

2003 RUTGERS Turfgrass Proceedings



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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, Cook College, 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 2003 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

EFFICACY OF BIOLOGICAL AND CHEMICAL FUNGICIDES FOR THE CONTROL OF DOLLAR SPOT IN CREEPING BENTGRASS

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Biological and chemical fungicides were evaluated in 2003 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* Crenshaw) maintained under golf course greens conditions. Turf was established September 1996 on a Norton loam with a pH of 6.5. Mowing was performed three times weekly at a height of 0.152 inches with clippings collected. The site was irrigated as needed to prevent drought stress. Fertilizer was applied as calcium nitrate (CaNO_3 ; 0.1 lb nitrogen (N)/1000 ft²) on 29 April, 16-4-8 (0.54 lb N/1000 ft²) on 9 May, as CaNO_3 (0.2 lb N/1000 ft²) on 19 June, and 16-4-8 (0.55 lb N/1000 ft²) on 7 October. Localized dry spots were controlled with Primer wetting agent on 20 May and 12 June (4.0 fl oz/1000 ft²) and on 30 June (2.0 fl oz/1000 ft²). Bensumec 4LF (2 gal/A) was applied for pre-emergence weed control. Daconil Ultrex 82.5SDG (3.2 oz/1000 ft²) was applied to the entire test area on 27 May to suppress dollar spot prior to the current study. Insect pests were controlled with Turcam 76 on 6 June (1.0 oz/1000 ft²) and 17 November (0.96 oz/1000 ft²). On 28 July, Merit 75WSP (0.145 oz/1000 ft²) was applied on 15 July for additional control of insects. The site was aerified with 0.625-inch hollow tines on 4-inch centers and topdressed with a sand root zone mix. Plots were 3 x 9 ft and were arranged in a randomized complete block with four replications.

Fungicides were applied in water equivalent to 1.9 gal per 1000 ft² with a CO₂ powered sprayer at 30 psi using TeeJet 8003VS flat fan nozzles. Treatments (trt) were initiated on 3 June when environmental conditions were conducive to dollar spot development. Fungicides were reapplied at the appropriate intervals as indicated in Tables 1 and 2. Turf was visually

evaluated for number of dollar spot infection centers per plot on 11, 20, and 30 June, 9, 18, and 28 July, 8 and 19 August, and 5 and 17 September; and for percent turf area infested with brown patch (caused by *Rhizoctonia solani*) on 12 and 20 August. 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 10 June. Disease pressure increased rapidly and became uniform throughout the study by 20 June (Table 1). Disease incidence peaked with more than 150 infection centers per plot (a very high level of disease) on the untreated control (trt 18) by 30 June. Except for the chemical fungicides Banner MAXX 1.3MC (trt 11) and Daconil Ultrex 82.5SDG (trts 13-14), none of the remaining chemical fungicides or biological products adequately controlled dollar spot (i.e., less than 10 infection centers per plot). However, several of the biological entries including DK-58 + Latron B-1956 (trt 6) and TS-21 + Latron B-1956 + Heritage 50WG (trt 9) reduced disease incidence to a level equivalent to the chemical standard Daconil Ultrex 82.5SDG (trts 13-14) on at least two rating dates.

EcoGuard L (trt 1) applied on a 7-day interval resulted in improved control of dollar spot on half of the rating dates, compared to EcoGuard L (trt 2) sprayed every 14 days. Alternating EcoGuard L with Daconil Ultrex 82.5SDG (trts 3-4) reduced the incidence of dollar spot compared to EcoGuard L alone (trt 2), but not to an acceptable level. On 18 July, the addition of Banner MAXX 1.3MC to a tank mixture of TS-21 plus Latron B-1956 (trt 10) provided equivalent or better control of dollar spot than did the same rate of Banner MAXX 1.3MC alone (trt 11). The application of a

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non-pathogenic isolate of *S. homoeocarpa* (trts 16-17) provided some suppression of symptoms, but the effect was inconsistent throughout the study. Surprisingly, all of the biological products in this study except trt 3 (EcoGuard L alternated with Daconil Ultrex 82.5SDG), trt 8 (TS-21 + Latron B-1956), trt 16, and trt 17 provided a level of brown patch control equivalent to the commercial fungicide standard Heritage 50WG (trt 12) on at least one rating date (Table 2). No phytotoxicity was observed.

Table 1. Control of dollar spot in creeping bentgrass with biorational products, North Brunswick, NJ, 2003.

Treatment and Rate per 1000 sq ft	Spray Interval (days) ^y	Number of Infection Centers per Plot ^z									
		11 June	20 June	30 June	9 July	18 July	28 July	8 Aug.	19 Aug.		
1. EcoGuard L 20 fl oz	7	2.8 c-f	76.8 f-h	81.5 e	98.8 d	68.8 g	21.3 c	24.3 de	16.0 a-e		
2. EcoGuard L 20 fl oz	14	3.5 ef	99.5 i	158.8 f	123.8 e	80.8 gh	72.5 f	27.0 e	18.5 b-e		
3. EcoGuard L 20 fl oz	14	2.5 c-f	73.3 e-g	7.8 ab	61.3 c	87.5 h	33.5 d	86.8 h	27.5 d-f		
/ Daconil Ultrex 82.5SDG 2.75 oz	14 ^x	0.3 a	29.8 bc	84.5 e	14.3 a	33.0 ef	81.3 f	20.5 c-e	23.5 c-f		
4. Daconil Ultrex 82.5SDG 2.75 oz	14	0.8 a-c	24.0 b	14.5 ab	4.5 a	29.8 c-f	51.3 e	14.8 b-d	10.5 a-c		
/ EcoGuard L 20 fl oz	14 ^x	1.5 a-d	49.3 d	16.0 ab	16.0 ab	16.3 a-c	19.0 c	25.5 e	29.3 ef		
5. EcoGuard L 15 fl oz	14	2.3 b-f	45.3 cd	29.3 bc	20.0 ab	41.8 f	21.3 c	28.3 e	27.3 d-f		
+ Daconil Ultrex 82.5SDG 1.8 oz	14	1.3 a-c	64.3 d-f	37.3 cd	32.5 b	27.0 b-e	19.8 c	28.3 e	29.3 ef		
6. DK-58 11.8 fl oz	7	1.8 a-f	52.0 d	27.8 bc	14.0 a	17.5 a-d	17.0 bc	41.0 f	21.5 c-e		
+ Latron B-1956 4.18 fl oz	7	0.8 a-c	2.5 a	4.3 a	2.5 a	6.3 a	3.5 a	7.8 ab	8.0 ab		
7. DK-60 11.8 fl oz	7	0.0 a	16.8 ab	11.8 ab	10.0 a	22.3 b-e	5.5 ab	13.8 bc	19.3 b-e		
+ Latron B-1956 4.18 fl oz	7	4.0 f	87.3 g-i	165.3 fg	155.0 f	168.8 k	175.0 i	130.0 i	35.3 f		
8. TS-21 14.6 fl oz	7	0.5 ab	19.3 ab	0.3 a	1.8 a	14.5 ab	11.0 a-c	2.5 a	4.3 a		
+ Latron B-1956 4.18 fl oz	7	0.8 a-c	31.0 bc	8.3 ab	5.0 a	31.8 d-f	13.5 a-c	12.5 bc	14.8 a-d		
9. TS-21 14.6 fl oz	7	1.5 a-d	57.0 de	55.8 d	101.5 d	26.0 b-e	43.3 de	58.3 g	36.5 f		
+ Latron B-1956 4.18 fl oz	7	2.8 c-f	74.5 e-g	156.3 f	123.8 e	143.8 j	110.0 g	52.3 g	26.0 d-f		
10. Heritige 50WG 0.2 oz	14	3.3 d-f	97.5 i	180.0 g	181.3 g	181.3 k	115.0 gh	86.0 h	29.0 ef		
+ Latron B-1956 4.18 fl oz	14	2.8 c-f	93.5 hi	158.8 f	148.8 f	128.8 i	125.0 h	90.8 h	51.0 g		
11. Banner MAXX 1.3MC 1.0 fl oz	21										
12. Heritige 50WG 0.2 oz	14										
13. Daconil Ultrex 82.5SDG 2.75 oz	14										
14. Daconil Ultrex 82.5SDG 1.8 oz	14										
15. Ag Bio Solution 100 ppm	Var ^w										
16. <i>Sclerotinia homoeocarpa</i> 2.0 oz	Once ^v										
17. <i>Sclerotinia homoeocarpa</i> 2.0 oz	14 ^v										
18. Untreated Control	---										

(Continued)

Table 1 (continued).

Treatment and Rate per 1000 sq ft	Spray Interval (days) ^y	Number of Infection Centers per Plot ^z									
		11 June	20 June	30 June	9 July	18 July	28 July	8 Aug.	19 Aug.		
	INT ^u	DAT ^t	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT	
	7	1	3	6	1	3	6	3	7		
	14	8	3	13	1	3	13	10	7		
	21	8	17	6	15	3	13	3	14		

^z Values are means of four replications. Means followed by the same letter are not significantly different according to Waller-Duncan k-ratio t-test ($k=100$).

^y Fungicides were applied on 3 June (all treatments, except treatment 16, 17), 10 June (7 day treatment, and treatments 16, 17), 17 June (7 and 14 day treatments), 24 June (7 and 21 day treatments), 1 July (7 and 14 day treatments), 8 July (7 day treatment), 15 July (7, 14, and 21 day treatments), 22 July (7 day treatment), 29 July (7 and 14 day treatments), 5 August (7 and 21 day treatments), 12 August (7 and 14 day treatments), and 19 August (7 day treatment).

^x For treatment 3, EcoGuard L was applied on 3 June, 1 July, and 29 July, whereas Daconil Ultrex 82.5SDG was applied on 17 June, 15 July, and 12 August. For treatment 4, Daconil Ultrex 82.5SDG was applied on 3 June, 1 July, and 29 July, whereas EcoGuard L was applied on 17 June, 15 July, and 12 August.

^w Treatment 15 was applied every Tuesday, Thursday, and Friday from 3 June to 1 July. The Ag Bio EO solution was discontinued from 3 July to 14 July. Daconil Ultrex 82.5SDG at 3.2 oz/1000 sq ft was applied in place of treatment 15 on 8 July. The Ag Bio Solution was reapplied, as described, from 15 July to 19 August.

^v Treatment 16 was applied once on 10 June, whereas treatment 17 was applied every two weeks from 10 June through 12 August. Both treatments were applied after 5pm with a shaker bottle and were watered in with 0.5 gal water per plot.

^u Spray interval in days.

^t Days after treatment (DAT) for each spray interval.

Table 2. Control of dollar spot in creeping bentgrass with biorational products, North Brunswick, NJ, 2003.

Treatment and Rate per 1000 sq ft	Spray Interval (days) ^y	Number Infection Centers per Plot ^z		Brown Patch (%)	
		-----		-----	
		5 Sept.	17 Sept.	12 Aug.	20 Aug.
1. EcoGuard L 20 fl oz	7	7.5 a-e	25.0 de	12.0 d-g	5.0 a-c
2. EcoGuard L 20 fl oz	14	9.8 c-e	26.3 e	15.3 e-h	10.0 a-d
3. EcoGuard L 20 fl oz	14				
/ Daconil Ultrex 82.5SDG 2.75 oz	14 ^x	1.3 ab	17.5 b-e	26.5 i	15.0 de
4. Daconil Ultrex 82.5SDG 2.75 oz	14				
/ EcoGuard L 20 fl oz	14 ^x	11.3 c-e	22.5 c-e	3.3 a-c	3.8 a-c
5. EcoGuard L 15 fl oz					
+ Daconil Ultrex 82.5SDG 1.8 oz	14	5.5 a-c	26.3 e	8.3 b-e	3.8 a-c
6. DK-58 11.8 fl oz					
+ Latron B-1956 4.18 fl oz	7	5.8 a-d	3.8 a	9.8 c-f	8.8 a-d
7. DK-60 11.8 fl oz					
+ Latron B-1956 4.18 fl oz	7	7.5 a-e	12.5 a-c	9.8 c-f	7.5 a-d
8. TS-21 14.6 fl oz					
+ Latron B-1956 4.18 fl oz	7	7.5 a-e	7.8 ab	11.3 d-g	25.0 f
9. TS-21 14.6 fl oz					
+ Latron B-1956 4.18 fl oz					
+ Heritage 50WG 0.2 oz	14	7.5 a-e	22.5 c-e	0.0 a	5.0 a-c
10. TS-21 14.6 fl oz					
+ Latron B-1956 4.18 fl oz					
+ Banner MAXX 1.3MC 1.0 fl oz	21	0.0 a	3.8 a	2.5 a-c	7.5 a-d
11. Banner MAXX 1.3MC 1.0 fl oz	21	8.8 b-e	15.0 b-c	7.3 a-d	11.3 b-e
12. Heritage 50WG 0.2 oz	14	13.8 de	20.0 c-e	2.8 a-c	3.8 a-c
13. Daconil Ultrex 82.5SDG 2.75 oz	14	0.0 a	13.8 a-c	0.0 a	1.3 a
14. Daconil Ultrex 82.5SDG 1.8 oz	14	4.8 a-c	15.0 bc	1.0 ab	2.5 ab
15. Ag Bio Solution 100 ppm	Var ^w	8.3 b-e	12.5 a-c	6.5 a-d	10.0 a-d
16. <i>Sclerotinia homoeocarpa</i> 2.0 oz	Once ^v	7.0 a-e	22.5 c-e	15.8 f-h	18.8 ef
17. <i>Sclerotinia homoeocarpa</i> 2.0 oz	14 ^v	9.0 b-e	27.5 e	18.3 gh	12.5 c-e
18. Untreated Control	---	15.0 e	21.3 c-e	20.8 hi	23.8 f

INT ^u	DAT ^t	DAT	DAT	DAT
7	17	29	7	1
14	24	36	14	8
21	31	43	7	15

^zValues are means of four replications. Means followed by the same letter are not significantly different according to Waller-Duncan *k*-ratio *t*-test (*k*=100).

^yFungicides were applied on 3 June (all treatments, except treatment 16, 17), 10 June (7 day treatment, and treatments 16,17), 17 June (7 and 14 day treatments), 24 June (7 and 21 day treatments), 1 July (7 and 14 day treatments), 8 July (7 day treatment), 15 July (7, 14, and 21 day treatments), 22 July (7 day treatment), 29 July (7 and 14 day treatments), 5 August (7 and 21 day treatments), 12 August (7 and 14 day treatments), and 19 August (7 day treatment).

(Continued)

Table 2 (continued).

^xFor treatment 3, EcoGuard L was applied on 3 June, 1 July, and 29 July, whereas Daconil Ultrex 82.5SDG was applied on 17 June, 15 July, and 12 August. For treatment 4, Daconil Ultrex 82.5SDG was applied on 3 June, 1 July, and 29 July, whereas EcoGuard L was applied on 17 June, 15 July, and 12 August.

^wTreatment 15 was applied every Tuesday, Thursday, and Friday from 3 June to 1 July. The Ag Bio EO solution was discontinued from 3 July to 14 July. Daconil Ultrex 82.5SDG at 3.2 oz/1000 sq ft was applied in place of treatment 15 on 8 July. The Ag Bio Solution was reapplied, as described, from 15 July to 19 August.

^vTreatment 16 was applied once on 10 June, whereas treatment 17 was applied every two weeks from 10 June through 12 August. Both treatments were applied after 5pm with a shaker bottle and were watered in with 0.5 gal water per plot.

^uSpray interval in days.

^tDays after treatment (DAT) for each spray interval.