

Brown Ring Patch Disease Control on Annual Bluegrass Putting Greens 2021 Report

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The Bottom Line: Thirty-one combinations of experimental and commercially available fungicide treatments were tested against an untreated control for their ability to control brown ring patch (BRP) disease (*Waitea circinata* var. *circinata*) on an annual bluegrass (*Poa annua*) putting green in Riverside, CA. All treatments were applied curatively on January 24, 2021 and repeated either two (February 7) or three (February 16) weeks later. A combination of natural disease decline and treatment effects resulted in almost no disease symptoms present on February 16. On April 8, disease symptoms returned on select plots including the untreated control (disease severity = 2.4 on a scale of 0-5, and 3.4 nine days later). Treatments containing Premion (PCNB, tebuconazole) + Par SG (pigment), Oximus (azoxystrobin, tebuconazole), Ascernity (benzovindiflupyr, difenoconazole), or Mirage Stressgard (tebuconazole) exhibited the longest residual activity against BRP as evidenced by no disease activity at 69 days since previous treatment. Both BRP disease control and *Poa* seedhead control (likely from DMI fungicides) contributed to turfgrass visual quality differences among treatments. All treatments were applied again on April 19 and most were effective in controlling BRP even though disease activity in the control also subsided naturally. Overall, results of this study demonstrated several fungicides and combinations that are effective against BRP including four products that demonstrated exceptional residual control.

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Introduction

Brown ring patch (BRP) caused by the fungus *Waitea circinata* var. *circinata* is a disease mostly found on annual bluegrass (*Poa annua*) and roughstalk bluegrass (*Poa trivialis*) putting greens. The causal agent is closely related to *Rhizoctonia* species with symptoms occurring as small yellow rings that can enlarge and turn brown and sunken. Brown ring patch usually occurs when daytime temperatures are between 65-95F and under low nitrogen fertility. At the turfgrass research facility in Riverside, widespread disease occurrence has only happened in recent years and usually during the months from January thru April. In general, most fungicides that are effective against *Rhizoctonia* diseases are also effective against BRP. A notable exception was reported to be thiophanate-methyl. Previous studies have also demonstrated differences among fungicides in regards to both speed and longevity of BRP control.

Objectives

This study was conducted to evaluate efficacy of 31 different fungicide treatments to control brown ring patch disease on annual bluegrass (*Poa annua*) putting greens. An unplanned, secondary objective was to evaluate residual disease control among the fungicide treatments.

Materials and Methods

The study was conducted on mature annual bluegrass 'Peterson's Creeping' turf established in 2007 on a Hanford fine sandy loam amended with sand. Turf was mowed 3-5 days/wk at 0.125 inches. Fungicide treatments were applied curatively on January 24, 2021 and thereafter as shown in Table 1. Treatments were applied using a CO₂-powered backpack sprayer equipped with TeeJet 8003VS nozzles calibrated to deliver 2 gallons/1000 ft² of carrier. Experimental design was a complete randomized block with 5 replications. Plot size was 4 ft × 6 ft with no alleys. Environmental data throughout the study period were collected from an on-site weather station and are presented in Appendix 1.

Plots were evaluated for BRP disease severity on a 0 to 5 scale, where 0 is no disease and 5 is 100% of the plot is diseased, as well as for turfgrass visual quality (1-9; 9=best). Data were analyzed using analysis of variance for each evaluated trait and rating event separately and the means were compared using the Fisher's protected least significant difference (LSD) test at the 0.05 probability level ($P \leq 0.05$).

Results

Brown ring patch disease was noted on the research green on January 7, 2021 and severity could be considered 4 or 5 on a 0-5 scale (data not shown). By the time the study could be initiated on January 24, BRP disease activity had subsided to <1.5 and treatment applications made on January 24 and repeated on either February 7 or 16 resulted in almost no disease activity on February 16 when only one ring was observed in a plot on that day (data not shown). On April 8, disease symptoms returned on select plots including the untreated control (disease severity = 2.4 on a scale of 0-5, and 3.4 nine days later). Treatments containing Premion (PCNB, tebuconazole) + Par SG (pigment), Oximus (azoxystrobin, tebuconazole), Ascernity (benzovindiflupyr, difenoconazole), or Mirage Stressgard (tebuconazole) exhibited the longest residual activity against BRP as evidenced by no disease activity at 69 days since previous treatment (Table 2). Both BRP disease control and *Poa* seedhead control (likely from DMI fungicides) contributed to turfgrass visual quality differences among treatments (Table 3). All treatments were applied again on April 19 and most were effective in controlling BRP even though disease activity in the control also subsided naturally (Tables 2 and 3). Overall, results of this study demonstrated several fungicides and combinations that are effective against BRP including four products that demonstrated exceptional residual control (Fig. 1).

Tables and Figures

Table 1. Fungicide treatments tested against brown ring patch disease. Riverside, CA. 2021.

No.	Treatment	Active ingredient	Company	Rate	Timing
1	Untreated Control	-	-	-	-
2	Premion	PCNB, tebuconazole	AMVAC	4.0 oz/M	ACM
	PAR SG	pigment	Harrell's	0.37 oz/M	
3	Premion	PCNB, tebuconazole	AMVAC	6.0 oz/M	ACM
	PAR SG	pigment	Harrell's	0.37 oz/M	
4	Premion	PCNB, tebuconazole	AMVAC	8.0 oz/M	ACM
	PAR SG	pigment	Harrell's	0.37 oz/M	
5	Turfcide 400	PCNB	AMVAC	8.0 oz/M	ACM
	PAR SG	pigment	Harrell's	0.37 oz/M	
6	Oximus	azoxystrobin, tebuconazole	AMVAC	0.8 oz/M	ACM
7	Oximus	azoxystrobin, tebuconazole	AMVAC	1.0 oz/M	ACM
8	Oximus	azoxystrobin, tebuconazole	AMVAC	1.6 oz/M	ACM
9	Rayora	flutriafol	FMC	1.4 oz/M	ACM
10	Traction	fluazinam, tebuconazole	Nufarm	1.3 oz/M	ACM
11	Ascernity	benzovindiflupyr, difenoconazole	Syngenta	1.0 oz/M	ACM
12	Briskway	azoxystrobin, difenoconazole	Syngenta	0.9 oz/M	ACM
13	Posterity Forte	pydiflumetofen, propiconazole, azoxystrobin	Syngenta	0.84 oz/M	ACM
14	Posterity XT	pydiflumetofen, propiconazole, azoxystrobin	Syngenta	1.5 oz/M	ACM
15	Maxtima	mefentrifluconazole	BASF	0.6 oz/M	ACM
16	Maxtima	mefentrifluconazole	BASF	0.6 oz/M	ADM
17	Mirage Stressgard	tebuconazole	Bayer	1.5 oz/M	ACM
18	Mirage Stressgard	tebuconazole	Bayer	1.5 oz/M	ADM
19	UCR 003	<i>classified</i>	-	-	ACM
20	UCR 003	<i>classified</i>	-	-	ACM
21	UCR 003	<i>classified</i>	-	-	ACM
22	UCR 003	<i>classified</i>	-	-	ADM
23	UCR 003	<i>classified</i>	-	-	ADM
24	UCR 003	<i>classified</i>	-	-	ADM
25	UCR 004	<i>classified</i>	-	-	ACM
26	UCR 004	<i>classified</i>	-	-	ACM
27	UCR 005	<i>classified</i>	-	-	ACM
	Secure	fluazinam	Syngenta	0.5 oz/M	
28	UCR 005	<i>classified</i>	-	-	ACM
	Medallion SC	fludioxonil	Syngenta	1.3 oz/M	
	Secure	fluazinam	Syngenta	0.33 oz/M	
29	UCR 006	<i>classified</i>	-	-	ACM
30	UCR 006	<i>classified</i>	-	-	ACM
31	UCR 007	<i>classified</i>	-	-	ACM
32	UCR 007	<i>classified</i>	-	-	ACM

Application codes (timing): A = 1/24/21; C = 2/7/21; D = 2/16/21; M = 4/19/21

Table 2. Effects of fungicide treatments on brown ring patch disease severity (0-5; 5 = worst) on annual bluegrass (*Poa annua*) turf. Riverside, CA. 2021. All treatments were previously applied on 2/7/21, except treatments 16, 18, and 22-24, which were previously applied on 2/16/21. All treatments were then applied again on 4/19/21.

No.	Treatment	Disease Severity (0-5; 5 = worst)			
		4/8/21	4/17/21	4/26/21	5/2/21
1	Untreated Control	2.4 AB*	3.4 A-C	0.2 EF	0.0 C
2	Premion** + Par SG	0.2 GH	0.8 H-K	0.0 F	0.0 C
3	Premion + Par SG	0.0 H	0.4 I-K	0.0 F	0.0 C
4	Premion + Par SG	0.0 H	0.0 K	0.0 F	0.0 C
5	Turficide 400 + Par SG	0.8 E-H	2.4 B-G	0.2 EF	0.2 C
6	Oximus	0.0 H	1.0 G-K	0.0 F	0.0 C
7	Oximus	0.0 H	0.4 I-K	0.0 F	0.0 C
8	Oximus	0.4 F-H	0.0 K	0.0 F	0.0 C
9	Rayora	0.8 E-H	2.0 C-H	0.8 C-F	0.0 C
10	Traction	0.4 F-H	0.4 I-K	0.0 F	0.0 C
11	Ascernity	0.2 GH	0.0 K	0.0 F	0.0 C
12	Briskway	0.8 E-H	1.2 F-K	0.4 D-F	0.0 C
13	Posterity Forte	2.2 A-C	3.0 A-E	1.6 B-D	0.2 C
14	Posterity XT	2.6 A	4.2 A	1.6 B-D	0.2 C
15	Maxtima	0.8 E-H	1.6 E-J	1.2 C-F	0.2 C
16	Maxtima	0.6 E-H	0.2 JK	0.6 C-F	0.6 BC
17	Mirage Stressgard	1.0 D-H	0.0 K	0.0 F	0.0 C
18	Mirage Stressgard	0.0 H	0.2 JK	0.0 F	0.0 C
19	UCR 003	0.6 E-H	1.8 D-I	0.4 D-F	0.0 C
20	UCR 003	1.6 A-E	3.2 A-D	1.8 BC	0.2 C
21	UCR 003	1.0 D-H	2.6 B-F	1.4 B-E	0.2 C
22	UCR 003	0.6 E-H	2.2 C-H	1.2 C-F	0.2 C
23	UCR 003	1.0 D-H	2.0 C-H	1.4 B-E	0.2 C
24	UCR 003	0.2 GH	2.0 C-H	0.6 C-F	0.0 C
25	UCR 004	0.6 E-H	0.8 H-K	0.2 EF	0.2 C
26	UCR 004	1.4 B-F	2.6 B-F	2.6 AB	1.0 AB
27	UCR 005 + Secure	2.4 AB	3.8 AB	2.6 AB	1.2 AB
28	UCR 005 + Secure + Medallion SC	2.0 A-D	3.4 A-C	3.2 A	1.6 A
29	UCR 006	0.0 H	0.2 JK	0.2 EF	0.2 C
30	UCR 006	0.4 F-H	0.2 JK	0.0 F	0.2 C
31	UCR 007	1.6 A-E	2.6 B-F	1.0 C-F	0.2 C
32	UCR 007	1.2 C-G	3.0 A-E	1.4 B-E	0.2 C

* Means followed by the same letter or by no letter in a column are not significantly different (P=0.05).

** For fungicides rates, refer to Table 1.

Table 3. Effects of fungicide treatments on turf quality (1-9; 9 = best) in response to brown ring patch disease on annual bluegrass (*Poa annua*) turf. Riverside, CA. 2021. . All treatments were previously applied on 2/7/21, except treatments 16, 18, and 22-24, which were previously applied on 2/16/21. All treatments were then applied again on 4/19/21.

No.	Treatment	Turf Quality (1-9; 9 = best)			
		4/8/21	4/17/21	4/26/21	5/2/21
1	Untreated Control	5.0 E-G*	3.6 J-M	5.8 D-G	5.8 B-E
2	Premion** + Par SG	6.4 A-C	6.0 AE	6.8 A-C	6.2 A-C
3	Premion + Par SG	6.6 AB	6.2 A-D	7.0 AB	6.6 A
4	Premion + Par SG	6.8 A	6.8 A	7.2 A	6.6 A
5	Turficide 400 + Par SG	6.4 A-C	4.0 H-L	6.6 A-D	6.4 AB
6	Oximus	6.6 AB	5.4 B-G	6.2 B-F	6.0 A-D
7	Oximus	6.8 A	5.6 A-F	5.6 E-H	6.0 A-D
8	Oximus	5.8 A-F	6.6 AB	6.2 B-F	5.8 B-E
9	Rayora	5.6 B-G	5.0 D-I	5.6 E-H	6.0 A-D
10	Traction	6.0 A-E	5.6 A-F	5.8 D-G	6.0 A-D
11	Ascernity	6.2 A-D	6.0 A-E	6.2 B-F	5.8 B-E
12	Briskway	6.0 A-E	5.2 C-H	5.6 E-H	5.8 B-E
13	Posterity Forte	5.4 C-G	3.6 J-M	5.4 F-H	5.8 B-E
14	Posterity XT	4.6 G	2.4 M	6.4 A-E	6.0 A-D
15	Maxtima	6.2 A-D	5.0 D-I	5.4 F-H	5.4 DE
16	Maxtima	6.2 A-D	6.2 ABCD	5.6 E-H	5.6 C-E
17	Mirage Stressgard	5.6 B-G	6.2 A-D	6.4 A-E	6.4 AB
18	Mirage Stressgard	6.6 AB	6.2 A-D	6.4 A-E	6.2 A-C
19	UCR 003	5.8 A-F	4.8 E-J	5.6 E-H	6.0 A-D
20	UCR 003	5.4 C-G	3.4 K-M	5.8 D-G	5.8 B-E
21	UCR 003	5.2 D-G	4.0 H-L	5.2 GH	5.8 B-E
22	UCR 003	6.0 A-E	4.4 F-L	5.4 FGH	6.0 A-D
23	UCR 003	5.8 A-F	4.8 E-J	6.0 C-G	5.8 B-E
24	UCR 003	6.6 AB	4.6 F-K	6.0 C-G	6.0 A-D
25	UCR 004	5.8 A-F	5.2 C-H	5.6 E-H	5.6 C-E
26	UCR 004	5.8 A-F	3.8 I-L	4.8 H	5.2 E
27	UCR 005 + Secure	5.0 EFG	3.2 LM	5.2 GH	5.6 C-E
28	UCR 005 + Secure + Medallion SC	5.0 EFG	3.2 LM	4.8 H	5.4 DE
29	UCR 006	6.8 A	6.4 A-C	6.2 B-F	6.2 A-C
30	UCR 006	5.8 A-F	6.0 A-E	5.8 D-G	5.8 B-E
31	UCR 007	4.8 FG	4.2 G-L	5.6 E-H	5.8 B-E
32	UCR 007	6.2 A-D	4.0 H-L	5.8 D-G	6.2 A-C

* Means followed by the same letter or by no letter in a column are not significantly different (P=0.05).

** For fungicides rates, refer to Table 1.



Figure 1. Brown ring patch disease pressure in plot of one of the fungicide treatments (left) compared to treatment 4 (Premion + Par SG; right), 59 days after previous application. Photos taken on April 17, 2021. Riverside, CA.

Appendix 1. Environmental data for the study period (January 2021 to April 2021) for the Los Angeles Basin derived from California Irrigation Management Information System (CIMIS) Station #44 (U.C. Riverside).

Month Year	Total ETo (in ^A)	Total Precip (in)	Avg Sol Rad (Ly/day ^B)	Avg Vap Pres (mBars ^C)	Avg Max Air Temp (°F ^D)	Avg Min Air Temp (°F)	Avg Air Temp (°F)	Avg Max Rel Hum (%)	Avg Min Rel Hum (%)	Avg Rel Hum (%)	Avg Dew Point (°F)	Avg Wind Speed (mph ^E)	Avg Soil Temp (°F)
Jan 2021	2.98 ^F	1.63	304 ^F	6.3	67.5 ^F	43.4 ^F	55.1 ^F	70 ^F	28 ^F	47 ^F	31.7 ^F	4.0	50.9
Feb 2021	3.51 ^F	0.01	409 ^F	6.9 ^F	68.0	44.2	55.5	71	27	47 ^F	33.0 ^F	4.1 ^F	53.3
Mar 2021	4.66	1.14	503 ^F	7.6 ^F	67.6	43.4 ^F	54.8 ^F	80	32	54 ^F	36.1 ^F	4.0 ^F	55.5
Apr 2021	5.87	0.00	583 ^F	9.7 ^F	75.5	50.6 ^F	61.9	80	33	54 ^F	43.1 ^F	4.4 ^F	62.3
Tots/Avgs	17.00	2.80	450	7.6	69.7	45.4	56.8	75	30	51	36.0	4.1	55.5

A 25.4 mm = inch

B W/m² = 2.065 Ly/day

C kPa = 10 mBars

D °C = 5/9 × (°F -32)

E m/s = 2.24 mph

^F One or more daily values flagged