

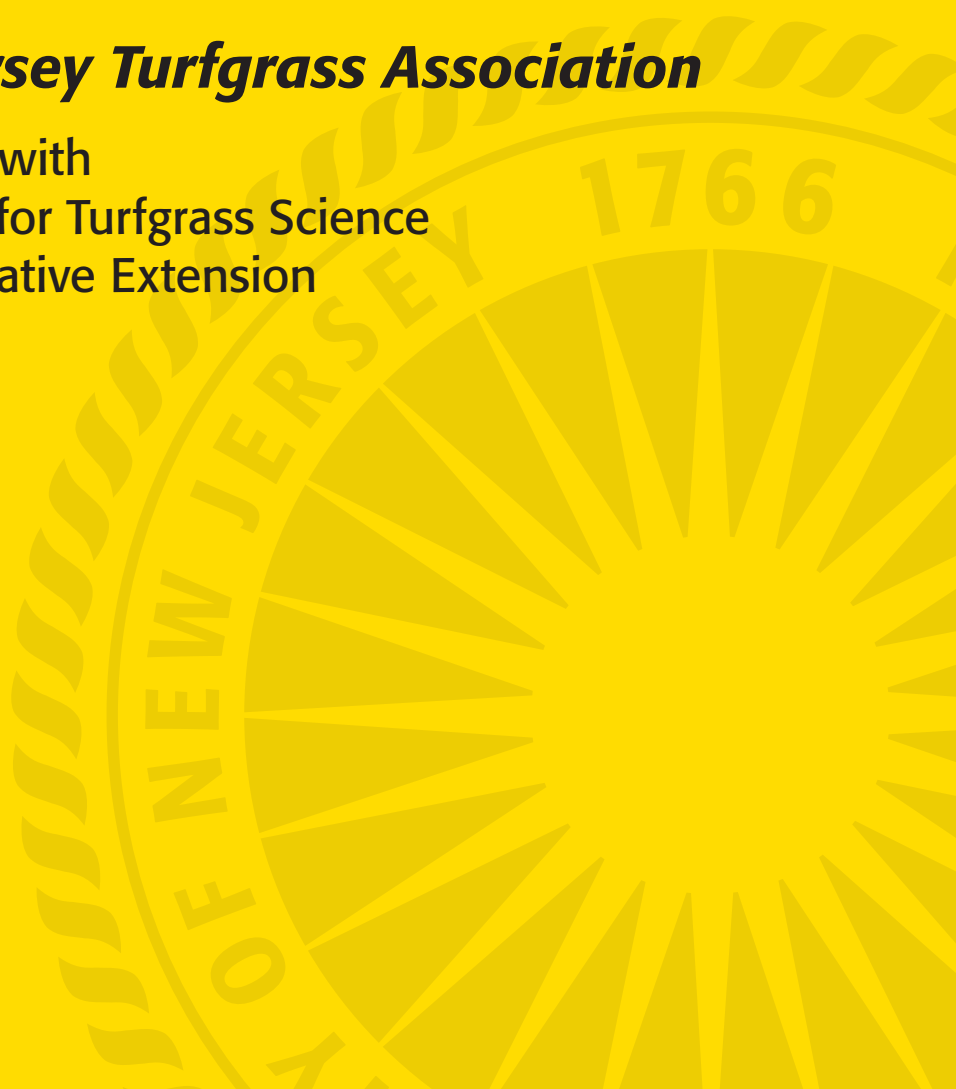
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The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State 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 avail-

able 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

EVALUATION OF GRANULAR AND FOLIAR FUNGICIDES FOR THE CONTROL OF BROWN PATCH ON TALL FESCUE, 2007

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Fungicides were evaluated in 2007 for their ability to control brown patch (caused by *Rhizoctonia solani*) on tall fescue (*Festuca arundinacea* cv. Coronado) at the Plant Science Research and Extension Farm in Adelphia, NJ. The study was established in September 2003 on a Freehold sandy loam with a pH of 5.9. Turf was mowed twice a week at a height of 2.0 inches and clippings were returned. The site was irrigated as needed to prevent drought stress and encourage disease.

Fertilizer was applied as 16-4-8 (0.75 lb N/1000 ft²) on 5 April and 11 June. Lime (2000 lb/A) was broadcast over the site on 25 April. Dimension 1E (1.5 pt/A) was applied for pre-emergence weed control on 24 April. The site was inoculated with three isolates of *R. solani* (i.e., COGGBP1, COGGBP2, and Rh76) on 25 July using 0.2 g/m² of oat-infested inoculum from each isolate. Banol 6S (3.0 fl oz/1000 ft²) was applied to the entire test area on 11 July to control Pythium blight (caused by *Pythium aphanidermatum*). Plots were 3 x 9 ft and were arranged in a randomized complete block with four replications.

Products were applied in water equivalent to 1.9 gal/1000 ft² with a CO₂ powered sprayer at 30 psi using TeeJet 8003VS flat fan nozzles. Treatments (trt) were initiated on 12 June when environmental conditions were conducive to brown patch development. Fungicides were reapplied at the appropriate intervals as indicated in Tables 1A and B. Turf was visually evaluated for percent turf area infested with brown patch on 25 June, 6, 16, and 24 July, 1, 15, and 23 August, and 1 September. Turf quality was rated on 23 August using a 1 to 9 scale, where 9 = best turf quality and 5 = acceptable quality. Data were subjected to analysis of variance and means were separated using the Waller-Duncan *k*-ratio *t*-test (*k* = 100).

Brown patch was first observed on 21 June and became uniform throughout the study by 25 June (Table 1A). Disease severity ranged from 8 to 69% turf area infested with *R. solani* on untreated turf, which was considered a low to severe level of brown patch infestation, respectively (Tables 1A and 1B). Less than 10% turf area infested per plot represented an acceptable level of disease control. Most treatments in the study provided acceptable control of brown patch during the early stages of the epidemic in June and July when disease severity was low to moderate (< 30% turf area infested on untreated turf) except Bayer Adv Fungus Ctrl for Lawns 1G (trt 20), Immunox 0.39G (trt 21), Scotts Lawn Fungus CTRL 2.3GR (trt 22), 3336 Plus 19.4F (trt 23), GW349 50W (Trt 43), and VN04 50W (trt 44).

Under more severe disease pressure (45 to 69% turf area infested in untreated turf [Table 1B]), only Heritage 50WG sprayed three times every 28 Days @ 0.4 oz (trt 11), Endorse 2.5W (trt 25), Honor 28WG applied every 21 days on a preventive or curative basis @ 0.825 oz (trts 27, 29, respectively) or @ 1.1 oz (trts 28, 30, respectively), and Heritage TL 0.8ME used every 28 days on a preventive schedule @ 2.0 fl oz (trt 35) afforded season-long suppression of brown patch (12 June to 1 September). Several additional products also provided good disease control, but only until 15 August [Armada 0.6G EG HW (trt 1), Bayer Program # 1 (trt 7) and # 2 (trt 8), ProStar 70WG (trt 10), Heritage 50WG applied twice every 28 Days @ 0.2 (trt 16) or @ 0.4 oz (trt 17), and Headway 1.39ME sprayed twice @ 1.5 fl oz every 28 days (trt 26)] or 23 August [Insignia 20WG (trt 39)] after which time the severity of brown patch became unacceptable.

Turf quality was acceptable (greater or equal to 5.0) for all entries in this study on 23 August (Table 1B) and was inversely associated with brown patch severity. No phytotoxicity was observed for any of the products evaluated.

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Table 1A. Evaluation of fungicides and biorational products for the control of brown patch on tall fescue: Rutgers University, 2007.

Treatment	Rate per 1000 sq ft)	Spray Interval (days) ²	Turf Area Infested (%) per Plot ¹				
			25 June	6 July	16 July	24 July	1 Aug.
1 Armada 0.6G EG HW 6.0 lb	28 ³	2.0 e	7.0 c-g	3.8 f-i	7.5 c-e	7.5 de	
2 Armada 0.6G EG HW 8.0 lb	28 ³	0.0 e	0.0 j	2.5 g-i	2.5 ef	4.5 de	
3 Bayleton 1G 4.0 lb	28 ³	1.3 e	2.0 h-j	2.5 g-i	3.8 d-f	2.5 de	
4 Bayleton 4SC 1.25 fl oz	28	0.0 e	3.0 g-j	1.3 hi	2.5 ef	2.3 e	
5 Armada 50WP 1.2 oz	28	0.8 e	2.0 h-j	2.5 g-i	1.3 ef	2.5 de	
6 Armada 50WP 1.5 oz	28	0.0 e	1.0 h-j	0.0 i	0.0 f	3.0 de	
7 Bayer Program #1 —	ALT ⁴	1.8 e	0.8 ij	6.3 e-h	2.5 ef	6.0 de	
8 Bayer Program #2 —	ALT ⁴	1.0 e	0.0 j	3.8 f-i	2.5 ef	2.0 e	
9 ProStar 70WP 2.2 oz	28	0.0 e	1.3 h-j	3.8 f-i	2.5 ef	5.0 de	
10 ProStar 70WG 2.2 oz	28	0.5 e	5.5 d-i	8.8 ef	7.5 c-e	6.0 de	
11 Heritage 50WG 0.4 oz	28	0.0 e	0.5 j	2.5 g-i	1.3 ef	4.5 de	
12 A14912 0.31G 2.0 lb	28 ^{3.5}	0.5 e	7.5 c-g	2.5 g-i	3.8 d-f	8.0 de	
13 A14912 0.31G 4.0 lb	28 ^{3.5}	1.0 e	1.8 h-j	1.3 hi	0.0 f	2.5 de	
14 A14912 0.31G 2.0 lb	35 ^{3.5}	1.8 e	5.8 d-h	7.5 e-g	5.0 c-f	7.0 de	
15 A14912 0.31G 4.0 lb	35 ^{3.5}	1.0 e	2.0 h-j	7.5 e-g	1.3 ef	5.0 de	
16 Heritage 50WG 0.2 oz	28 ⁵	0.0 e	1.0 h-j	2.5 g-i	0.0 f	2.5 de	
17 Heritage 50WG 0.4 oz	28 ⁵	0.0 e	0.3 j	0.0 i	1.3 ef	2.0 e	
18 Heritage 50WG 0.2 oz	35 ⁵	0.0 e	0.3 j	1.3 hi	2.5 ef	3.0 de	
19 Heritage 50WG 0.4 oz	35 ⁵	1.0 e	0.3 j	0.0 i	0.0 f	2.0 e	
20 Bayer Adv Fungus Ctrl for Lawn 1G 1.5 lb	28 ^{3.5}	2.8 de	3.3 g-j	16.3 bc	17.5 b	33.8 bc	
21 Immunox 0.39G 4.0 lb	28 ^{3.5}	1.8 e	11.3 a-c	11.3 c-e	10.0 cd	28.0 c	
22 Scotts Lawn Fungus CTRL 2.3GR. 2.68 lb	28 ^{3.5}	1.8 e	3.3 g-j	15.0 b-d	11.3 c	39.5 b	
23 3336 Plus 19.4F 6.0 fl oz	21	0.0 e	1.3 h-j	18.8 b	11.3 c	54.0 a	
24 Endorse 2.5W 4.0 oz	14	1.3 e	4.3 f-j	1.3 hi	1.3 ef	1.0 e	
25 Endorse 2.5W 4.0 oz	21	1.8 e	1.3 h-j	1.3 hi	1.3 ef	3.0 de	
26 Headway 1.39ME 1.5 fl oz	28 ⁵	0.0 e	0.0 j	1.3 hi	0.0 f	1.8 e	
27 Honor 28WG 0.825 oz	21	0.5 e	3.8 f-j	0.3 i	1.3 ef	3.0 de	
28 Honor 28WG 1.1 oz	21	5.8 cd	0.0 j	1.0 hi	3.8 d-f	2.3 e	
29 Honor 28WG 0.825 oz	CUR 21 ⁶	6.8 bc	9.5 a-d	11.3 c-e	2.5 ef	3.5 de	
30 Honor 28WG 1.1 oz	CUR 21 ⁶	2.0 e	8.3 b-f	7.5 e-g	3.8 d-f	1.0 e	

(Continued)

Table 1A (continued).

Treatment	Rate per 1000 sq ft)	Spray Interval (days) ²	Turf Area Infested (%) per Plot ¹				
			25 June	6 July	16 July	24 July	1 Aug.
31 Honor 28WG	0.825 oz	28	1.0 e	1.3 h-j	2.5 g-i	1.3 ef	2.5 de
32 Honor 28WG	1.1 oz	28	0.8 e	0.0 j	2.5 g-i	2.5 ef	1.0 e
33 Honor 28WG	0.825 oz	CUR 28 ⁷	7.0 bc	5.5 d-i	10.0 de	0.0 f	2.5 de
34 Honor 28WG	1.1 oz	CUR 28 ⁷	6.5 bc	4.5 e-j	7.5 e-g	1.3 ef	3.0 de
35 Heritage TL 0.8ME	2.0 fl oz	28	0.5 e	0.0 j	0.0 i	1.3 ef	4.3 de
36 Heritage TL 0.8ME	2.0 fl oz	CUR 28 ⁷	8.3 a-c	4.3 f-j	7.5 e-g	3.8 d-f	2.0 e
37 Medallion 50W	0.5 oz	14	0.8 e	0.5 j	1.3 hi	7.5 c-e	5.0 de
38 Insignia 20WG	0.9 oz	28 ⁵	0.0 e	0.0 j	3.8 f-i	0.0 f	2.3 e
39 Insignia 20WG	0.9 oz	28	0.0 e	0.0 j	1.3 hi	2.5 ef	1.3 e
40 DK037 282 50W.....	0.78 oz	14 ⁸	8.0 a-c	10.0 a-d	3.8 f-i	1.3 ef	2.0 e
41 DK037 283 50W.....	0.78 oz	14 ⁸	8.3 a-c	9.3 a-e	3.8 f-i	0.0 f	6.3 de
42 DA03 50W.....	0.78 oz	14 ⁸	8.3 a-c	10.0 a-d	2.5 g-i	5.0 c-f	11.0 d
43 GW349 50W	0.78 oz	14 ⁸	11.0 a	12.5 ab	7.5 e-g	2.5 ef	7.3 de
44 VN04 50W.....	0.78 oz	14 ⁸	9.0 a-c	12.5 ab	15.0 b-d	3.8 d-f	11.0 d
45 Untreated Check	—	—	8.0 a-c	13.8 a	15.0 b-d	28.8 a	54.8 a
46 Untreated Check	—	—	8.3 a-c	10.0 a-d	20.0 ab	26.3 a	51.8 a
47 Untreated Check	—	—	9.8 ab	9.5 a-d	25.0 a	27.5 a	50.5 a

	INT ⁹	DAT ¹⁰	DAT	DAT	DAT	DAT
	14	13	10	6	14	7
	21	13	3	13	21	7
	28	13	24	6	14	22
	35	13	24	34	7	15
	CUR 21	—	—	6	14	8
	CUR 28	—	—	6	14	22

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).

(Continued)

Table 1A (continued).

- ² Fungicides were applied on 12 June (all treatments), 26 June (14-day treatment), 3 July (21-day treatment), 10 July (14- and 28-day treatments), 17 July (35-day treatment), 24 July (14- and 21-day treatments), 7 August (14- and 28-day treatments), 14 August (21-day treatment), and 21 August (14- and 35-day treatments).
- ³ Treatments 1 to 3, 12 to 15, and 20 to 22 were applied to dry foliage and then irrigated with 0.5 gal of water per plot 24 hours post application.
- ⁴ Alternation of fungicides on a 28-day schedule, where treatment 7 (Bayer Program #1) received Armada 50WP (1.2 oz) on 12 June and 7 August and ProStar 70WG (2.2 oz) on 10 July, whereas treatment 8 (Bayer Program #2) received Armada 50WP (1.5 oz) on 12 June and 7 August and ProStar 70WG (2.2 oz) on 10 July.
- ⁵ Treatments 12, 13, 16, 17, 20 to 22, 26, and 38 were applied only twice on a 28-day interval on 12 June and 10 July, whereas treatments 14, 15, 18, and 19 were applied twice on a 35-day interval on 12 June and 17 July.
- ⁶ Treatments 29 and 30 were applied on a curative (CUR) basis every 21 days on 10 and 24 July and 14 August.
- ⁷ Treatments 33, 34, and 36 were applied on a curative (CUR) basis every 28 days on 10 July and 7 August.
- ⁸ Treatments 40 to 44 were applied on a 14-day schedule from 10 July to 21 August. Prior to initiation of treatments 40 to 43, turf receiving these treatments were oversprayed with Daconil Ultrex 82.5WDG (5.0 oz) on 28 June to enhance symptom remission.
- ⁹ Spray intervals in days.
- ¹⁰ Days after treatment (DAT) for each spray interval.

Table 1B. Evaluation of fungicides and biorational products for the control of brown patch on tall fescue: Rutgers University, 2007.

Treatment	Rate per 1000 sq ft)	Spray Interval (days) ³	Turf Area Infested (%) per Plot ¹			Turf Quality ² 23 Aug.
			15 Aug.	23 Aug.	1 Sept.	
1 Armada 0.6G EG HW	6.0 lb	28 ⁴	10.0 g-l	12.5 f-j	2.0 p	6.8 a-e
2 Armada 0.6G EG HW	8.0 lb	28 ⁴	11.3 f-l	11.3 f-j	16.5 j-p	7.3 a-c
3 Bayleton 1G	4.0 lb	28 ⁴	30.0 c-g	24.3 e-i	24.5 h-o	6.3 b-f
4 Bayleton 4SC	1.25 fl oz	28	15.0 e-l	17.5 f-j	16.5 j-p	6.8 a-e
5 Armada 50WP	1.2 oz	28	21.3 c-k	28.8 d-g	25.3 g-o	6.3 b-f
6 Armada 50WP	1.5 oz	28	15.0 e-l	23.8 e-i	22.0 i-o	6.3 b-f
7 Bayer Program #1	—	ALT ⁵	5.0 j-l	12.5 f-j	6.5 m-p	6.8 a-e
8 Bayer Program #2	—	ALT ⁵	8.8 h-l	15.0 f-j	6.8 m-p	6.5 a-e
9 ProStar 70WP	2.2 oz	28	36.3 b-d	31.3 c-f	26.5 f-n	6.3 b-f
10 ProStar 70WG	2.2 oz	28	8.8 h-l	11.3 f-j	18.8 i-p	7.5 ab
11 Heritage 50WG	0.4 oz	28	2.5 kl	7.5 g-j	0.0 p	6.8 a-e
12 A14912 0.31G	2.0 lb	28 ^{4,6}	22.5 c-k	15.0 f-j	29.3 e-l	6.8 a-e
13 A14912 0.31G	4.0 lb	28 ^{4,6}	11.3 f-l	10.0 f-j	14.3 k-p	6.8 a-e
14 A14912 0.31G	2.0 lb	35 ^{4,6}	16.3 d-l	20.0 e-j	21.5 i-p	6.5 a-e
15 A14912 0.31G	4.0 lb	35 ^{4,6}	26.3 c-i	30.0 d-f	27.8 f-m	6.3 b-f
16 Heritage 50WG	0.2 oz	28 ⁶	6.3 i-l	13.8 f-j	13.3 k-p	7.5 ab
17 Heritage 50WG	0.4 oz	28 ⁶	10.0 g-l	15.0 f-j	28.8 f-m	6.8 a-e
18 Heritage 50WG	0.2 oz	35 ⁶	20.0 c-l	18.8 f-j	18.0 i-p	6.3 b-f
19 Heritage 50WG	0.4 oz	35 ⁶	28.8 c-h	22.5 e-i	25.8 f-n	6.3 b-f
20 Bayer Adv Fungus Ctrl for Lawn 1G	1.5 lb	28 ^{4,6}	31.3 c-f	26.3 d-h	37.8 d-j	6.3 b-f
21 Immunox 0.39G	4.0 lb	28 ^{4,6}	16.3 d-l	16.3 f-j	47.0 b-f	6.5 a-e
22 Scotts Lawn Fungus CTRL 2.3GR.	2.68 lb	28 ^{4,6}	16.3 d-l	12.5 f-j	46.0 c-g	6.8 a-e
23 3336 Plus 19.4F	6.0 fl oz	21	56.3 a	45.0 a-d	66.3 ab	5.8 d-f
24 Endorse 2.5W	4.0 oz	14	37.5 bc	27.5 d-g	35.0 d-k	5.8 d-f
25 Endorse 2.5W	4.0 oz	21	5.0 j-l	0.0 j	4.8 n-p	7.8 a
26 Headway 1.39ME	1.5 fl oz	28 ⁶	0.0 l	12.5 f-j	14.8 k-p	6.8 a-e
27 Honor 28WG	0.825 oz	21	0.0 l	5.0 h-j	0.0 p	7.0 a-d
28 Honor 28WG	1.1 oz	21	0.0 l	3.8 ij	1.0 p	7.3 a-c
29 Honor 28WG	0.825 oz	CUR 21 ⁷	0.0 l	3.8 ij	0.8 p	7.3 a-c
30 Honor 28WG	1.1 oz	CUR 21 ⁷	0.0 l	0.0 j	2.0 p	7.8 a

Table 1B (continued).

Treatment	Rate per 1000 sq ft)	Spray Interval (days) ³	Turf Area Infested (%) per Plot ¹			Turf Quality ² 23 Aug.
			15 Aug.	23 Aug.	1 Sept.	
31 Honor 28WG	0.825 oz	28	11.3 f-l	17.5 f-j	18.3 i-p	6.5 a-e
32 Honor 28WG	1.1 oz	28	2.5 kl	15.0 f-j	6.5 m-p	6.0 c-f
33 Honor 28WG	0.825 oz	CUR 28 ⁸	16.3 d-l	17.5 f-j	15.5 k-p	6.5 a-e
34 Honor 28WG	1.1 oz	CUR 28 ⁸	11.3 f-l	15.0 f-j	13.8 k-p	6.3 b-f
35 Heritage TL 0.8ME	2.0 fl oz	28	0.0 l	3.8 ij	3.3 op	6.8 a-e
36 Heritage TL 0.8ME	2.0 fl oz	CUR 28 ⁸	15.0 e-l	15.0 f-j	11.3 l-p	6.5 a-e
37 Medallion 50W	0.5 oz	14	23.8 c-j	26.3 d-h	17.5 i-p	6.0 c-f
38 Insignia 20WG	0.9 oz	28 ⁶	12.5 e-l	13.8 f-j	10.8 l-p	6.5 a-e
39 Insignia 20WG	0.9 oz	28	8.8 h-l	7.5 g-j	14.8 k-p	6.3 b-f
40 DK037 282 50W.....	0.78 oz	14 ⁹	28.8 c-h	28.8 d-g	43.5 d-h	6.5 a-e
41 DK037 283 50W.....	0.78 oz	14 ⁹	32.5 c-e	30.0 d-f	49.8 a-e	6.0 c-f
42 DA03 50W.....	0.78 oz	14 ⁹	37.5 bc	40.0 b-e	26.5 f-n	5.5 ef
43 GW349 50W	0.78 oz	14 ⁹	18.8 c-l	17.5 f-j	39.0 d-i	6.5 a-e
44 VN04 50W.....	0.78 oz	14 ⁹	57.5 a	45.0 a-d	55.3 a-d	5.5 ef
45 Untreated Check	—	—	53.8 ab	52.5 ab	68.0 a	5.5 ef
46 Untreated Check	—	—	57.5 a	50.0 a-c	65.5 a-c	5.5 ef
47 Untreated Check	—	— ⁹	65.0 a	60.0 a	68.8 a	5.0 f

	INT ¹⁰	DAT ¹¹	DAT	DAT	DAT
	14	8	2	11	2
	21	1	9	18	9
	28	8	16	25	16
	35	29	2	11	2
	CUR 21	1	9	18	9
	CUR 28	8	16	25	16

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).

(Continued)

Table 1B (continued).

- ² Turf quality on a 1 to 9 scale where 9 = best turf quality and 5 = commercially acceptable quality.
- ³ Fungicides were applied on 12 June (all treatments), 26 June (14-day treatment), 3 July (21-day treatment), 10 July (14- and 28-day treatments), 17 July (35-day treatment), 24 July (14- and 21-day treatments), 7 August (14- and 28-day treatments), 14 August (21-day treatment), and 21 August (14- and 35-day treatments).
- ⁴ Treatments 1 to 3, 12 to 15, and 20 to 22 were applied to dry foliage and then irrigated with 0.5 gal of water per plot 24 hours post application.
- ⁵ Alternation of fungicides on a 28-day schedule, where treatment 7 (Bayer Program #1) received Armada 50WP (1.2 oz) on 12 June and 7 August and ProStar 70WG (2.2 oz) on 10 July, whereas treatment 8 (Bayer Program #2) received Armada 50WP (1.5 oz) on 12 June and 7 August and ProStar 70WG (2.2 oz) on 10 July.
- ⁶ Treatments 12, 13, 16, 17, 20 to 22, 26, and 38 were applied only twice on a 28-day interval on 12 June and 10 July, whereas treatments 14, 15, 18, and 19 were applied twice on a 35-day interval on 12 June and 17 July.
- ⁷ Treatments 29 and 30 were applied on a curative (CUR) basis every 21 days on 10 and 24 July and 14 August.
- ⁸ Treatments 33, 34, and 36 were applied on a curative (CUR) basis every 28 days on 10 July and 7 August.
- ⁹ Treatments 40 to 44 were applied on a 14-day schedule from 10 July to 21 August. Prior to initiation of treatments 40 to 43, turf receiving these treatments were oversprayed with Daconil Ultrex 82.5WDG (5.0 oz) on 28 June to enhance symptom remission.
- ¹⁰ Spray intervals in days.
- ¹¹ Days after treatment (DAT) for each spray interval.



Cooperating Agencies: Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and County Boards of Chosen Freeholders. Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.