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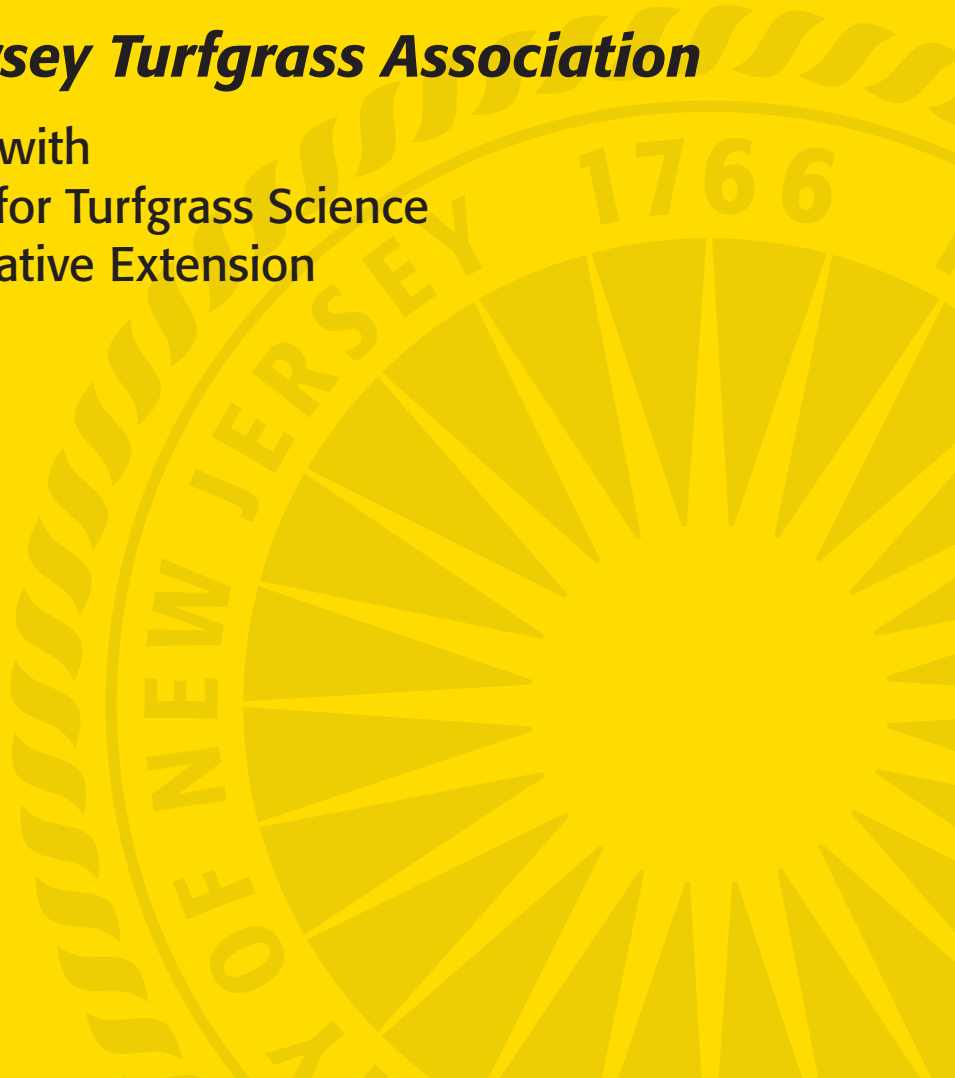

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The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State University of New Jersey in cooperation with the New Jersey Turfgrass Association. The purpose of this document is to provide a forum for the dissemination of information and the exchange of ideas and knowledge. The proceedings provide turfgrass managers, research scientists, extension specialists, and industry personnel with opportunities to communicate with co-workers. Through this forum, these professionals also reach a more general audience, which includes the public.

This publication includes lecture notes of papers presented at the 2008 New Jersey Turfgrass Expo. Publication of these lectures provides a readily available source of information covering a wide range of topics and includes technical and popular presentations of importance to the turfgrass industry.

This proceedings also includes research papers that contain original research findings and reviews of selected subjects in turfgrass science. These papers are presented primarily to facilitate the timely dissemination of original turfgrass research for use by the turfgrass industry.

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Dr. Ann Brooks Gould, Editor
Dr. Bruce B. Clarke, Coordinator

PREVENTIVE CONTROL OF DOLLAR SPOT WITH FUNGICIDES AND BIORATIONAL PRODUCTS ON A CREEPING BENTGRASS GREEN, 2008

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Fungicides were evaluated in 2008 for their ability to control dollar spot (caused by *Sclerotinia homoeocarpa*) at the Rutgers Turf Research Farm in North Brunswick, NJ on creeping bentgrass (*Agrostis stolonifera*) maintained under golf course greens conditions. Turf was established September 2007 on a Nixon on loam with a pH of 6.3. Mowing was performed daily at a height of 0.125 inches with clippings collected. The site was irrigated as needed to prevent drought stress.

Fertilizer was applied as 20-0-0 (0.15 lb nitrogen (N)/1000 ft^2) and 46-0-0 (0.5 lb N/1000 ft^2) on 27 April, 34-0-0 (0.5 lb N/1000 ft^2) on 7 May and (0.25 lb N/1000 ft^2) on 1 and 26 August, and 15.5-0-0 (0.5 lb N/1000 ft^2) on 1 June. Dimension 2EW (12 fl oz/A) was applied on 1 May and 26 June for pre-emergence weed control. ProStar 70W (2.9 oz/1000 ft^2) and Chipco Signature 80WG (4.0 oz/1000 ft^2) were applied on 15 July to suppress brown patch (caused by *Rhizoctonia solani*) and Pythium blight (caused by *Pythium aphanidermatum*). Localized dry spots were suppressed with the wetting agent Tricure 100LC (6.0 oz/1000 ft^2) on 7 May, 10 June, 12 July and 2 August. Insect pests were controlled with Telstar GC 0.67F (0.25 oz/1000 ft^2) on 8 July. The site was aerified to a depth of 3.5 inch with 0.5-inch hollow tines on 4-inch centers and topdressed with a sand root zone mix on 1 June. Plots were 3 x 5 ft and were arranged in a randomized complete block with four replications.

Fungicides were applied in water equivalent to 1.9 gal/1000 ft^2 with a $C0_2$ powered sprayer at 30 psi using TeeJet 8003VS flat fan nozzles. Treatments (trt) were initiated on 22 May when environmental conditions were conducive to dollar spot development. Fungicides were reapplied at the appropriate intervals as indicated in Tables 1A, 1B, and 1C. Turf was visually evaluated for number of dollar spot infection centers per plot on 9 and 19 June, 1, 11, and 21 July, 1, 11, 21, and 29 August, and 10 September, and for percent turf area infested with copper spot (caused by *Gloeocercospora sorghii*) on 11 and 29 August. Turf quality was rated on 4 September using a 1 to 9 scale, where 9 = best turf quality and 5 = acceptable quality. No phytotoxicity was observed during the study period. Data were subjected to analysis of variance and means were separated using the Waller-Duncan *k*-ratio *t*-test (*k* = 100).

Dollar spot was first observed on 2 June and became uniform throughout the study by 9 June (Table 1A). The disease progressed rapidly throughout June and July, peaking on 21 August at approximately 200 lesion centers per plot on untreated turf (Tables 1A and 1B). This was considered a high level of dollar spot infestation and thus a very stringent test of a products ability to control this disease under commercial golf course greens conditions. Less than 10 infection centers per plot represented an acceptable level of disease control for this study.

All fungicide entries provided good to excellent control of dollar spot throughout the application period (22 May to 7 August) except Renown 5.15SC @ 2.5 fl oz every 21 days (trt 3), Heritage 50WG + Daconil Weatherstik 6F (trt 6), Daconil Ultrex 82.5WDG @ 1.8 oz (trt 29) and @ 2.4 oz (trt 18) every 14 days, Legacy B 3.1SC (trt 19), Pegasus HPX 6F + Pegasus 6L (trt 23), Pegasus HPX 6F + Chaperone L (trt 24), PEX 6015 82.5DF + Pegasus 82.5DF (trt 25), Pegasus 82.5DF + Chaperone L (trt 26), Chaperone L (trt 27), Daconil Weatherstik 6F @ 2.0 fl oz (trt 29), Legacy F 1.67SC (trt 36), Trinity 1.67SC @ 0.5 fl oz (trt 37),

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CX-2250 DG (trt 59), Rhapsody QRD 145 @ 5 fl oz + Daconil Ultrex 82.5WDG @ 1.6 oz (trt 60), Daconil Ultrex 82.5WDG @ 3.2 oz every 21 days (trt 67), MOI-106 + Sync 100L (trt 70), MOI-106 + Daconil Ultrex 82.5WDG + Sync 100L (trt 71), MOI-106 + Insignia 20WG + Sync 100L (trt 72). All other entries in this study provided excellent residual control (i.e., at least until 21 August; 21 to 36 days after the last application) except for Renown 5.15SC @ 4.5 fl oz every 21 days (trt 4), Banner MAXX 1.3ME 0.8 fl oz every 21 days (trt 38), and Daconil Ultrex 82.5WDG @ 3.2 oz every 14 days (trt 61), which did not adequately protect turf from the dollar spot epidemic after 11 August. Season-long control of dollar spot (22 May to 10 September) was only afforded turf treated with Emerald 70WG @ 0.13 oz every 14 days (trt 68) and 0.18 oz every 21 days (trt 69).

A natural outbreak of copper spot was observed on the study in mid- to late-August (Table 1C). On 11 August, the incidence of copper spot was very low (0 to 0.8 percent turf area infested with *G. sorghii*) for all treatments except RU 42116-08E WG (trts 11 to 14). Of these entries, turf sprayed with RU 42116-08E @ 0.4 oz (trt 13) or 0.5 oz (trt 14) sustained 10 to 11% more copper spot, respectively, than untreated turf. By 29 August, copper spot had intensified on untreated turf (9 to 14% turf area infested). On this date, all treatments provided good to excellent control of the disease except RU 42116-08D WG (trt 10), SARS-346 40WP @ 0.13 oz (trt 51), and Emerald 70WG @ 0.13 oz (trt 68) applied every 14 days, and SARS-346 40WP @ 0.2 oz (trt 55), SARS-346 40WP @ 0.3 oz (trt 56), and Emerald 70WG @ 0.18 oz (trt 69) sprayed every 21 days, which were statistically similar to the untreated checks (trts 73 to 75). RU 42116-08E WG (trts 11 to 14) intensified copper spot 14 to 51% compared to untreated turf on 29 August.

Turf quality evaluated on 4 September was closely associated with dollar spot control (Table 1C). With few exceptions, turf quality was acceptable (at or above 5.0) for all entries on this date except Chaperone L (trt 27) and CX-2250 DG (trt 59), which sustained extensive dollar spot damage during the study.

Table 1A. Preventive control of dollar spot with fungicides and biorational products on a creeping bentgrass green: Rutgers University, 2008.

	Treatment	Rate per 1000 sq ft	Application Interval (days)[2]	Number of Lesion Centers per Plot[1]					
				9 June	19 June	1 July	11 July	21 July	1 Aug.
1	Renown 5.15SC	2.5 fl oz	14	0.0 f	0.0 l	1.8 no	1.5 no	2.5 l-o	8.3 k-p
2	Renown 5.15SC	4.5 fl oz	14	0.0 f	0.0 l	0.3 o	0.0 o	0.3 o	1.8 op
3	Renown 5.15SC	2.5 fl oz	21	1.5 f	2.0 i-l	16.5 fg	13.3 ij	20.8 e-g	16.0 h-l
4	Renown 5.15SC	4.5 fl oz	21	0.0 f	0.0 l	5.8 k-n	2.8 m-o	5.5 j-o	3.8 m-p
5	Untreated check	—	—	8.8 bc	20.5 d	48.3 bc	79.3 a	67.3 ab	171.3 b
6	Heritage 50WG	0.2 oz							
	+ Daconil Weather Stik 6F	2.0 fl oz	14	0.0 f	1.8 i-l	1.3 no	1.3 no	3.5 l-o	12.5 i-n
7	Headway 1.39EC	1.5 fl oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
8	Tartan 2.4SC	1.0 fl oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
9	Concert 4.3SE	3.0 fl oz	14	0.0 f	0.0 l	0.8 no	0.3 o	0.5 no	1.0 op
10	RU42116-08D WG	0.2 oz	14	0.0 f	0.0 l	0.3 o	0.8 no	0.3 o	1.3 op
11	RU42116-08E WG	0.2 oz	14	0.0 f	0.0 l	0.0 o	0.8 no	0.3 o	3.0 n-p
12	RU42116-08E WG	0.3 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.3 p
13	RU42116-08E WG	0.4 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
14	RU42116-08E WG	0.5 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
15	Legacy C 4.8SC	3.6 fl oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
16	Legacy C 4.8SC	4.5 fl oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
17	Legacy C 4.8SC	5.4 fl oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
18	Daconil Ultrex 82.5WDG	2.4 oz	14	0.0 f	3.5 h-k	4.5 k-o	2.5 no	5.8 j-o	21.3 g-i
19	Legacy B 3.1SC	0.4 fl oz	14	0.0 f	0.0 l	5.0 k-o	4.0 l-o	5.0 k-o	12.8 i-m
20	Legacy C 4.8SC	3.6 fl oz							
	+ Chipco Signature 80WG	4.0 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
21	Concert 4.3EC	5.0 fl oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
22	Banner MAXX 1.3ME	1.0 fl oz							
	+ Daconil Ultrex 82.5WDG	3.2 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
23	Pegasus HPX	2.0 fl oz							
	+ Pegasus 6L	2.0 fl oz	14	0.0 f	0.0 l	3.3 m-o	1.0 no	2.3 l-o	10.5 j-o
24	Pegasus HPX	2.0 fl oz							
	+ Chaperone L	2.0 fl oz	14	1.3 f	7.0 fg	16.5 fg	13.8 ij	10.5 i-k	24.3 gh

(Continued)

Table 1A (continued).

	Treatment	Rate per 1000 sq ft	Application Interval (days)[2]	Number of Lesion Centers per Plot[1]					
				9 June	19 June	1 July	11 July	21 July	1 Aug.
25	PEX 6015	1.8 oz							
	+ Pegasus 82.5DF	1.8 oz	14	0.3 f	2.5 i-l	1.8 no	1.0 no	3.0 l-o	12.5 i-n
26	Pegasus 82.5DF	1.8 oz							
	+ Chaperone L	1.8 fl oz	14	1.3 f	10.0 ef	24.5 e	29.3 g	24.8 e	47.5 ef
27	Chaperone L	4.0 fl oz	14	5.3 d	11.0 e	22.8 e	43.3 e	31.3 d	56.8 e
28	Daconil Weather Stick	2.0 fl oz	14	0.0 f	2.5 i-l	5.8 k-n	4.3 l-o	6.3 j-o	17.3 h-k
29	Daconil Ultrex 82.5WDG	1.8 oz	14	0.0 f	3.5 h-k	7.3 j-m	8.8 j-l	11.5 h-j	30.3 g
30	26/36 39.3F	3.0 fl oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
31	EXC3950 0.65GR	64.0 oz	21[3]	0.3 f	0.3 kl	3.3 m-o	1.5 no	0.8 no	0.3 p
32	EXC3952 0.65GR	64.0 oz	21[3]	0.8 f	0.0 l	3.5 l-o	0.8 no	0.0 o	0.5 p
33	Headway 1.39EC	1.5 fl oz	21	0.5 f	0.0 l	3.0 m-o	1.3 no	1.3 m-o	0.8 p
34	Andersons Fungicide VII 0.59GR	32.0 oz	21[3]	3.8 de	2.5 i-l	7.5 j-m	2.0 no	2.8 l-o	0.5 p
35	Prophesy 0.72GR	40.0 oz	21[3]	1.8 ef	0.8 kl	2.8 m-o	5.0 k-o	1.0 no	0.0 p
36	Legacy F 1.67SC	0.5 fl oz	21	5.5 d	4.8 g-i	23.8 e	10.5 jk	21.8 ef	20.0 h-j
37	Trinity 1.67SC	0.5 fl oz	21	5.5 d	4.5 g-j	20.0 ef	20.3 h	17.8 f-h	18.5 h-j
38	Banner MAXX 1.3ME	0.8 fl oz	21	0.8 f	0.3 kl	8.0 i-m	16.5 hi	7.8 j-l	7.3 l-p
39	RU22112-08A	0.26 fl oz	14	0.0 f	0.0 l	1.0 no	4.0 l-o	0.5 no	6.0 m-p
40	RU22112-08A	0.52 fl oz	14	0.0 f	0.0 l	0.0 o	0.8 no	0.0 o	0.0 p
41	RU22112-08A	0.78 fl oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
42	RU22112-08B	0.28 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
43	RU22112-08A	0.26 fl oz							
	+ RU22112-08B	0.18 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
44	RU22112-08A	0.39 fl oz							
	+ RU22112-08B	0.18 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
45	RU22112-08A	0.52 fl oz							
	+ RU22112-08B	0.18 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
46	RU22112-08A	0.26 fl oz							
	+ RU22112-08B	0.28 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
47	RU22112-08A	0.39 fl oz							
	+ RU22112-08B	0.28 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p

(Continued)

Table 1A (continued).

	Treatment	Rate per 1000 sq ft	Application Interval (days)[2]	Number of Lesion Centers per Plot[1] 9 June	19 June	1 July	11 July	21 July	1 Aug.
48	RU22112-08A	0.52 fl oz							
	+ RU22112-08B	0.28 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
49	Trinity 1.67SC	1.0 fl oz	14	0.0 f	0.0 l	1.0 no	0.8 no	0.3 o	2.5 op
50	Insignia 20WG	0.9 oz	14	0.0 f	0.0 l	0.3 o	0.0 o	0.0 o	1.0 op
51	SARS-346 40WP	0.13 oz	14	1.0 f	0.5 kl	0.0 o	0.3 o	0.0 o	0.5 p
52	SARS-346 40WP	0.27 oz	14	0.5 f	0.0 l	0.0 o	0.8 no	0.0 o	0.0 p
53	SARS-346 40WP	0.4 oz	14	0.5 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
54	SARS-346 40WP	0.6 oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
55	SARS-346 40WP	0.2 oz	21	1.5 f	1.5 i-l	0.0 o	0.5 o	0.5 no	1.3 op
56	SARS-346 40WP	0.3 oz	21	0.8 f	1.5 i-l	0.0 o	0.3 o	0.0 o	1.3 op
57	SARS-346 40WP	0.4 oz	21	0.5 f	1.5 i-l	0.0 o	0.3 o	0.0 o	0.0 p
58	SARS-346 40WP	0.6 oz	21	0.5 f	1.0 kl	0.0 o	0.0 o	0.0 o	0.0 p
59	CX-2250 DG	3.0 oz	7[4]	12.5 a	29.3 a	55.0 a	67.3 b	61.0 bc	140.3 c
60	Rhapsody QRD 145	5.0 fl oz							
	+ Daconil Ultrex 82.5WDG	1.6 oz	14	0.3 f	6.5 gh	8.8 h-l	6.5 k-n	7.5 j-m	24.8 gh
61	Daconil Ultrex 82.5WDG	3.2 oz	14	0.0 f	0.8 kl	0.3 o	0.3 o	0.8 no	3.8 m-p
62	Disarm 480SC	0.27 fl oz	14	0.0 f	0.0 l	0.5 no	0.0 o	0.0 o	1.8 op
63	Disarm C	4.32 fl oz	14	0.3 f	0.0 l	0.0 o	0.0 o	0.0 o	0.3 p
64	Banner MAXX 1.3ME	1.0 fl oz	14	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
65	Banner MAXX 1.3ME	1.0 fl oz	21	1.3 f	1.3 j-l	9.0 h-k	6.5 k-n	6.8 j-n	4.3 m-p
66	Curalan 50EG	1.0 oz	14	0.0 f	0.0 l	0.3 o	0.5 o	0.5 no	3.0 n-p
67	Daconil Ultrex 82.5WDG	3.2 oz	21	0.0 f	1.3 j-l	12.5 g-j	8.5 j-m	15.3 g-i	17.3 h-k
68	Emerald 70WG	0.13 oz	14	0.0 f	0.5 kl	0.3 no	0.0 o	0.0 o	0.0 p
69	Emerald 70WG	0.18 oz	21	0.0 f	0.0 l	0.0 o	0.0 o	0.0 o	0.0 p
70	MOI-106	2.56 fl oz							
	+ Sync 100XL	0.32 fl oz	14	8.8 bc	19.0 d	13.3 g-i	36.3 f	36.0 d	95.0 d
71	MOI-106	2.56 fl oz							
	+ Daconil Ultrex 82.5WDG	1.8 oz							
	+ Sync 100XL	0.32 fl oz	14	10.3 b	22.3 cd	14.0 gh	12.8 ij	16.0 f-i	46.3 f

(Continued)

Table 1A (continued).

	Treatment	Rate per 1000 sq ft	Application Interval (days)[2]	Number of Lesion Centers per Plot[1] 9 June	19 June	1 July	11 July	21 July	1 Aug.
72	MOI-106 + Insignia 20WG + Sync 100XL	2.56 fl oz 0.5 oz 0.32 fl oz	14	9.3 bc	25.5 bc	9.3 h-k	17.3 hi	16.3 f-i	17.8 h-k
73	Untreated check	—	—	8.5 bc	19.3 d	39.0 d	54.3 d	55.3 c	136.5 c
74	Untreated check	—	—	8.0 c	20.3 d	43.0 cd	61.3 c	67.0 ab	177.3 ab
75	Untreated check	—	—	10.5 ab	28.3 ab	52.8 ab	68.8 b	67.8 a	183.5 a
			INT[5]	DAT[6]	DAT	DAT	DAT	DAT	DAT
			7	4	7	5	1	4	1
			14	4	12	12	8	4	1
			21	18	7	19	8	18	8

[1] Values are means of four replicates. Means followed by the same letter are not significantly different according to Waller-Duncan *k*-ratio *t*-test (*k*=100). No phytotoxicity was observed for this test.

[2] Fungicides were applied on 22 May (all treatments except treatments 31 and 32), 29 May (7-day treatment), 5 June (7- and 14-day treatments), 12 June (7- and 21-day treatments and initiated treatments 31 and 32), 19 June (7- and 14-day treatments), 26 June (7-day treatment), 3 July (7-, 14-, and 21-day treatments), 10 July (7-day treatment), 17 July (7- and 14-day treatments), 24 July (7- and 21-day treatments), 31 July (7- and 14-day treatments), and 7 August (7-day treatment).

[3] Treatments 31, 32, 34, and 35 were applied to dry foliage and then immediately irrigated with 0.5 gal of water per plot.

[4] Treatment 59 was applied (after 5 PM) to wet foliage in 0.5 gal of water per plot using a watering can.

[5] Spray interval in days.

[6] Days after the last treatment.

Table 1B. Preventive control of dollar spot with fungicides and biorational products on a creeping bentgrass green: Rutgers University, 2008.

	Treatment	Rate per 1000 sq ft	Application Interval (days)[2]	Number of Lesion Centers per Plot[1] 11 Aug.	21 Aug.	29 Aug.	10 Sept.
1	Renown 5.15SC	2.5 fl oz	14	6.3 k-m	18.8 i-l	17.8 k-p	92.8 h-k
2	Renown 5.15SC	4.5 fl oz	14	1.0 lm	7.3 m-q	12.3 n-t	68.8 k-n
3	Renown 5.15SC	2.5 fl oz	21	17.5 h-j	34.5 fg	44.3 de	175.0 ab
4	Renown 5.15SC	4.5 fl oz	21	4.0 lm	13.5 j-p	23.8 i-m	107.5 e-h
5	Untreated check	—	—	147.0 a	224.0 a	111.8 a	200.0 a
6	Heritage 50WG	0.2 oz					
	+ Daconil Weather Stik 6F	2.0 fl oz	14	0.8 lm	22.0 h-k	27.3 g-k	105.0 f-h
7	Headway 1.39EC	1.5 fl oz	14	0.0 m	0.0 q	0.5 uv	20.0 t-y
8	Tartan 2.4SC	1.0 fl oz	14	0.0 m	0.0 q	0.5 uv	16.8 u-y
9	Concert 4.3SE	3.0 fl oz	14	0.5 m	2.3 q	5.8 r-v	42.0 o-v
10	RU42116-08D WG	0.2 oz	14	0.5 m	4.8 o-q	9.5 p-v	51.3 l-q
11	RU42116-08E WG	0.2 oz	14	1.8 lm	5.3 n-q	10.3 p-u	45.0 n-t
12	RU42116-08E WG	0.3 oz	14	0.0 m	1.0 q	3.8 t-v	26.3 q-y
13	RU42116-08E WG	0.4 oz	14	0.0 m	0.0 q	1.0 uv	22.3 r-y
14	RU42116-08E WG	0.5 oz	14	0.0 m	0.0 q	0.0 v	16.3 v-y
15	Legacy C 4.8SC	3.6 fl oz	14	0.0 m	0.5 q	1.0 uv	23.0 r-y
16	Legacy C 4.8SC	4.5 fl oz	14	0.0 m	0.0 q	0.0 v	13.8 xy
17	Legacy C 4.8SC	5.4 fl oz	14	0.0 m	0.0 q	0.0 v	12.5 xy
18	Daconil Ultrex 82.5WDG	2.4 oz	14	20.5 gh	28.3 g-i	33.8 f-h	123.0 d-f
19	Legacy B 3.1SC	0.4 fl oz	14	7.3 k-m	16.8 j-m	22.0 i-n	96.5 g-j
20	Legacy C 4.8SC	3.6 fl oz					
	+ Chipco Signature 80WG	4.0 oz	14	0.0 m	0.0 q	1.0 uv	30.8 q-x
21	Concert 4.3EC	5.0 fl oz	14	0.0 m	0.0 q	0.0 v	14.8 w-y
22	Banner MAXX 1.3ME	1.0 fl oz					
	+ Daconil Ultrex 82.5WDG	3.2 oz	14	0.0 m	0.0 q	0.0 v	16.8 u-y
23	Pegasus HPX	2.0 fl oz					
	+ Pegasus 6L	2.0 fl oz	14	14.0 h-k	23.0 h-j	31.5 g-i	101.3 f-i
24	Pegasus HPX	2.0 fl oz					
	+ Chaperone L	2.0 fl oz	14	10.5 i-l	34.3 fg	45.0 de	125.0 d-f

(Continued)

Table 1B (continued).

	Treatment	Rate per 1000 sq ft	Application Interval (days)[2]	Number of Lesion Centers per Plot[1] 11 Aug.	21 Aug.	29 Aug.	10 Sept.
25	PEX 6015	1.8 oz					
	+ Pegasus 82.5DF	1.8 oz	14	13.5 h-k	27.0 g-i	36.5 e-g	120.8 d-g
26	Pegasus 82.5DF	1.8 oz					
	+ Chaperone L	1.8 fl oz	14	31.8 f	66.3 de	62.5 c	180.0 ab
27	Chaperone L	4.0 fl oz	14	32.3 f	81.0 c	70.0 c	183.8 ab
28	Daconil Weather Stick	2.0 fl oz	14	18.3 hi	28.5 g-i	30.8 g-j	133.8 d
29	Daconil Ultrex 82.5WDG	1.8 oz	14	28.3 fg	44.0 f	43.3 d-f	176.3 ab
30	26/36 39.3F	3.0 fl oz	14	0.5 m	2.5 q	4.3 t-v	42.5 o-u
31	EXC3950 0.65GR	64.0 oz	21[3]	0.0 m	1.8 q	4.5 t-v	30.0 q-x
32	EXC3952 0.65GR	64.0 oz	21[3]	2.3 lm	9.5 l-q	15.0 m-s	132.5 de
33	Headway 1.39EC	1.5 fl oz	21	0.5 m	4.0 o-q	6.0 r-v	33.8 p-x
34	Andersons Fungicide VII 0.59GR	32.0 oz	21[3]	0.0 m	0.5 q	3.5 t-v	47.5 m-r
35	Prophesy 0.72GR	40.0 oz	21[3]	0.0 m	0.0 q	1.0 uv	13.3 xy
36	Legacy F 1.67SC	0.5 fl oz	21	9.0 j-m	34.8 fg	43.0 d-f	161.3 bc
37	Trinity 1.67SC	0.5 fl oz	21	7.0 k-m	29.0 gh	26.5 h-l	93.8 h-k
38	Banner MAXX 1.3ME	0.8 fl oz	21	3.3 lm	15.0 j-n	21.0 j-o	106.3 f-h
39	RU22112-08A	0.26 fl oz	14	3.0 lm	8.8 l-q	12.0 o-t	71.8 j-m
40	RU22112-08A	0.52 fl oz	14	0.0 m	0.0 q	1.3 uv	27.5 q-y
41	RU22112-08A	0.78 fl oz	14	0.0 m	0.0 q	0.0 v	20.8 s-y
42	RU22112-08B	0.28 oz	14	0.0 m	0.0 q	1.0 uv	22.5 r-y
43	RU22112-08A	0.26 fl oz					
	+ RU22112-08B	0.18 oz	14	0.0 m	0.0 q	1.0 uv	23.8 r-y
44	RU22112-08A	0.39 fl oz					
	+ RU22112-08B	0.18 oz	14	0.0 m	0.0 q	0.0 v	16.8 u-y
45	RU22112-08A	0.52 fl oz					
	+ RU22112-08B	0.18 oz	14	0.0 m	0.0 q	0.0 v	19.5 t-y
46	RU22112-08A	0.26 fl oz					
	+ RU22112-08B	0.28 oz	14	0.0 m	0.0 q	0.0 v	17.0 u-y
47	RU22112-08A	0.39 fl oz					
	+ RU22112-08B	0.28 oz	14	0.0 m	0.0 q	0.0 v	18.0 u-y

(Continued)

Table 1B (continued).

	Treatment	Rate per 1000 sq ft	Application Interval (days)[2]	Number of Lesion Centers per Plot[1] 11 Aug.	21 Aug.	29 Aug.	10 Sept.
48	RU22112-08A	0.52 fl oz					
	+ RU22112-08B	0.28 oz	14	0.0 m	0.0 q	0.0 v	12.0 xy
49	Trinity 1.67SC	1.0 fl oz	14	0.8 lm	4.5 o-q	7.8 q-v	57.5 l-p
50	Insignia 20WG	0.9 oz	14	0.0 m	0.8 q	2.5 t-v	41.3 o-v
51	SARS-346 40WP	0.13 oz	14	0.0 m	2.0 q	5.5 s-v	40.0 o-w
52	SARS-346 40WP	0.27 oz	14	0.0 m	0.3 q	2.0 uv	25.0 r-y
53	SARS-346 40WP	0.4 oz	14	0.0 m	0.0 q	1.3 uv	26.3 q-y
54	SARS-346 40WP	0.6 oz	14	0.0 m	0.0 q	1.0 uv	22.5 r-y
55	SARS-346 40WP	0.2 oz	21	0.0 m	2.3 q	8.8 p-v	42.5 o-u
56	SARS-346 40WP	0.3 oz	21	0.0 m	0.8 q	2.8 t-v	33.8 p-x
57	SARS-346 40WP	0.4 oz	21	0.0 m	0.8 q	2.5 t-v	32.5 p-x
58	SARS-346 40WP	0.6 oz	21	0.0 m	0.5 q	2.8 t-v	28.3 q-y
59	CX-2250 DG	3.0 oz	7[4]	111.3 c	201.3 b	108.0 a	200.0 a
60	Rhapsody QRD 145	5.0 fl oz					
	+ Daconil Ultrex 82.5WDG	1.6 oz	14	30.3 f	40.8 f	51.8 d	168.8 b
61	Daconil Ultrex 82.5WDG	3.2 oz	14	5.3 k-m	13.8 j-o	16.5 m-q	63.8 l-o
62	Disarm 480SC	0.27 fl oz	14	0.5 m	3.5 pq	9.3 p-v	61.3 l-o
63	Disarm C	4.32 fl oz	14	0.0 m	1.5 q	8.5 p-v	46.3 m-s
64	Banner MAXX 1.3ME	1.0 fl oz	14	0.0 m	0.3 q	2.8 t-v	21.0 s-y
65	Banner MAXX 1.3ME	1.0 fl oz	21	1.3 lm	7.3 m-q	17.3 l-q	76.3 i-l
66	Curalan 50EG	1.0 oz	14	1.3 lm	9.3 l-q	15.5 m-r	101.3 f-i
67	Daconil Ultrex 82.5WDG	3.2 oz	21	14.5 h-k	29.8 gh	35.3 e-h	137.5 cd
68	Emerald 70WG	0.13 oz	14	0.0 m	0.0 q	0.0 v	3.8y
69	Emerald 70WG	0.18 oz	21	0.0 m	0.0 q	0.0 v	3.0 y
70	MOI-106	2.56 fl oz					
	+ Sync 100XL	0.32 fl oz	14	52.8 e	74.3 cd	80.5 b	200.0 a
71	MOI-106	2.56 fl oz					
	+ Daconil Ultrex 82.5WDG	1.8 oz					
	+ Sync 100XL	0.32 fl oz	14	35.3 f	56.8 e	69.0 c	200.0 a

(Continued)

Table 1B (continued).

	Treatment	Rate per 1000 sq ft	Application Interval (days)[2]	Number of Lesion Centers per Plot[1] 11 Aug.	21 Aug.	29 Aug.	10 Sept.
72	MOI-106 + Insignia 20WG + Sync 100XL	2.56 fl oz 0.5 oz 0.32 fl oz	14	2.8 lm	12.8 k-p	23.3 i-m	173.8 b
73	Untreated check	—	—	99.5 d	193.8 b	104.0 a	186.3 ab
74	Untreated check	—	—	116.0 bc	196.0 b	111.5 a	200.0 a
75	Untreated check	—	—	122.3 b	199.8 b	109.0 a	200.0 a

INT[5]	DAT[6]	DAT	DAT	DAT
7	4	14	22	34
14	11	21	29	41
21	18	28	36	48

[1] Values are means of four replicates. Means followed by the same letter are not significantly different according to Waller-Duncan *k*-ratio *t*-test (*k*=100). No phytotoxicity was observed for this test.

[2] Fungicides were applied on 22 May (all treatments except treatments 31 and 32), 29 May (7-day treatment), 5 June (7- and 14-day treatments), 12 June (7- and 21-day treatments and initiated treatments 31 and 32), 19 June (7- and 14-day treatments), 26 June (7-day treatment), 3 July (7-, 14-, and 21-day treatments), 10 July (7-day treatment), 17 July (7- and 14-day treatments), 24 July (7- and 21-day treatments), 31 July (7- and 14-day treatments), and 7 August (7-day treatment).

[3] Treatments 31, 32, 34, and 35 were applied to dry foliage and then immediately irrigated with 0.5 gal of water per plot.

[4] Treatment 59 was applied (after 5 PM) to wet foliage in 0.5 gal of water per plot using a watering can.

[5] Spray interval in days.

[6] Days after the last treatment.

Table 1C. Preventive control of dollar spot with fungicides and biorational products on a creeping bentgrass green: Rutgers University, 2008.

	Treatment	Rate per 1000 sq ft	Application Interval (days)[4]	Copper Spot[1,2] 11 Aug.	Copper Spot[1,2] 29 Aug.	Turf Quality[3] 4 Sept.
1	Renown 5.15SC	2.5 fl oz	14	0.0 b	0.0 i	6.8 g-j
2	Renown 5.15SC	4.5 fl oz	14	0.0 b	0.0 i	7.0 f-i
3	Renown 5.15SC	2.5 fl oz	21	0.0 b	0.0 i	6.5 h-k
4	Renown 5.15SC	4.5 fl oz	21	0.0 b	0.0 i	7.0 f-i
5	Untreated check	—	—	0.0 b	4.8 g-i	3.8 s
6	Heritage 50WG	0.2 oz				
	+ Daconil Weather Stik 6F	2.0 fl oz	14	0.0 b	0.0 i	6.8 g-j
7	Headway 1.39EC	1.5 fl oz	14	0.0 b	0.0 i	6.8 g-j
8	Tartan 2.4SC	1.0 fl oz	14	0.0 b	0.0 i	6.8 g-j
9	Concert 4.3SE	3.0 fl oz	14	0.0 b	0.0 i	6.0 j-m
10	RU42116-08D WG	0.2 oz	14	0.8 b	19.5 d	7.8 c-f
11	RU42116-08E WG	0.2 oz	14	4.5 b	28.8 c	7.8 c-f
12	RU42116-08E WG	0.3 oz	14	9.8 a	38.5 b	7.8 c-f
13	RU42116-08E WG	0.4 oz	14	12.3 a	51.3 a	7.8 c-f
14	RU42116-08E WG	0.5 oz	14	11.3 a	55.5 a	8.5 a-c
15	Legacy C 4.8SC	3.6 fl oz	14	0.0 b	0.0 i	8.5 a-c
16	Legacy C 4.8SC	4.5 fl oz	14	0.0 b	0.0 i	8.8 ab
17	Legacy C 4.8SC	5.4 fl oz	14	0.0 b	0.0 i	8.8 ab
18	Daconil Ultrex 82.5WDG	2.4 oz	14	0.0 b	0.8 i	6.0 j-m
19	Legacy B 3.1SC	0.4 fl oz	14	0.0 b	0.0 i	6.0 j-m
20	Legacy C 4.8SC	3.6 fl oz				
	+ Chipco Signature 80WG	4.0 oz	14	0.0 b	0.0 i	8.8 ab
21	Concert 4.3EC	5.0 fl oz	14	0.0 b	0.0 i	6.0 j-m
22	Banner MAXX 1.3ME	1.0 fl oz				
	+ Daconil Ultrex 82.5WDG	3.2 oz	14	0.0 b	0.0 i	6.3 i-l
23	Pegasus HPX	2.0 fl oz				
	+ Pegasus 6L	2.0 fl oz	14	0.0 b	0.0 i	5.5 l-o
24	Pegasus HPX	2.0 fl oz				
	+ Chaperone L	2.0 fl oz	14	0.0 b	0.3 i	5.5 l-o

(Continued)

Table 1C (continued).

	Treatment	Rate per 1000 sq ft	Application Interval (days)[4]	Copper Spot[1,2] 11 Aug.	Copper Spot[1,2] 29 Aug.	Turf Quality[3] 4 Sept.
25	PEX 6015	1.8 oz				
	+ Pegasus 82.5DF	1.8 oz	14	0.0 b	0.5 i	5.8 k-n
26	Pegasus 82.5DF	1.8 oz				
	+ Chaperone L	1.8 fl oz	14	0.0 b	1.0 i	5.8 k-n
27	Chaperone L	4.0 fl oz	14	0.0 b	0.0 i	4.8 o-r
28	Daconil Weather Stick	2.0 fl oz	14	0.0 b	0.0 i	5.3 m-p
29	Daconil Ultrex 82.5WDG	1.8 oz	14	0.0 b	3.0 i	5.8 k-n
30	26/36 39.3F	3.0 fl oz	14	0.0 b	1.8 i	7.0 f-i
31	EXC3950 0.65GR	64.0 oz	21[5]	0.0 b	0.0 i	8.8 ab
32	EXC3952 0.65GR	64.0 oz	21[5]	0.0 b	0.5 i	9.0 a
33	Headway 1.39EC	1.5 fl oz	21	0.0 b	0.0 i	6.8 g-j
34	Andersons Fungicide VII 0.59GR	32.0 oz	21[5]	0.0 b	0.0 i	5.8 k-n
35	Prophesy 0.72GR	40.0 oz	21[5]	0.0 b	0.0 i	5.8 k-n
36	Legacy F 1.67SC	0.5 fl oz	21	0.0 b	0.0 i	5.5 l-o
37	Trinity 1.67SC	0.5 fl oz	21	0.8 b	0.0 i	6.3 i-l
38	Banner MAXX 1.3ME	0.8 fl oz	21	0.0 b	0.0 i	7.5 d-g
39	RU22112-08A	0.26 fl oz	14	0.0 b	0.0 i	7.0 f-i
40	RU22112-08A	0.52 fl oz	14	0.0 b	0.0 i	8.0 b-e
41	RU22112-08A	0.78 fl oz	14	0.0 b	0.0 i	8.0 b-e
42	RU22112-08B	0.28 oz	14	0.0 b	0.0 i	7.0 f-i
43	RU22112-08A	0.26 fl oz				
	+ RU22112-08B	0.18 oz	14	0.0 b	0.0 i	7.3 e-h
44	RU22112-08A	0.39 fl oz				
	+ RU22112-08B	0.18 oz	14	0.0 b	0.0 i	6.8 g-j
45	RU22112-08A	0.52 fl oz				
	+ RU22112-08B	0.18 oz	14	0.0 b	0.0 i	7.8 c-f
46	RU22112-08A	0.26 fl oz				
	+ RU22112-08B	0.28 oz	14	0.0 b	0.0 i	6.5 h-k
47	RU22112-08A	0.39 fl oz				
	+ RU22112-08B	0.28 oz	14	0.0 b	0.0 i	7.8 c-f

(Continued)

Table 1C (continued).

	Treatment	Rate per 1000 sq ft	Application Interval (days)[4]	Copper Spot[1,2] 11 Aug.	Copper Spot[1,2] 29 Aug.	Turf Quality[3] 4 Sept.
48	RU22112-08A	0.52 fl oz				
	+ RU22112-08B	0.28 oz	14	0.0 b	0.0 i	6.8 g-j
49	Trinity 1.67SC	1.0 fl oz	14	0.0 b	0.0 i	7.8 c-f
50	Insignia 20WG	0.9 oz	14	0.0 b	0.0 i	7.8 c-f
51	SARS-346 40WP	0.13 oz	14	0.0 b	4.3 g-i	7.3 e-h
52	SARS-346 40WP	0.27 oz	14	0.0 b	2.8 i	7.5 d-g
53	SARS-346 40WP	0.4 oz	14	0.0 b	0.0 i	7.3 e-h
54	SARS-346 40WP	0.6 oz	14	0.0 b	0.5 i	7.8 c-f
55	SARS-346 40WP	0.2 oz	21	0.0 b	4.5 g-i	6.8 g-j
56	SARS-346 40WP	0.3 oz	21	0.0 b	4.0 hi	7.0 f-i
57	SARS-346 40WP	0.4 oz	21	0.0 b	3.0 i	7.0 f-i
58	SARS-346 40WP	0.6 oz	21	0.0 b	1.3 i	7.0 f-i
59	CX-2250 DG	3.0 oz	7[6]	0.0 b	0.5 i	4.0 rs
60	Rhapsody QRD 145	5.0 fl oz				
	+ Daconil Ultrex 82.5WDG	1.6 oz	14	0.0 b	1.8 i	6.0 j-m
61	Daconil Ultrex 82.5WDG	3.2 oz	14	0.0 b	0.0 i	5.3 m-p
62	Disarm 480SC	0.27 fl oz	14	0.0 b	0.0 i	7.5 d-g
63	Disarm C	4.32 fl oz	14	0.0 b	0.0 i	7.5 d-g
64	Banner MAXX 1.3ME	1.0 fl oz	14	0.0 b	0.0 i	7.3 e-h
65	Banner MAXX 1.3ME	1.0 fl oz	21	0.0 b	0.0 i	6.5 h-k
66	Curalan 50EG	1.0 oz	14	0.0 b	1.8 i	7.5 d-g
67	Daconil Ultrex 82.5WDG	3.2 oz	21	0.0 b	1.8 i	6.0 j-m
68	Emerald 70WG	0.13 oz	14	0.5 b	17.0 de	8.3 a-d
69	Emerald 70WG	0.18 oz	21	0.5 b	13.3 ef	8.5 a-c
70	MOI-106	2.56 fl oz				
	+ Sync 100XL	0.32 fl oz	14	0.0 b	0.8 i	5.0 n-q
71	MOI-106	2.56 fl oz				
	+ Daconil Ultrex 82.5WDG	1.8 oz				
	+ Sync 100XL	0.32 fl oz	14	0.0 b	2.8 i	6.0 j-m

(Continued)

Table 1C (continued).

	Treatment	Rate per 1000 sq ft	Application Interval (days)[4]	Copper Spot[1,2] 11 Aug.	Copper Spot[1,2] 29 Aug.	Turf Quality[3] 4 Sept.
72	MOI-106 + Insignia 20WG + Sync 100XL	2.56 fl oz + 0.5 oz + 0.32 fl oz	14	0.0 b	0.0 i	7.3 e-h
73	Untreated check	—	—	0.0 b	9.5 f-h	4.8 o-r
74	Untreated check	—	—	0.8 b	14.5 d-f	4.5 p-s
75	Untreated check	—	—	0.8 b	10.0 fg	4.3 q-s

INT[7]	DAT[8]	DAT	DAT
7	4	22	4
14	11	29	4
21	18	36	11

[1] Values are means of four replicates. Means followed by the same letter are not significantly different according to Waller-Duncan *k*-ratio *t*-test (*k*=100). No phytotoxicity was observed for this test.

[2] Percent turf area infested with copper spot, caused by *Gloeocercospora sorghii*.

[3] Turf quality on a scale of 1 to 9, where 9 = best turf quality and 5 = commercially acceptable quality.

[4] Fungicides were applied on 22 May (all treatments except treatments 31 and 32), 29 May (7-day treatment), 5 June (7- and 14-day treatments), 12 June (7- and 21-day treatments and initiated treatments 31 and 32), 19 June (7- and 14-day treatments), 26 June (7-day treatment), 3 July (7-, 14-, and 21-day treatments), 10 July (7-day treatment), 17 July (7- and 14-day treatments), 24 July (7- and 21-day treatments), 31 July (7- and 14-day treatments), and 7 August (7-day treatment).

[5] Treatments 31, 32, 34, and 35 were applied to dry foliage and then immediately irrigated with 0.5 gal of water per plot.

[6] Treatment 59 was applied (after 5 PM) to wet foliage in 0.5 gal of water per plot using a watering can.

[7] Spray interval in days.

[8] Days after the last treatment.

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