEFGHI	8.0 a	7.0 a	7.5 ab	6.0 a
Capsil 6 fl oz per 100 gal	ABCDEFGHI				
3 Howler 0.5 g per 100 ml	ACEGI	8.0 a	7.0 a	7.5 ab	6.0 a
4 Companion 4 fl oz	ACEGI	8.0 a	7.0 a	7.0 b	6.0 a
5 Howler 0.5 g per 100 ml	ACEGI	8.0 a	7.5 a	7.5 ab	6.0 a
Iprodione 1 fl oz	ACEGI				
6 Nontreated	-	8.0 a	7.0 a	7.0 b	6.0 a

[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 = 23 May, B= 31 May, C = 7 Jun, D = 14 Jun, E = 21 Jun, F= 28 Jun, G= 5 Jul, H= 12 Jul, I= 19 Jul.

[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.