

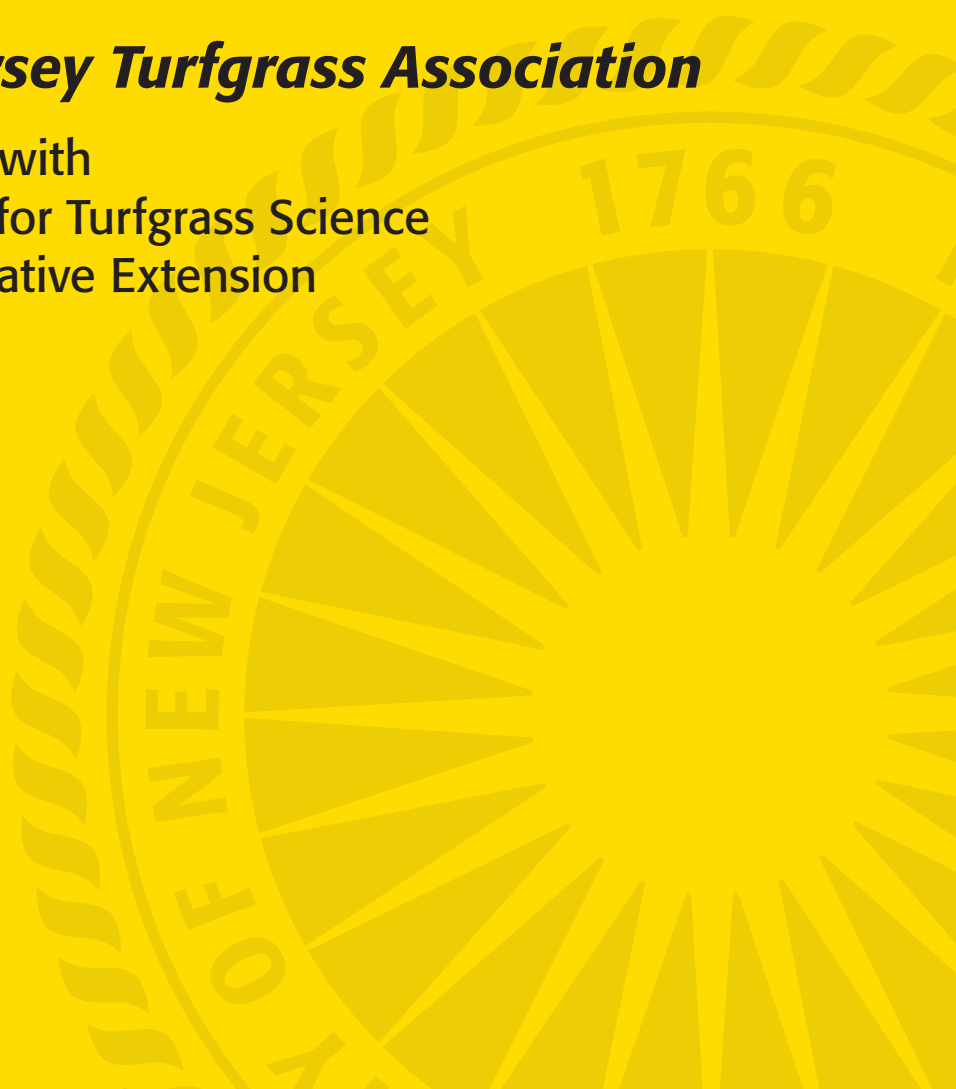
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The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State 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 2009 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 FUNGICIDES AND BIORATIONAL PRODUCTS FOR THE CONTROL OF BROWN PATCH ON A COLONIAL BENTGRASS FAIRWAY, 2009

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Fungicides were evaluated in 2009 for their ability to control brown patch (caused by *Rhizoctonia solani*) at the Rutgers Turf Research Farm in North Brunswick, NJ on colonial bentgrass (*Agrostis capillaris* L.) cv. SR7100 maintained under golf course fairway conditions. Turf was established in 2000 on a Nixon loam with a pH of 6.4. Mowing was performed three times per week at a height of 0.375 inches with clippings collected. The site was irrigated as needed to prevent drought stress.

Fertilizer was applied as 34-0-0 (0.4 lb nitrogen (N)/1000 ft²) on 13 May and (0.2 lb N/1000 ft²) on 25 June, and 2, 12, and 19 July. Dimension 2EW (8.3 fl oz/A) was applied on 30 April for pre-emergence weed control. Broadleaf weeds were controlled with Trimec Bentgrass 1.3L (1.5 fl oz/1000 ft²) + Lontrel T/O 3L (0.18 oz/1000 ft²) on 10 June. Emerald 70WG (0.18 oz/1000 ft²) was applied on 21 and 30 May and Curalan 50EG (1.2 oz/1000 ft²) was sprayed on 10 and 19 June to suppress dollar spot (caused by *Sclerotinia homoeocarpa*). Localized dry spots were prevented with the wetting agent Tricure 100LC (6.0 oz/1000 ft²) on 2 May and 2 July. Insect pests were controlled with Sevin SL 4L (8 qt/A) on 23 June and Merit 75WP (0.16 oz/1000 ft²) on 7 July. 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 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 brown patch development. Fungicides were reapplied at the appropriate intervals as indicated in Tables 1A and 1B. Turf was visually evaluated for percent turf area infested with

brown patch on 2, 13, and 24 July, and 3, 13, and 24 August as well as percent soil/leaf surface area covered with blue-green algae (cyanobacteria) on 24 August. Turf quality was rated on 2 and 24 July and 24 August using a 1 to 9 scale, where 9 = best turf quality and 5 = acceptable quality. Phytotoxicity was assessed on 2 July using a 1 to 5 scale, where 1 = no foliar discoloration, 2 = slight chlorosis or necrosis, 3 = moderate chlorosis or necrosis, 4 = severe chlorosis or necrosis, and 5 = all turf dead. 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 29 June and became uniform throughout the study by 2 July. Disease severity ranged from 48 to 83% turf area infested with *R. solani* on untreated turf (Tables 1A and 1B), which was considered a moderate to severe level of brown patch infestation, respectively. Less than 10% turf area infested per plot represented an acceptable level of disease control. Approximately 41% of the treatments in this study provided season-long control (3 June to 26 August) of brown patch (Table 1A). This included entries containing QoI fungicides [i.e., Heritage TL 0.8ME (trt 1), Heritage 50WG (trt 15), Heritage 50WG + A9180A 50WG (trts 16, 17), Headway 1.39EC (trt 19), Headway 1.39EC + A9180A 50WG (trts 20, 21), Insignia 20WG @ 0.5 and 0.7 oz (trts 72 and 26, respectively), SARS-346 40WP + Heritage 50WG (trt 61), Honor 28WG (trts 70, 71), and Insignia 20WG + HM9333 27LC (trt 91)]; numerous experimental products [i.e., A17595A 0.7 EC @ 1.7 fl oz every 14 (trt 18) or 21 days (trt 6), A17601A 0.9EC (trt 7), A13703G 2.7SC @ 0.32 fl oz every 14 (trt 76) or 21 days (trt 8) and @ 0.5 fl oz every 21 days (trt 9), A9898A 0.8SC @ 0.96 fl oz (trt11), A12910C 2.3SC (trts 13, 14), BAS 500 17F 2.1SC + BAS 595

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16F 1.67SC (trts 22, 23), BAS 500 17F 2.1SC (trt 24), RU21196-09A SC @ 0.34 and 0.46 fl oz every 14 days (trts 32 and 34, respectively), RU21196-09C SC (trt 37), RU21196-09B SC + RU21196-09G EC (trts 41, 42), DPX-LEM17-50 50WDG @ 0.3 to 0.5 oz (trts 57 to 59), SARS-346 40WP + Endorse 2.5W (trt 62), A12910 2.34SC (trt 77), and IKF-205 28W (trt 82)], and the labeled fungicides Reserve 4.8SC @ 4.5 fl oz (trt 51), Prostar 70W (trt 65), and Endorse 2.5W (trt 66).

Turf quality evaluated on 2 and 24 July, and 24 August was closely associated with the degree of brown patch control; treatments affording good protection from this disease had acceptable turf quality (Table 1B). Slight foliar chlorosis was noted on 2 July

for turf treated with A12910C 2.3SC @ 0.76 fl oz (trt 14), Headway 1.39EC + A9180A 50WG (trts 20, 21), RU21196-09B SC @ 0.25 fl oz + RU21196-09I EC @ 6.0 fl oz (trt 46), and A9898A 0.83SC @ 0.6 fl oz every 14 days (trt 74; Table 1B), but the injury was only temporary and turf quickly recovered in 14 days. Approximately half of the treatments reduced algal cover compared to the untreated check (trt 95; Table 1B). Among the best treatments in reducing algal cover (< 2% algae) were products containing chlorothalonil [Emerald 70WG + Daconil Ultrex 82.5WDG (trts 29, 30), Cleary BP Program #1 (trt 47), Reserve 4.8SC 2.8-4.5 fl oz (trts 48-51), Concert 4.3SE (trt 52), Daconil Ultrex 82.5WDG @ 3.2 oz (trt 69)], and IKF-205 28W (trt 82).

Table 1A. Evaluation of fungicides and biorational products for the control of brown patch on a colonial bentgrass fairway: Rutgers University, 2009.

Treatment	Rate per 1000 sq ft	Application Interval (days) ²	Turf Area Infested (%) per Plot ¹					
			2 July	13 July	24 July	3 Aug.	13 Aug.	24 Aug.
1 Heritage TL 0.8ME	1.0 fl oz	21	6.5 j-r	11.0 m-x	0.0 r	3.8 r-t	3.8 u-x	2.3 q-t
2 A16841A 1.3ME	0.247 fl oz	21	1.8 p-r	10.3 n-z	5.0 o-r	41.3 e-i	35.0 h-m	36.5 d-i
3 A16841A 1.3ME	0.494 fl oz	21	1.5 p-r	8.3 o-z'c'	3.8 p-r	22.5 k-o	33.8 i-m	32.0 i
4 A8122B 4.2EC	0.157 fl oz	21	3.5 o-r	7.5 p-z'c'	5.0 o-r	43.8 e-h	36.3 g-l	34.3 f-i
5 A8122B 4.2EC	0.314 fl oz	21	2.3 o-r	7.3 q-z'c'	3.8 p-r	35.0 g-k	35.0 h-m	24.0 j
6 A17595A 0.7 EC	1.7 fl oz	21	2.8 o-r	3.3 w-z'c'	0.0 r	2.5 st	1.3 wx	0.8 r-t
7 A17601A 0.9EC	1.61 fl oz	21	0.8 p-r	2.0 x-z'c'	0.0 r	0.0 t	0.0 x	0.8 r-t
8 A13703G 2.7SC	0.32 fl oz	21	2.3 o-r	5.5 s-z'c'	2.5 p-r	7.5 p-t	8.8 r-x	2.8 p-t
9 A13703G 2.7SC	0.5 fl oz	21	2.3 o-r	5.3 s-z'c'	1.3 qr	3.8 r-t	3.8 u-x	0.0 t
10 A9898A 0.8SC	0.61 fl oz	21	1.3 p-r	15.8 k-q	30.0 c-f	16.3 n-r	15.0 p-s	12.5 l-o
11 A9898A 0.8SC	0.96 fl oz	21	0.0 r	6.8 q-z'c'	0.0 r	5.0 q-t	7.5 s-x	1.8 q-t
12 Banner MAXX 1.3EC	1.0 fl oz	21	2.5 o-r	3.5 v-z'c'	16.3 i-n	46.3 e-g	33.8 i-m	39.8 c-h
13 A12910C 2.3SC	0.48 fl oz	21	5.3 k-r	8.3 o-z'c'	0.0 r	7.5 p-t	5.0 t-x	0.8 r-t
14 A12910C 2.3SC	0.76 fl oz	21	2.3 o-r	4.8 t-z'c'	0.0 r	0.0 t	0.0 x	0.0 t
15 Heritage 50WG	0.2 oz	14	8.3 i-p	10.5 n-y	0.0 r	1.3 st	2.5 v-x	3.3 p-t
16 Heritage 50WG	0.2 oz							
+ A9180A 50WG	0.006 oz	14	2.8 o-r	9.5 n-z'c'	3.8 p-r	7.5 p-t	2.5 v-x	0.3 st
17 Heritage 50WG	0.2 oz							
+ A9180A 50WG	0.0121 oz	14	12.3 h-k	8.5 o-z'c'	0.0 r	5.0 q-t	0.0 x	0.0 t
18 A17595A 0.7EC	1.7 fl oz	14	1.5 p-r	2.8 x-z'c'	0.0 r	0.0 t	0.0 x	0.0 t
19 Headway 1.39EC	1.5 fl oz	14	2.0 o-r	0.3 z'b'c'	0.0 r	8.8 p-t	5.0 t-x	1.0 q-t
20 Headway 1.39EC	1.5 fl oz							
+ A9180A 50WG	0.006 oz	14	2.3 o-r	3.0 x-z'c'	0.0 r	6.3 q-t	3.8 u-x	0.3 st
21 Headway 1.39EC	1.5 fl oz							
+ A9180A 50WG	0.0121 oz	14	0.5 qr	1.5 x-z'c'	1.3 qr	8.8 p-t	7.5 s-x	0.3 st
22 BAS 500 17F 2.1SC	0.54 fl oz							
+ BAS 595 16F 1.67SC	1.0 fl oz	14	2.0 o-r	3.0 x-z'c'	0.0 r	3.8 r-t	3.8 u-x	0.5 st
23 BAS 500 17F 2.1SC	0.71 fl oz							
+ BAS 595 16F 1.67SC	1.0 fl oz	21	1.8 p-r	2.0 x-z'c'	0.0 r	2.5 st	0.0 x	0.0 t
24 BAS 500 17F 2SC	0.54 fl oz	14	4.3 m-r	4.8 t-z'c'	0.0 r	1.3 st	0.0 x	0.0 t

(Continued)

Table 1A (continued).

Treatment	Rate per 1000 sq ft	Application Interval (days) ²	Turf Area Infested (%) per Plot ¹					
			2 July	13 July	24 July	3 Aug.	13 Aug.	24 Aug.
25 Trinity 1.67SC	1.0 fl oz	14	3.3 o-r	2.3 x-z'c'	0.0 r	2.5 st	20.0 n-p	15.5 k-m
26 Insignia 20WG	0.7 oz	14	3.5 o-r	6.3 r-z'c'	5.0 o-r	0.0 t	2.5 v-x	0.8 r-t
27 Emerald 70WG	0.13 oz	14	5.3 k-r	9.3 n-z'c'	2.5 p-r	7.5 p-t	37.5 g-l	20.8 jk
+ Iprodione Pro 2SC	2.0 fl oz							
28 Emerald 70WG	0.13 oz	14	2.0 o-r	2.3 x-z'c'	1.3 qr	5.0 q-t	29.5 k-m	20.0 jk
+ Iprodione Pro 2SC	3.0 fl oz							
29 Emerald 70WG	0.13 oz	14	2.3 o-r	4.8 t-z'c'	2.5 p-r	12.8 o-s	39.8 g-j	10.0 l-p
+ Daconil Ultrex 82.5WDG.....	1.8 oz							
30 Emerald 70WG	0.13 oz	14	1.5 p-r	1.0 y-z'c'	0.0 r	7.5 p-t	26.3 m-o	6.0 o-t
+ Daconil Ultrex 82.5WDG.....	3.25 oz							
31 Curalan EG 50WG	1.0 oz	14	32.8 c	36.0 d-f	27.5 d-g	51.3 c-e	51.3 de	55.8 b
32 RU21196-09A SC.....	0.34 fl oz	14	2.3 o-r	6.5 q-z'c'	0.0 r	6.3 q-t	7.5 s-x	0.0 t
33 RU21196-09A SC.....	0.34 fl oz	21	9.5 h-o	9.5 n-z'c'	27.5 d-g	1.3 st	5.0 t-x	0.5 st
34 RU21196-09A SC.....	0.46 fl oz	14	6.8 j-r	7.8 p-z'c'	0.0 r	7.5 p-t	5.0 t-x	0.0 t
35 RU21196-09A SC.....	0.46 fl oz	21	21.8 d-f	30.0 e-g	22.5 e-j	2.5 st	1.3 wx	3.0 p-t
36 RU21196-09B SC	0.288 fl oz	14	15.0 g-i	8.8 o-z'c'	0.0 r	2.5 st	0.0 x	0.3 st
+ RU21196-09C SC	0.7 fl oz							
37 RU21196-09C SC	0.7 fl oz	14	1.3 p-r	1.5 x-z'c'	0.0 r	2.5 st	1.3 wx	0.3 st
38 RU21196-09B SC	0.288 fl oz	14	7.0 j-r	17.5 j-o	20.0 g-k	5.0 q-t	10.0 q-w	3.3 p-t
39 RU21196-09B SC	0.21 fl oz	21	8.3 i-p	14.8 k-s	16.3 i-n	3.8 r-t	7.5 s-x	6.8 n-t
40 RU21196-09B SC	0.25 fl oz	21	3.5 o-r	13.0 l-v	13.8 j-o	2.5 st	2.5 v-x	7.5 n-s
41 RU21196-09B SC	0.21 fl oz	21	4.3 m-r	10.0 n-z'a'	10.0 l-q	2.5 st	2.5 v-x	2.0 q-t
+ RU21196-09G EC.....	0.367 fl oz							
42 RU21196-09B SC	0.25 fl oz	21	4.3 m-r	9.8 n-z'b'	8.8 m-r	2.5 st	1.3 wx	3.0 p-t
+ RU21196-09G EC.....	0.367 fl oz							
43 RU21196-09B SC	0.21 fl oz	21	8.0 i-q	15.3 k-r	21.3 f-j	19.8 l-p	13.8 p-t	7.5 n-s
+ RU21196-09H EC.....	0.275 fl oz							
44 RU21196-09B SC	0.25 fl oz	21	4.8 l-r	13.8 l-t	18.8 g-l	8.8 p-t	5.3 t-x	2.8 p-t
+ RU21196-09H EC.....	0.275 fl oz							

(Continued)

Table 1A (continued).

Treatment	Rate per 1000 sq ft	Application Interval (days) ²	Turf Area Infested (%) per Plot ¹					
			2 July	13 July	24 July	3 Aug.	13 Aug.	24 Aug.
45 RU21196-09B SC0.21 fl oz + RU21196-09I EC.....6.0 fl oz		21	11.3 h-n	37.8 de	37.5 a-c	27.8 j-n	18.5 o-q	6.8 n-t
46 RU21196-09B SC0.25 fl oz + RU21196-09I EC.....6.0 fl oz		21	22.3 de	42.5 cd	43.8 a	32.0 h-l	13.5 p-t	6.5 n-t
47 Cleary BP Program #1	—	Var ³	0.0 r	0.0 z'c'	0.0 r	12.5 o-t	15.0 p-s	1.5 q-t
48 Reserve 4.8SC.....2.8 fl oz		14	1.3 p-r	0.0 z'c'	0.0 r	3.8 r-t	34.3 i-m	16.0 kl
49 Reserve 4.8SC.....3.2 fl oz		14	0.0 r	0.0 z'c'	0.0 r	1.3 st	26.8 m-o	8.0 n-r
50 Reserve 4.8SC.....3.6 fl oz		14	0.0 r	0.0 z'c'	0.0 r	1.3 st	11.5 p-v	5.5 o-t
51 Reserve 4.8SC.....4.5 fl oz		14	0.0 r	0.0 z'c'	0.0 r	0.0 t	7.5 s-x	5.0 p-t
52 Concert 4.3SE.....5.0 fl oz		14	0.0 r	0.5 z-z'c'	0.0 r	7.5 p-t	33.8 i-m	21.0 jk
53 Triton Flo 3.1SC.....0.5 fl oz		14	1.0 p-r	2.3 x-z'c'	0.0 r	11.3 o-t	38.3 g-k	23.5 j
54 Triton Flo 3.1SC.....0.75 fl oz		14	0.8 p-r	2.3 x-z'c'	0.0 r	1.3 st	17.5 o-r	16.8 j-l
55 Triton Flo 3.1SC.....1.0 fl oz		14	0.5 qr	0.5 z-z'c'	0.0 r	1.3 st	12.8 p-u	8.3 m-q
56 Banner MAXX 1.3ME.....2.0 fl oz		14	1.5 p-r	0.5 z-z'c'	0.0 r	5.0 q-t	35.5 n-m	23.5 j
57 DPX-LEM17-50 50WDG 0.3 oz		14	0.3 r	4.0 u-z'c'	0.0 r	2.5 st	6.3 s-x	3.8 p-t
58 DPX-LEM17-50 50WDG 0.4 oz		14	2.3 o-r	1.5 x-z'c'	1.3 qr	2.5 st	3.8 u-x	1.5 q-t
59 DPX-LEM17-50 50WDG 0.5 oz		14	0.5 qr	2.3 x-z'c'	0.0 r	1.3 st	2.5 v-x	0.5 st
60 SARS-346 40WP 0.27 oz + 3336 Plus 9.4F.....3.0 fl oz		14	0.8 p-r	0.5 z-z'c'	6.3 o-r	37.5 f-j	50.0 d-f	33.3 hi
61 SARS-346 40WP 0.27 oz + Heritage 50WG.....0.2 oz		14	2.8 o-r	7.8 p-z'c'	2.5 p-r	0.0 t	0.0 x	0.0 t
62 SARS-346 40WP 0.27 oz + Endorse 2.5W 4.0 oz		14	0.3 r	1.5 x-z'c'	0.0 r	1.3 st	3.8 u-x	2.0 q-t
63 SARS-346 40WP 0.27 oz		14	4.8 l-r	23.5 g-k	13.8 j-o	30.0 i-m	28.8 l-n	42.5 c-e
64 3336 Plus 19.4F.....3.0 fl oz		14	1.5 p-r	3.3 w-z'c'	7.5 n-r	62.5 b-d	55.0 cd	33.3 hi
65 Prostar 70W 2.2 oz		14	4.3 m-r	7.3 q-z'c'	8.8 m-r	10.0 o-t	5.0 t-x	2.8 p-t
66 Endorse 2.5W 4.0 oz		14	0.3 r	4.5 t-z'c'	1.3 qr	2.5 st	5.0 t-x	6.0 o-t
67 Tartan 2.4SC1.0 fl oz		14	13.5 g-j	12.8 l-w	1.3 qr	6.3 q-t	10.0 q-w	4.8 p-t
68 Emerald 70WG 0.13 oz		14	38.5 bc	42.3 cd	38.8 a-c	36.3 g-j	37.5 g-l	44.0 c
69 Daconil Ultrex 82.5WDG..... 3.2 oz		14	0.3 r	0.3 z-z'c'	0.0 r	10.0 o-t	38.8 g-k	13.8 k-n

(Continued)

Table 1A (continued).

Treatment	Rate per 1000 sq ft	Application Interval (days) ²	Turf Area Infested (%) per Plot ¹					
			2 July	13 July	24 July	3 Aug.	13 Aug.	24 Aug.
70 Honor 28WG	0.7 oz	14	3.0 o-r	6.0 r-z'c'	3.8 p-r	3.8 r-t	3.8 u-x	0.5 st
71 Honor 28WG	0.9 oz	14	1.8 p-r	5.8 s-z'c'	1.3 qr	2.5 st	1.3 wx	0.0 t
72 Insignia 20WG	0.5 oz	14	5.5 k-r	7.3 q-z'c'	1.3 qr	0.0 t	5.0 t-x	0.0 t
73 A9898A 0.83SC	0.6 fl oz	28	11.5 h-m	18.3 j-n	31.3 b-e	46.3 e-g	31.3 j-m	39.5 c-h
74 A9898A 0.83SC	0.6 fl oz	14	1.3 p-r	0.8 z-z'c'	8.8 m-r	8.8 p-t	13.8 p-t	5.5 o-t
75 A9898A 0.83SC	0.95 fl oz	28	6.5 j-r	20.0 i-m	27.5 d-g	43.8 e-h	43.8 e-h	40.8 c-g
76 A13703 2.72SC.....	0.32 fl oz	14	1.8 p-r	1.5 x-z'c'	0.0 r	0.0 t	1.3 wx	2.3 q-t
77 A12910 2.34SC.....	0.48 fl oz	14	4.0 n-r	1.5 x-z'c'	0.0 r	2.5 st	2.5 v-x	1.0 q-t
78 MOI-10605 ME.....	5.12 fl oz	7	22.0 de	21.3 h-l	30.0 c-f	50.0 d-f	42.5 e-i	46.0 c
79 MOI-10605 ME.....	5.12 fl oz	14	34.0 c	42.5 cd	32.5 b-d	75.0 ab	63.8 bc	70.8 a
80 MOI-10605 ME.....	1.28 fl oz							
+ Heritage 50WG.....	0.2 oz	14	4.0 n-r	3.3 w-z'c'	5.0 o-r	11.3 o-t	5.0 t-x	3.0 p-t
81 MOI-10605 ME.....	2.56 fl oz							
+ Heritage 50WG.....	0.2 oz	14	19.5 d-g	16.8 j-p	1.3 qr	3.8 r-t	2.5 v-x	2.5 q-t
82 IKF-205 28W.....	1.1 oz	14	4.3 m-r	7.3 q-z'c'	0.0 r	1.3 st	2.5 v-x	1.5 q-t
83 Segway 3.3SC	0.45 fl oz	14	47.5 a	56.5 b	31.3 b-e	47.5 e-g	41.3 f-i	46.5 c
84 Disarm M 3.82 SC.....	0.5 fl oz	14	16.0 e-h	27.8 g-i	23.8 d-i	17.5 m-q	4.0 u-x	2.0 q-t
85 Disarm M 3.82 SC.....	1.0 fl oz	28	15.5 f-h	13.0 l-v	17.5 h-m	16.3 n-r	12.5 p-u	36.0 e-i
86 Disarm 480 SC.....	0.27 fl oz	28	11.8 h-l	17.5 j-o	7.5 n-r	13.8 o-s	8.8 r-x	41.3 c-f
87 Disarm C 4.25SC.....	4.4 fl oz	28	14.0 g-i	13.5 l-u	6.3 o-r	11.3 o-t	11.3 p-v	43.5 cd
88 ARY-0473-014G.....	3.5 lb	28	15.0 g-i	25.0 g-j	26.3 d-h	30.0 i-m	20.0 n-p	21.0 jk
89 ARY-0473-013G.....	3.5 lb	28	24.0 d	13.0 l-v	11.3 k-p	41.3 e-i	15.0 p-s	4.3 p-t
90 Disarm 0.25 G.....	3.5 lb	28	11.3 h-n	29.3 f-h	40.0 ab	63.8 bc	40.0 g-j	32.0 i
91 Insignia 20WG	0.5 oz							
+ HM9333 27LC.....	7.0 fl oz	14	5.8 k-r	7.8 p-z'c'	1.3 qr	2.5 st	0.0 x	1.3 q-t
92 Tourney 50WG.....	0.18 oz	14	4.0 n-r	4.8 t-z'c'	0.0 r	2.5 st	45.5 e-g	32.8 hi
93 Tourney 50WG.....	0.18 oz							
+ HM9333 27LC.....	7.0 fl oz	14	0.0 r	0.5 z-z'c'	0.0 r	7.5 p-t	55.8 cd	33.8 g-i
94 HM9333 27LC.....	7.0 fl oz	14	40.5 b	48.0 c	43.8 a	81.3 a	66.3 b	54.0 b
95 Untreated check.....	—	—	48.0 a	66.3 a	45.0 a	83.8 a	81.3 a	70.5 a

(Continued)

Table 1A (continued).

Treatment	Rate per 1000 sq ft	Application Interval (days) ²	Turf Area Infested (%) per Plot ¹					
			2 July	13 July	24 July	3 Aug.	13 Aug.	24 Aug.
		INT ⁴	DAT ⁵	DAT	DAT	DAT	DAT	DAT
		7	1	5	2	5	1	5
		14	1	12	9	5	1	12
		21	8	19	9	9	8	19
		28	1	12	23	5	15	26
		Var ³	1	12	9	5	1	12

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).

² Fungicides were applied on 3 June (all treatments), 10 June (7-day treatment), 17 June (7- and 14-day treatments), 24 June (7- and 21-day treatments), 1 July (7-, 14-, and 28-day treatments), 8 July (7-day treatment), 15 July (7-, 14-, and 21-day treatments), 22 July (7-day treatment), 29 July (7-, 14-, and 28-day treatments), 5 August (7- and 21-day treatments), 12 August (7- and 14-day treatments), 19 August (7-day treatment), and 26 August (treatment 47 only).

³ Variable spray schedule, where treatment 47 (Cleary Brown Patch Program #1) consisted of Strider 1.3ME (2.0 fl oz) + Legend 6F (3.6 fl oz) on 3 June, 3336 Plus 19.4F (3.0 fl oz) + Legend 6F (3.6 fl oz) + Alude 46SL (6.0 fl oz) on 17 June, 26/36 3.8SC (3.0 fl oz) + Alude 46SL (6.0 fl oz) on 1 July, Heritage 50WG (0.4 oz) + Protect 75DF (4.0 oz) + Alude 46SL (6.0 fl oz) on 15 July, Spectro 90WDG (5.0 oz) + Alude 46SL (6.0 fl oz) on 29 July, Strider 1.3ME (1.0 fl oz) + Legend 6F (3.6 fl oz) + Alude 46SL (6.0 fl oz) on 12 August, and 26/36 3.8SC (3.0 fl oz) on 26 August.

⁴ Spray interval in days.

⁵ Days after the last treatment.

Table 1B. Evaluation of fungicides and biorational products for the control of brown patch on a colonial bentgrass fairway: Rutgers University, 2009.

Treatment	Rate per 1000 sq ft	Application Schedule (days) ⁴	Turf Quality ^{1,2}			Phytotoxicity ³	Algae (%)
			2 July	24 July	24 Aug.	2 July	24 Aug.
1 Heritage TL 0.8ME	1.0 fl oz	21	6.8 b-g	6.8 b-e	6.5 b-f	1.0 c	15.3 g-u
2 A16841A 1.3ME	0.247 fl oz	21	7.3 a-e	6.0 e-g	4.3 k	1.0 c	16.5 g-s
3 A16841A 1.3ME	0.494 fl oz	21	6.8 b-g	6.5 c-f	5.0 h-k	1.0 c	10.5 l-z'd'
4 A8122B 4.2EC	0.157 fl oz	21	7.3 a-e	6.8 b-e	5.3 g-k	1.0 c	29.5 a-e
5 A8122B 4.2EC	0.314 fl oz	21	6.5 c-h	6.3 d-g	4.8 i-k	1.0 c	31.3 a-d
6 A17595A 0.7 EC	1.7 fl oz	21	7.0 b-f	7.8 a	6.0 d-h	1.0 c	20.5 d-l
7 A17601A 0.9EC	1.61 fl oz	21	7.5 a-d	6.5 c-f	6.3 c-g	1.0 c	17.5 g-q
8 A13703G 2.7SC	0.32 fl oz	21	7.3 a-e	6.5 c-f	5.8 e-i	1.0 c	13.3 i-x
9 A13703G 2.7SC	0.5 fl oz	21	7.8 a-c	6.5 c-f	6.3 c-g	1.0 c	11.0 l-z'c'
10 A9898A 0.8SC	0.61 fl oz	21	6.0 e-h	6.0 e-g	5.5 f-j	1.3 bc	28.5 a-f
11 A9898A 0.8SC	0.96 fl oz	21	6.0 e-h	6.3 d-g	5.3 g-k	1.8 a	11.0 l-z'c'
12 Banner MAXX 1.3EC	1.0 fl oz	21	6.8 b-g	6.0 e-g	4.5 jk	1.0 c	25.3 a-g
13 A12910C 2.3SC	0.48 fl oz	21	7.0 b-f	6.5 c-f	6.3 c-g	1.0 c	12.0 k-z
14 A12910C 2.3SC	0.76 fl oz	21	5.8 f-h	6.5 c-f	7.0 a-d	1.8 a	9.8 l-z'd'
15 Heritage 50WG	0.2 oz	14	6.8 b-g	6.3 d-g	6.5 b-f	1.0 c	4.8 u-z'd'
16 Heritage 50WG	0.2 oz						
+ A9180A 50WG	0.006 oz	14	6.0 e-h	6.0 e-g	6.8 a-e	1.0 c	5.5 t-z'd'
17 Heritage 50WG	0.2 oz						
+ A9180A 50WG	0.0121 oz	14	5.5 gh	5.8 fg	7.0 a-d	1.0 c	6.0 s-z'd'
18 A17595A 0.7EC	1.7 fl oz	14	7.0 b-f	6.8 b-e	5.5 f-j	1.0 c	25.0 a-h
19 Headway 1.39EC	1.5 fl oz	14	6.3 d-h	6.8 b-e	6.0 d-h	1.0 c	19.3 e-n
20 Headway 1.39EC	1.5 fl oz						
+ A9180A 50WG	0.006 oz	14	6.5 c-h	6.3 d-g	6.0 d-h	1.5 ab	10.3 l-z'd'
21 Headway 1.39EC	1.5 fl oz						
+ A9180A 50WG	0.0121 oz	14	7.0 b-f	6.3 d-g	6.8 a-e	1.5 ab	22.3 c-k
22 BAS 500 17F 2.1SC	0.54 fl oz						
+ BAS 595 16F 1.67SC	1.0 fl oz	14	6.5 c-h	7.3 a-c	6.5 b-f	1.0 c	20.3 e-m
23 BAS 500 17F 2.1SC	0.71 fl oz						
+ BAS 595 16F 1.67SC	1.0 fl oz	21	6.8 b-g	6.8 b-e	6.8 a-e	1.0 c	17.5 g-q

(Continued)

Table 1B (continued).

Treatment	Rate per 1000 sq ft	Application Schedule (days) ⁴	Turf Quality ^{1,2}			Phytotoxicity ³	Algae (%)
			2 July	24 July	24 Aug.	2 July	24 Aug.
24 BAS 500 17F 2SC.....	0.54 fl oz	14	6.8 b-g	7.8 a	6.0 d-h	1.0 c	19.0 e-o
25 Trinity 1.67SC	1.0 fl oz	14	5.8 f-h	7.0 a-d	5.8 e-i	1.0 c	8.3 o-z'd'
26 Insignia 20WG	0.7 oz	14	6.5 c-h	7.0 a-d	6.3 c-g	1.0 c	6.0 s-z'd'
27 Emerald 70WG	0.13 oz						
+ Iprodione Pro 2SC	2.0 fl oz	14	7.0 b-f	7.0 a-d	4.8 i-k	1.0 c	18.0 f-p
28 Emerald 70WG	0.13 oz						
+ Iprodione Pro 2SC	3.0 fl oz	14	6.5 c-h	6.8 b-e	6.5 b-f	1.0 c	14.3 h-v
29 Emerald 70WG	0.13 oz						
+ Daconil Ultrex 82.5WDG.....	1.8 oz	14	7.3 a-e	6.8 b-e	7.0 a-d	1.0 c	1.8 z-z'd'
30 Emerald 70WG	0.13 oz						
+ Daconil Ultrex 82.5WDG.....	3.25 oz	14	7.3 a-e	7.3 a-c	7.8 a	1.0 c	0.3 z'c'd'
31 Curalan EG 50WG	1.0 oz	14	6.0 e-h	5.8 fg	5.0 h-k	1.0 c	16.3 g-t
32 RU21196-09A SC.....	0.34 fl oz	14	6.8 b-g	6.8 b-e	7.5 ab	1.0 c	10.0 l-z'd'
33 RU21196-09A SC.....	0.34 fl oz	21	6.5 c-h	7.0 a-d	6.5 b-f	1.0 c	25.8 a-g
34 RU21196-09A SC.....	0.46 fl oz	14	7.0 b-f	6.8 b-e	7.5 ab	1.0 c	7.0 q-z'd'
35 RU21196-09A SC.....	0.46 fl oz	21	6.5 c-h	7.0 a-d	7.0 a-d	1.0 c	14.3 h-v
36 RU21196-09B SC	0.288 fl oz						
+ RU21196-09C SC	0.7 fl oz	14	6.5 c-h	7.3 a-c	6.5 b-f	1.0 c	15.0 g-u
37 RU21196-09C SC	0.7 fl oz	14	7.3 a-e	7.3 a-c	7.0 a-d	1.0 c	20.3 e-m
38 RU21196-09B SC	0.288 fl oz	14	6.8 b-g	6.5 c-f	6.3 c-g	1.0 c	10.8 l-z'd'
39 RU21196-09B SC	0.21 fl oz	21	7.3 a-e	6.3 d-g	7.3 a-c	1.0 c	11.0 l-z'c'
40 RU21196-09B SC	0.25 fl oz	21	6.8 b-g	6.8 b-e	5.5 f-j	1.0 c	13.8 i-w
41 RU21196-09B SC	0.21 fl oz						
+ RU21196-09G EC.....	0.367 fl oz	21	6.8 b-g	6.8 b-e	4.8 i-k	1.0 c	18.8 e-o
42 RU21196-09B SC	0.25 fl oz						
+ RU21196-09G EC.....	0.367 fl oz	21	6.3 d-h	6.3 d-g	6.3 c-g	1.0 c	2.3 y-z'd'
43 RU21196-09B SC	0.21 fl oz						
+ RU21196-09H EC	0.275 fl oz	21	6.3 d-h	6.5 c-f	6.3 c-g	1.0 c	8.5 n-z'd'
44 RU21196-09B SC	0.25 fl oz						
+ RU21196-09H EC	0.275 fl oz	21	6.8 b-g	6.5 c-f	5.5 f-j	1.0 c	16.3 g-t

(Continued)

Table 1B (continued).

Treatment	Rate per 1000 sq ft	Application Schedule (days) ⁴	Turf Quality ^{1,2}			Phytotoxicity ³	Algae (%)
			2 July	24 July	24 Aug.	2 July	24 Aug.
45 RU21196-09B SC0.21 fl oz + RU21196-09I EC.....6.0 fl oz		21	5.8 f-h	5.5 g	5.5 f-j	1.0 c	18.0 f-p
46 RU21196-09B SC0.25 fl oz + RU21196-09I EC.....6.0 fl oz		21	5.5 gh	5.8 fg	6.3 c-g	1.8 a	11.8 k-z
47 Cleary BP Program #1	—	Var ⁵	7.0 b-f	6.5 c-f	6.0 d-h	1.0 c	0.0 z'd'
48 Reserve 4.8SC.....2.8 fl oz		14	7.0 b-f	7.8 a	6.3 c-g	1.0 c	1.8 z-z'd'
49 Reserve 4.8SC.....3.2 fl oz		14	7.5 a-d	7.3 a-c	7.5 ab	1.0 c	0.5 z'b'-d'
50 Reserve 4.8SC.....3.6 fl oz		14	7.8 a-c	7.3 a-c	7.5 ab	1.0 c	0.8 z'a'-d'
51 Reserve 4.8SC.....4.5 fl oz		14	7.8 a-c	7.5 ab	7.5 ab	1.0 c	0.5 z'b'-d'
52 Concert 4.3SE.....5.0 fl oz		14	6.8 b-g	6.8 b-e	6.0 d-h	1.0 c	1.3 z-z'd'
53 Triton Flo 3.1SC.....0.5 fl oz		14	8.0 ab	6.3 d-g	5.5 f-j	1.0 c	11.5 k-z'a'
54 Triton Flo 3.1SC.....0.75 fl oz		14	8.0 ab	6.5 c-f	5.3 g-k	1.0 c	22.3 c-k
55 Triton Flo 3.1SC.....1.0 fl oz		14	8.0 ab	7.5 ab	6.3 c-g	1.0 c	17.8 f-q
56 Banner MAXX 1.3ME.....2.0 fl oz		14	6.3 d-h	6.5 c-f	6.0 d-h	1.3 bc	8.3 o-z'd'
57 DPX-LEM17-50 50WDG 0.3 oz		14	6.8 b-g	7.0 a-d	7.3 a-c	1.0 c	9.5 m-z'd'
58 DPX-LEM17-50 50WDG 0.4 oz		14	7.0 b-f	7.0 a-d	6.8 a-e	1.0 c	8.3 o-z'd'
59 DPX-LEM17-50 50WDG 0.5 oz		14	7.3 a-e	7.5 ab	5.5 f-j	1.0 c	13.0 i-y
60 SARS-346 40WP 0.27 oz + 3336 Plus 19.4F.....3.0 fl oz		14	7.0 b-f	6.5 c-f	4.8 i-k	1.0 c	5.8 s-z'd'
61 SARS-346 40WP 0.27 oz + Heritage 50WG..... 0.2 oz		14	7.0 b-f	7.0 a-d	5.3 g-k	1.0 c	34.0 ab
62 SARS-346 40WP 0.27 oz + Endorse 2.5W 4.0 oz		14	6.5 c-h	7.3 a-c	7.0 a-d	1.0 c	5.5 t-z'd'
63 SARS-346 40WP 0.27 oz		14	7.3 a-e	6.0 e-g	5.0 h-k	1.0 c	7.8 p-z'd'
64 3336 Plus 19.4F.....3.0 fl oz		14	6.8 b-g	5.5 g	5.0 h-k	1.0 c	3.5 v-z'd'
65 Prostar 70W 2.2 oz		14	7.0 b-f	6.5 c-f	6.5 b-f	1.0 c	15.8 g-t
66 Endorse 2.5W 4.0 oz		14	7.0 b-f	6.3 d-g	6.8 a-e	1.0 c	2.5 x-z'd'
67 Tartan 2.4SC1.0 fl oz		14	6.3 d-h	7.0 a-d	6.3 c-g	1.0 c	9.3 n-z'd'
68 Emerald 70WG 0.13 oz		14	5.8 f-h	6.0 e-g	5.0 h-k	1.0 c	34.5 ab
69 Daconil Ultrex 82.5WDG..... 3.2 oz		14	7.3 a-e	7.8 a	6.5 b-f	1.0 c	0.0 z'd'

(Continued)

Table 1B (continued).

Treatment	Rate per 1000 sq ft	Application Schedule (days) ⁴	Turf Quality ^{1,2}			Phytotoxicity ³	Algae (%)
			2 July	24 July	24 Aug.	2 July	24 Aug.
70 Honor 28WG	0.7 oz	14	6.3 d-h	6.5 c-f	5.8 e-i	1.0 c	23.8 b-i
71 Honor 28WG	0.9 oz	14	7.0 b-f	6.3 d-g	5.5 f-j	1.0 c	35.5 a
72 Insignia 20WG	0.5 oz	14	6.8 b-g	7.0 a-d	6.3 c-g	1.0 c	32.3 a-c
73 A9898A 0.83SC	0.6 fl oz	28	5.5 gh	6.3 d-g	5.0 h-k	1.0 c	17.0 g-r
74 A9898A 0.83SC	0.6 fl oz	14	6.0 e-h	6.3 d-g	5.0 h-k	1.5 ab	15.3 g-u
75 A9898A 0.83SC	0.95 fl oz	28	5.8 f-h	5.8 fg	4.3 k	1.0 c	23.0 c-j
76 A13703 2.72SC.....	0.32 fl oz	14	7.3 a-e	6.8 b-e	6.8 a-e	1.0 c	11.3 l-z'b'
77 A12910 2.34SC.....	0.48 fl oz	14	5.8 f-h	6.0 e-g	6.5 b-f	1.0 c	9.5 m-z'd'
78 MOI-10605 ME.....	5.12 fl oz	7	6.3 d-h	5.8 fg	4.8 i-k	1.8 a	15.5 g-u
79 MOI-10605 ME.....	5.12 fl oz	14	6.8 b-g	5.8 fg	4.5 jk	1.0 c	16.0 g-t
80 MOI-10605 ME.....	1.28 fl oz						
+ Heritage 50WG.....	0.2 oz	14	6.8 b-g	6.8 b-e	6.8 a-e	1.0 c	6.5 r-z'd'
81 MOI-10605 ME.....	2.56 fl oz						
+ Heritage 50WG.....	0.2 oz	14	6.0 e-h	7.0 a-d	6.3 c-g	1.0 c	16.5 g-s
82 IKF-205 28W.....	1.1 oz	14	6.5 c-h	6.3 d-g	7.3 a-c	1.0 c	0.8 z'a'-d'
83 Segway 3.3SC	0.45 fl oz	14	5.5 gh	5.8 fg	5.8 e-i	1.0 c	2.3 y-z'd'
84 Disarm M 3.82 SC.....	0.5 fl oz	14	5.8 f-h	6.3 d-g	6.3 c-g	1.0 c	13.5 i-w
85 Disarm M 3.82 SC.....	1.0 fl oz	28	7.0 b-f	6.3 d-g	5.0 h-k	1.0 c	20.5 d-l
86 Disarm 480 SC.....	0.27 fl oz	28	6.8 b-g	6.5 c-f	5.0 h-k	1.0 c	12.8 j-y
87 Disarm C 4.25SC.....	4.4 fl oz	28	6.0 e-h	6.3 d-g	4.5 jk	1.0 c	8.3 o-z'd'
88 ARY-0473-014G.....	3.5 lb	28	6.3 d-h	6.8 b-e	5.0 h-k	1.0 c	32.5 a-c
89 ARY-0473-013G.....	3.5 lb	28	6.3 d-h	6.3 d-g	5.0 h-k	1.0 c	34.0 ab
90 Disarm 0.25 G.....	3.5 lb	28	6.0 e-h	6.3 d-g	5.8 e-i	1.0 c	10.3 l-z'd'
91 Insignia 20WG	0.5 oz						
+ HM9333 27 LC.....	7.0 fl oz	14	8.5 a	7.3 a-c	6.0 d-h	1.0 c	16.5 g-s
92 Tourney 50WG.....	0.18 oz	14	6.8 b-g	7.0 a-d	5.5 f-j	1.0 c	17.3 g-r
93 Tourney 50WG.....	0.18 oz						
+ HM9333 27 LC.....	7.0 fl oz	14	8.5 a	6.8 b-e	5.5 f-j	1.0 c	13.3 i-x
94 HM9333 27 LC.....	7.0 fl oz	14	6.0 e-h	5.8 fg	4.5 jk	1.0 c	3.0 w-z'd'
95 Untreated check.....	—	—	5.3 h	5.5 g	4.5 jk	1.0 c	25.0 a-h

(Continued)

Table 1B (continued).

Treatment	Rate per 1000 sq ft	Application Schedule (days) ⁴	Turf Quality ^{1,2}			Phytotoxicity ³		Algae (%)	
			2 July	24 July	24 Aug.	2 July	24 Aug.		
		INT ⁶	DAT ⁷	DAT	DAT	DAT	DAT	DAT	
		7	1	2	5	1	5	5	
		14	1	9	12	1	12	12	
		21	8	9	19	8	19	19	
		28	1	23	26	1	26	26	
		Var ⁵	1	9	12	1	12	12	

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).

² Turf quality on a scale of 1 to 9, where 9 = best turf quality and 5 = commercially acceptable quality.

³ Phytotoxicity on a 1 to 5 scale, where 1 = no discoloration, 2 = slight foliar chlorosis or necrosis, 3 = moderate chlorosis or necrosis, 4 = severe chlorosis or necrosis, and 5 = all turf dead.

⁴ Fungicides were applied on 3 June (all treatments), 10 June (7-day treatment), 17 June (7- and 14-day treatments), 24 June (7- and 21-day treatments), 1 July (7-, 14-, and 28-day treatments), 8 July (7-day treatment), 15 July (7-, 14-, and 21-day treatments), 22 July (7-day treatment), 29 July (7-, 14-, and 28-day treatments), 5 August (7- and 21-day treatments), 12 August (7- and 14-day treatments), 19 August (7-day treatment), and 26 August (treatment 47 only).

⁵ Variable spray schedule, where treatment 47 (Cleary Brown Patch Program #1) consisted of Strider 1.3ME (2.0 fl oz) + Legend 6F (3.6 fl oz) on 3 June, 3336 Plus 19.4F (3.0 fl oz) + Legend 6F (3.6 fl oz) + Alude 46SL (6.0 fl oz) on 17 June, 26/36 3.8SC (3.0 fl oz) + Alude 46SL (6.0 fl oz) on 1 July, Heritage 50WG (0.4 oz) + Protect 75DF (4.0 oz) + Alude 46SL (6.0 fl oz) on 15 July, Spectro 90WDG (5.0 oz) + Alude 46SL (6.0 fl oz) on 29 July, Strider 1.3ME (1.0 fl oz) + Legend 6F (3.6 fl oz) + Alude 46SL (6.0 fl oz) on 12 August, and 26/36 3.8SC (3.0 fl oz) on 26 August.

⁶ Spray interval in days.

⁷ Days after the last treatment.