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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 University 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. Articles appearing in these proceedings are divided into two sections.

The first section includes lecture notes of papers presented at the 1999 New Jersey Turfgrass Expo. Publication of the New Jersey Turfgrass Expo Notes provides a readily available

source of information covering a wide range of topics. The Expo Notes include technical and popular presentations of importance to the turfgrass industry.

The second section includes research papers containing original research findings and reviews covering selected subjects in turfgrass science. The primary objective of this section is to facilitate the timely dissemination of original turfgrass research for use by the turfgrass industry.

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

## CURATIVE CONTROL OF BROWN PATCH ON COLONIAL BENTGRASS WITH SELECTED FUNGICIDES

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Fungicides were evaluated in 1999 for their ability to control brown patch caused by *Rhizoctonia solani* at the Rutgers Turf Research Farm in North Brunswick, New Jersey on colonial bentgrass (*Agrostis tenuis* 'SR7100') maintained under golf course fairway conditions. Turf was established September 1995 on a Norton loam with a pH of 6.1. The site was mowed at a height of 0.4 inches three times per week and clippings were collected. Turf was irrigated to prevent drought stress.

Fertilizer was applied as 16-4-8 on 2 April (1.1 lb N/1000 ft<sup>2</sup>), 18-4-10 on 13 May (0.7 lb N/1000 ft<sup>2</sup>), 16-4-8 on 15 June (0.4 lb N/1000 ft<sup>2</sup>), and 18-4-10 on 9 August (0.75 lb N/1000 ft<sup>2</sup>). A mixture of MCPP-4 amine (1 fl oz/1000 ft<sup>2</sup>) plus Banvel-4 amine (0.18 fl oz/1000 ft<sup>2</sup>) was applied for broadleaf weed control on 5 April. Preemergent weed control was provided by Betasan 4E (7.4 fl oz/1000 ft<sup>2</sup>) on 19 April. Insect pests were suppressed with Turcam 1.5G (3 lb/1000 ft<sup>2</sup>) on 14 September. Aquaduct wetting agent (6.0 oz/1000 ft<sup>2</sup>) was applied on 28 May and 27 July to control localized dry spots. To suppress dollar spot, the entire study was treated with Chipco 26GT (3.0 fl oz/1000 ft<sup>2</sup>) on 15 June and Bayleton 50DF (2.0 oz/1000 ft<sup>2</sup>) on 13 September. Plots were 3 ft x 9 ft and were arranged in a randomized complete block with four replications.

Fungicides were applied in water equivalent to 2 gal/1000 ft<sup>2</sup> with a CO<sub>2</sub> powered sprayer at 30 psi using TeeJet 8003E nozzles. Treatments (trt) were initiated on 1 July. Fungicides were reapplied as indicated in Table 1. Percent turf

area infested with *R. solani* was assessed on 13 July, 23 July, 31 July, 8 August, 20 August, and 10 September. Turf quality was evaluated on 21 September. Data were subjected to analysis of variance and means separation by Waller-Duncan *k*-ratio *t*-test (*k* = 100) following arcsine transformation.

Brown patch was first observed in late June. Disease pressure was very severe on untreated turf (50 to 85% turf area infected) from 13 July to 10 September. Excellent season-long control of brown patch was provided by Heritage 50WG (trt 19 and 20), Chipco 26GT 2SC + Chipco Signature 80WG (trt 3), Spectro 90WDG (trt 4), WAC 79 + Cleary 3336 50W (trt 7), WAC 79 + Daconil Ultrex 82.5SDG (trt 8), RH-0753 2SC + Eagle 40W (trt 12 and 13), Eagle 40W + Fore 80W (trt 14), Daconil Ultrex 82.5SDG (trt 21), ProStar 70W + Daconil Ultrex 82.5SDG (trt 26), and ProStar 70W / AE B066752 (trt 29) also provided good to excellent control of the target disease throughout most of the study.

It is interesting to note that although Chipco 26GT 2SC + Chipco Signature 80WG (trt 3) afforded excellent disease control, the components of this mixture (trt 1 and 2) provided less than adequate suppression of brown patch. From 8 Aug to 10 Sep, untreated turf (trt 35), RH-0753 2SC (trt 9 to 11), ProStar 70W (trt 22 to 24), and ProStar 70W + Chipco 26GT 2SC (trt 25) sustained noticeable foliar necrosis (anthracnose) induced by *Colletotrichum graminicola*. As a result, disease assessments for these treatments during this period represent a combined

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disease evaluation for both anthracnose and brown patch. All other data in the Table 1 represent percent turf area affected by brown patch only. Treatments 33 and 34 induced severe foliar necrosis from 13 July to 10 September, thus precluding disease evaluations. No other phy-

totoxicity was observed. With the exception of Heritage 50WG (trt 19 and 20) and ProStar 70W (trt 22 to 24), which sustained significant dollar spot damage (data not shown), turf quality was closely associated with the incidence of brown patch (13 July to 21 September).

Table 1. Impact of fungicides on the incidence of brown patch on colonial bentgrass in North Brunswick, NJ: 1999.

Treatment and rate/1000 sq ft	Spray interval <sup>3</sup> (days)	Turf area infected (%) per plot <sup>1</sup>							Turf quality <sup>2</sup>	
		13 July	23 July	31 July	8 Aug.	20 Aug.	10 Sept.	21 Sept.		
1. Chipco 26GT 2SC 4.0 fl oz .....	14	18.0 d-g	12.2 e-h	17.5 j-l	16.5 i-k	34.0 j	46.8 k-n	5.0 a-c		
2. Chipco Signature 80WG 8.0 oz .....	14	33.0 j-n	35.8 kl	33.0 n	36.2 m	46.5 k	37.5 i-k	5.2 a-d		
3. Chipco 26GT 2SC 4.0 fl oz + Chipco Signature 80WG 8.0 oz .....	14	5.8 a	0.0 a	1.0 a	0.5 a	3.5 ab	38.5 j-l	5.5 b-e		
4. Spectro 90WDG 5.0 oz .....	14	12.8 b-d	2.2 ab	7.2 c-g	6.0 d-g	5.5 bc	20.8 d-f	6.5 fg		
5. WAC 79 5.0 fl oz .....	14	36.2 l-o	41.2 lm	59.2 o	64.2 op	62.8 l	44.5 k-n	5.2 a-d		
6. WAC 79 10.0 fl oz .....	14	31.8 i-n	52.0 mn	62.8 op	54.0 n	60.5 l	45.8 k-n	5.8 c-f		
7. WAC 79 5.0 fl oz + Cleary 3336 50W 4.0 oz .....	14	8.8 ab	2.0 ab	5.8 b-f	3.0 b-d	11.5 c-f	39.2 j-m	5.5 b-e		
8. WAC 79 5.0 fl oz + Daconil Ultrex 82.5SDG 1.9 oz .....	14	13.8 b-e	6.0 c-e	5.5 b-f	6.0 d-g	12.0 d-g	49.5 n	6.0 d-g		
9. RH-0753 2SC 0.12 fl oz .....	14 <sup>4</sup>	41.8 n-p	51.0 mn	20.5 k-m	25.2 l	32.8 j	33.2 h-j	5.0 a-c		
10. RH-0753 2SC 0.5 fl oz .....	14 <sup>4</sup>	34.8 l-n	28.2 k	13.8 h-l	10.8 g-j	23.5 hi	25.2 f-h	5.2 a-d		
11. RH-0753 2SC 1.0 fl oz .....	28 <sup>4</sup>	33.2 k-n	30.0 kl	27.0 mn	25.0 l	33.5 j	28.8 g-i	5.5 b-e		
12. RH-0753 2SC 0.12 fl oz + Eagle 40W 0.6 oz .....	14	20.5 d-h	8.5 d-f	7.8 d-i	5.2 d-f	13.8 e-g	8.2 b	7.2 g		
13. RH-0753 2SC 0.5 fl oz + Eagle 40W 0.6 oz .....	14	19.2 d-h	7.2 c-e	8.2 e-i	12.0 h-j	13.2 e-g	1.2 a	7.2 g		
14. Eagle 40W 0.6 oz + Fore 80W 8.0 oz .....	14	17.0 d-g	3.0 a-c	2.0 ab	1.0 ab	1.5 a	26.5 f-h	6.0 d-g		
15. Fore 80W 8.0 oz .....	14	22.5 e-i	14.0 f-h	12.5 g-k	4.2 c-e	33.2 j	42.0 j-n	4.5 a		
16. F-155 20W 0.4 oz .....	14	32.8 j-n	27.5 jk	28.2 mn	26.2 l	34.0 j	47.2 l-n	6.5 fg		
17. F-155 20W 0.8 oz .....	14	25.8 g-l	15.2 f-i	15.2 i-l	17.5 jk	18.2 gh	38.0 j-l	6.5 fg		
18. F-155 20W 1.2 oz .....	14	28.8 h-m	17.0 h-j	12.5 g-k	10.0 f-i	10.5 c-f	15.8 de	7.2 g		
19. Heritage 50WG 0.2 oz .....	14	14.2 b-e	2.5 a-c	5.8 b-f	2.0 a-c	6.0 b-d	4.5 b	4.8 ab		

(continued)

Table 1 (continued).

Treatment and rate/1000 sq ft	Spray interval <sup>3</sup> (days)	Turf area infected (%) per plot <sup>1</sup>							Turf quality <sup>2</sup>	
		13 July	23 July	31 July	8 Aug.	20 Aug.	10 Sept.	21 Sept.		
20. Heritage 50WG 0.4 oz .....	28	10.5 a-c	3.2 bc	2.5 a-c	1.5 a-c	8.8 c-e	9.2 bc	5.5 b-e		
21. Daconil Ultrex 82.5SDG 3.8 oz .....	14	21.0 d-h	3.0 a-c	3.5 a-d	5.5 d-f	17.8 gh	23.2 fg	6.2 e-g		
22. ProStar 70W 1.5 oz .....	14 <sup>4</sup>	35.0 l-o	24.0 i-k	16.8 j-l	10.2 f-i	29.5 ij	25.2 f-h	4.2 a		
23. ProStar 70W 2.2 oz .....	14 <sup>4</sup>	23.0 f-k	14.2 f-h	15.8 j-l	13.8 i-k	13.5 e-g	14.0 cd	5.0 a-c		
24. ProStar 70W 2.2 oz .....	28 <sup>4</sup>	38.5 m-o	30.0 kl	11.0 f-j	15.8 i-k	30.5 ij	21.2 e-g	4.8 ab		
25. ProStar 70W 1.5 oz + Chipco 26GT 2SC 3.0 fl oz .....	14 <sup>4</sup>	22.5 e-i	1.0 ab	8.0 d-i	12.2 h-j	22.0 hi	15.0 c-e	6.2 e-h		
26. ProStar 70W 1.5 oz + Daconil Ultrex 82.5SDG 1.9 oz .....	14	16.0 c-f	3.8 b-d	5.0 b-e	4.2 c-e	17.2 f-h	15.0 c-e	6.0 d-g		
27. AE B066752 4.0 oz. ....	14	46.2 o-q	16.5 g-i	21.2 lm	19.5 kl	29.5 ij	41.5 j-n	5.2 a-d		
28. AE B066752 6.0 oz. ....	14	17.5 d-g	9.0 d-g	12.5 g-k	8.2 e-h	14.0 e-g	46.5 k-n	5.5 b-e		
29. ProStar 70W 1.5 oz / AE B066752 4.0 oz .....	14 <sup>6</sup>	17.5 d-g	6.2 c-e	6.0 b-g	5.8 d-f	23.8 hi	16.0 de	5.2 a-d		
30. OPGAP 2.0 oz .....	14	55.5 q	68.8 o	77.8 q	72.5 pq	77.2 m	49.0 n	5.0 a-c		
31. RU011720 3.67 oz + Intac 0.125% v/v .....	7	34.2 l-n	57.5 no	77.0 q	62.5 no	75.2 m	42.8 k-n	5.0 a-c		
32. RU011720 7.35 oz + Intac 0.125% v/v .....	7	35.2 l-o	52.5 mn	62.5 op	63.2 o	81.0 mn	48.5 mn	4.8 ab		
33. Par-Flo 4F 4.0 fl oz .....	7 <sup>5</sup>	—	—	—	—	—	—	5.0 a-c		
34. Par-Flo 4F 6.0 fl oz .....	14 <sup>5</sup>	—	—	—	—	—	—	5.2 a-d		
35. Untreated Check .....	— <sup>4</sup>	53.2 pq	61.8 o	71.2 pq	80.0 q	85.0 n	50.0 n	5.2 a-d		

(continued)

Table 1 (continued).

Treatment and rate/1000 sq ft	Spray interval <sup>3</sup> (days)		Turf area infected (%) per plot <sup>1</sup>					Turf quality <sup>2</sup>
	13 July	23 July	31 July	8 Aug.	20 Aug.	10 Sept.	21 Sept.	
	INT <sup>7</sup>	DAT <sup>8</sup>	DAT	DAT	DAT	DAT	DAT	DAT
	7	5	1	2	3	8	29	40
	14	12	8	2	10	8	29	40
	28	12	8	2	10	22	43	54

<sup>1</sup> 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).

<sup>2</sup> Turf quality on a scale of 1 to 9, where 9 = best turf quality. Values above 6.0 represent acceptable turf quality.

<sup>3</sup> Fungicides were applied on 1 July (all treatments), 8 July (7 day treatment), 15 July (7 and 14 day treatments), 22 July (7 day treatment), 29 July (7, 14, and 28 day treatments), 5 August (7 day treatment), and 12 August (7 and 14 day treatments, except treatment 33 and 34 which were not applied on this date).

<sup>4</sup> Data obtained on 8 August, 20 August, and 10 September for treatments 9, 10, 11, 22 to 25, and 35 represent a combined disease evaluation for both brown patch and anthracnose. All other data in the table represent the percent turf area affected by brown patch only.

<sup>5</sup> Treatments 33 and 34 caused severe foliar necrosis from 13 July to 10 September. As a result, an estimation of disease control could not be made during the study.

<sup>6</sup> For treatment 29, ProStar 70W 1.5 oz was applied on 1 July and 29 July; AE B066752 4.0 oz was applied on 15 July and 12 August.

<sup>7</sup> Spray interval in days.

<sup>8</sup> Days after treatment (DAT) for each spray interval.