

2003 RUTGERS Turfgrass Proceedings



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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
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EFFICACY OF SELECTED FUNGICIDES FOR THE CONTROL OF DOLLAR SPOT IN CREEPING BENTGRASS

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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, 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). Most fungicide entries provided good to excellent control of dollar spot during the application period (3 June to 19 August) except for CJB EXP 0214 (trt 2), A13666 660SC (trt 10), Heritage 50WG (trt 12), Emerald 70WG (trt 19), Insignia 20WG (trt 20), Banner MAXX 1.3MC (trts 23, 25), CGA 245704 50W (trts 27, 56), the 1 to 1.8 oz rate of Daconil Ultrex 82.5SDG (trts 29-30, 57), Compass 50WG (trt 31), Topsin-M 70W (trt 37), TD2193-07 4.5F (trt 38), V-10114 50WDG (trt 39), Rubigan 1AS (trt 50), AlgAway 60LC (trt 51), and Rotational Program 1 (trt 53). Moreover, RCS67 67WDG (trt 3), Spectro 90WG (trt 4), A13705 200SC (trt 5), A14035 440SE (trt 6), A14036 433SE (trt 7), A13817 515SE (trt 8), A14167 200ME (trt 9), Banner MAXX 1.3MC + Heritage 50WG (trt 11), Banner MAXX 1.3MC (trts 13, 60, 63), Emerald 70WG (trt 18), Propiconazole PRO 1.3MC (trt 22), Daconil Ultrex 82.5SDG + CGA 245704 50W (trt 28), Bayleton 50DF (trt 33), Compass 50WG + Bayleton 50DF (trts 34-35), V-10114 50WDG (trt 42), V-10114 1.67SC (trt 43), V-10116 1.67SC (trts 44-48), Eagle 20EW (trts 52, 65-66), Eagle 40W (trts 54, 67-68), Curalan 50EG (trt 62), Daconil Ultrex 82.5SDG (trt 64), and Rotational Program 2 (trt 69) provided excellent disease suppression throughout the study. Although Emerald

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70WG applied at 0.13 oz/1000 ft² every 14 days (trt 18) prevented major outbreaks of this disease, the 0.18 oz rate of Emerald 70WG (trt 19) did not control dollar spot during the peak disease period (20 June-28 July) when sprayed on a 21-day schedule. Propiconazole PRO 1.3MC (trt 22) performed as well as Banner MAXX 1.3MC (trt 13) on a 14-day schedule, whereas the same rate (1.0 fl oz) of Banner MAXX 1.3MC (trt 23) was less effective at the 21-day interval. The addition of CGA 245704 50W to Daconil Ultrex 82.5SDG (trt 28) significantly improved dollar spot control on 70% of the rating dates compared to Daconil Ultrex 82.5SDG alone (trt 29) at the 1.8 oz (low label) rate. Surprisingly, one mid-summer application of Velocity 80W (trt 49) suppressed dollar spot for over eight weeks, and Cleary 3336 4F (trt 36) provided excellent disease control throughout most of the season even though benzimidazole resistant isolates had been detected on this green in prior years.

With regard to the rotational programs, program 1 (trt 53) was not as effective as program 2 (trt 69) in preventing outbreaks of dollar spot. Curative applications of Daconil Ultrex 82.5SDG (trt 61), Curalan 50EG (trt 62), or Banner MAXX 1.3MC (trt 63) resulted in equivalent levels of disease control and a savings of one fungicide application in 2003, compared to the same products applied on a preventive basis (trts 58, 59, and 60, respectively).

Most treatments suppressed brown patch to acceptable levels (less than 10% infection) (Table 2). Other than a slight foliar necrosis associated with Eagle 20EW (trt 66) and a mild, foliar chlorosis that persisted for three weeks after the application of Velocity 80W (trt 49), no phytotoxicity was observed.

Table 1. Efficacy of selected fungicides for the control of dollar spot in creeping bentgrass, 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.	CJB EXP 0207 2.0 fl oz	21	0.5 ab	0.8 ab	10.5 a-c	7.0 a-e	9.8 a-d	7.8 a-e	10.0 a-e	16.5 g-m		
2.	CJB EXP 0214 2.0 fl oz	21	0.0 a	17.5 d-j	36.5 f	23.0 gh	20.3 c-f	20.3 f-h	26.5 g	22.0 k-n		
3.	RCS67 67WDG 4.0 oz	14	0.3 ab	0.0 a	0.8 ab	3.8 a-c	3.5 ab	4.0 a-e	1.5 a	5.8 a-f		
4.	Spectro 90WG 4.0 oz	14	0.5 ab	0.3 a	0.3 a	2.3 a-c	2.3 ab	1.8 a-c	1.0 a	3.0 a-c		
5.	A13705 200SC 1.33 fl oz	14	0.5 ab	1.8 a-d	1.3 ab	1.3 a	2.3 ab	3.8 a-e	1.8 a	1.8 a		
6.	A14035 440SE 9.33 fl oz	14	0.3 ab	0.3 a	0.5 ab	2.5 a-c	1.5 ab	0.8 a	0.8 a	3.8 a-d		
7.	A14036 433SE 9.33 fl oz	14	0.8 ab	0.3 a	0.3 a	3.5 a-c	1.3 ab	0.5 a	1.0 a	2.0 a		
8.	A13817 515SE 4.2 fl oz	14	0.5 ab	0.3 a	0.3 a	1.3 a	1.3 ab	1.5 ab	1.8 a	3.0 a-c		
9.	A14167 200ME 1.33 fl oz	14	0.0 a	2.3 a-d	0.0 a	1.8 ab	3.8 ab	3.3 a-e	1.0 a	2.5 a-b		
10.	A13666 660SC 1.66 fl oz	14	1.0 ab	29.0 i-l	30.5 ef	7.3 a-e	33.8 f	45.3 i	23.5 fg	25.5 l-o		
11.	Banner MAXX 1.3MC 1.0 fl oz											
	+ Heritage 50WG 0.2 oz	14	0.8 ab	2.8 a-d	2.8 ab	0.5 a	4.0 ab	5.3 a-e	1.5 a	3.0 a-c		
12.	Heritage 50WG 0.2 oz	14	3.3 e	132.8 rs	175.0 l	176.3 o	165.0 l	124.8 m	74.8 j	64.8 s		
13.	Banner MAXX 1.3MC 1.0 fl oz	14	0.3 ab	3.5 a-e	1.0 ab	1.0 a	1.8 ab	3.0 a-e	2.0 a	2.0 a		
14.	Concorde 82.5SDG 3.2 oz	14	0.5 ab	9.5 a-g	0.3 a	3.3 a-c	8.0 a-c	5.3 a-e	3.8 ab	14.8 e-k		
15.	Concorde 6F 3.5 fl oz	14	1.0 ab	9.8 a-g	0.8 ab	1.3 a	8.0 a-c	5.0 a-e	2.5 a	17.0 h-m		
16.	Concorde 82.5SDG 3.2 oz	14										
	/ Pentathlon 75DF 6.0 oz											
17.	+ Aviator 1.0 fl oz	14 ^x	0.5 ab	31.3 j-l	6.5 ab	3.5 a-c	4.3 ab	2.0 a-d	1.5 a	9.3 a-j		
	Concorde 6F 3.5 fl oz	14										
	/ Pentathlon 4LF 10.0 fl oz											
	+ Aviator 1.0 fl oz	14 ^x	0.5 ab	18.5 e-j	2.8 ab	2.8 a-c	3.3 ab	1.3 a	1.5 a	7.3 a-i		
18.	Emerald 70WG 0.13 oz	14	1.0 ab	9.8 a-g	2.5 ab	1.8 ab	4.0 ab	5.5 a-e	2.0 a	10.8 a-j		
19.	Emerald 70WG 0.18 oz	21	0.8 ab	42.0 lm	75.8 h	108.0 l	120.5 j	21.5 gh	7.8 a-d	13.5 c-k		
20.	Insignia 20WG 0.9 oz	14	0.8 ab	14.0 a-i	35.0 f	21.0 f-h	58.8 g	8.0 a-e	9.8 a-e	17.5 i-m		
21.	Emerald 70WG 0.13 oz											
	/ Insignia 20W 0.9 oz	14 ^x	0.8 ab	26.0 h-k	3.3 ab	3.8 a-c	3.5 ab	7.0 a-e	2.5 a	3.0 a-c		
22.	Propiconazole PRO 1.3MC 1.0 fl oz	14	0.3 ab	4.5 a-f	0.8 ab	1.0 a	1.5 ab	4.5 a-e	1.5 a	3.3 a-c		
23.	Banner MAXX 1.3MC 1.0 fl oz	21	1.5 a-c	27.3 h-k	34.8 f	25.3 h	15.8 b-e	7.0 a-e	5.3 a-c	8.0 a-i		

(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.		
24.	Banner MAXX 1.3MC 1.0 fl oz + Heritage 50WG 0.2 oz	21	1.8 b-d	15.8 a-j	30.5 ef	10.5 a-g	11.5 a-d	4.3 a-e	3.5 ab	11.5 a-j		
25.	Banner MAXX 1.3MC 1.0 fl oz + CGA 245704 50W 0.012 oz	21	1.0 ab	16.3 b-j	26.3 d-f	14.8 b-h	8.8 a-d	4.0 a-e	3.0 ab	11.0 a-j		
26.	Banner MAXX 1.3MC 1.0 fl oz + Daconil Ultrex 82.5SDG 1.8 oz	21	1.0 ab	1.5 a-c	14.8 b-d	2.5 a-c	5.0 ab	4.8 a-e	1.3 a	5.5 a-f		
27.	CGA 245704 50W 0.012 oz	14	1.3 a-c	66.8 o	84.3 hi	80.3 jk	74.8 h	27.0 h	16.5 ef	36.5 pq		
28.	Daconil Ultrex 82.5SDG 1.8 oz + CGA 245704 50W 0.012 oz	14	0.8 ab	1.3 a-c	0.3 a	3.3 a-c	5.0 ab	4.8 a-e	4.0 ab	8.8 a-j		
29.	Daconil Ultrex 82.5SDG 1.8 oz	14	0.5 ab	18.5 e-j	2.0 ab	10.8 a-g	51.0 g	26.3 h	17.3 ef	33.5 o-q		
30.	Daconil Ultrex 82.5SDG 1.0 oz	7	1.3 a-c	55.8 no	11.0 a-c	17.0 d-h	4.0 ab	5.3 a-e	2.5 a	16.5 g-m		
31.	Compass 50WG 0.15 oz	14	1.5 a-c	47.0 mn	91.5 i	74.5 j	104.5 i	87.5 k	84.0 k	70.0 st		
32.	Bayleton 50DF 0.50 oz	14	1.5 a-c	31.0 j-l	21.8 c-e	8.5 a-e	7.8 a-c	5.3 a-e	3.3 ab	10.0 a-j		
33.	Bayleton 50DF 1.0 oz	14	1.3 a-c	15.3 a-i	2.8 ab	2.8 a-c	3.3 ab	4.0 a-e	1.5 a	7.5 a-i		
34.	Compass 50WG 0.15 oz + Bayleton 50DF 0.5 oz	14	1.0 ab	10.0 a-g	1.8 ab	3.0 a-c	2.3 ab	6.0 a-e	2.5 a	5.5 a-f		
35.	Compass 50WG 0.15 oz + Bayleton 50DF 1.0 oz	14	0.8 ab	3.5 a-e	0.8 ab	0.8 a	2.8 ab	3.8 a-e	2.3 a	2.3 ab		
36.	Cleary 3336 4F 3 fl oz	14	0.3 ab	0.5 ab	0.8 ab	3.8 a-c	5.0 ab	7.0 a-e	7.3 a-d	15.8 fl		
37.	Topsin-M 70W 2.14 oz	14	0.8 ab	1.5 a-c	2.3 ab	9.0 a-f	8.0 a-c	12.0 c-f	12.0 b-e	22.3 k-n		
38.	TD2193-07 4.5F 2.68 fl oz	14	0.0 a	1.8 a-d	4.0 ab	12.0 a-g	13.8 a-d	12.0 c-f	13.8 c-e	19.0 j-m		
39.	V-10114 50WDG 0.18 oz	14	0.8 ab	27.5 h-k	13.5 a-d	11.0 a-g	22.3 d-f	11.8 b-f	5.0 a-c	13.0 b-k		
40.	V-10114 50WDG 0.37 oz	14	1.0 ab	21.5 g-k	10.3 a-c	4.0 a-c	6.3 a-c	7.3 a-e	1.3 a	3.0 a-c		
41.	V-10114 50WDG 0.55 oz	14	1.0 ab	25.5 h-k	10.0 a-c	1.8 ab	4.0 ab	3.3 a-e	1.5 a	4.3 a-e		
42.	V-10114 50WDG 0.73 oz	14	0.3 ab	3.8 a-e	1.0 ab	2.8 a-c	5.3 ab	5.3 a-e	2.5 a	9.8 a-j		
43.	V-10114 1.67SC 1.32 fl oz	14	0.5 ab	13.5 a-h	0.0 a	2.8 a-c	1.8 ab	6.3 a-e	1.5 a	3.8 a-d		
44.	V-10116 1.67SC 0.22 fl oz	14	0.0 a	8.0 a-g	6.5 ab	1.3 a	7.3 a-c	12.3 d-f	4.8 ab	6.5 a-h		
45.	V-10116 1.67SC 0.44 fl oz	14	0.3 ab	0.8 ab	0.0 a	1.3 a	3.8 ab	6.3 a-e	2.5 a	6.8 a-h		
46.	V-10116 1.67SC 0.88 fl oz	14	0.8 ab	0.5 ab	0.0 a	3.5 a-c	4.5 ab	6.8 a-e	2.5 a	7.0 a-h		
47.	V-10116 1.67SC 0.88 fl oz	21	1.3 a-c	2.3 a-d	4.3 ab	4.8 a-d	5.5 ab	6.0 a-e	2.5 a	8.0 a-i		
48.	V-10116 1.67SC 1.32 fl oz	14	0.8 ab	0.5 ab	0.0 a	2.3 a-c	3.8 ab	7.5 a-e	2.8 ab	3.5 a-d		

(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.
49. Daconil Ultrex 82.5SDG 5.0 oz / Velocity 80W 0.061 oz	14	3.0 de	145.0 s	166.0 l	56.8 i	31.5 f	3.3 a-e	3.0 ab	4.5 a-e
50. Rubigan 1AS 1.5 fl oz	Var ^w	0.8 ab	16.8 c-j	20.0 c-e	15.0 c-h	27.8 ef	13.3 e-g	14.8 de	33.3 o-q
51. AlgAway 60LC 0.082 fl oz	14	3.0 de	121.0 r	152.5 k	164.5 n	135.5 k	84.0 k	35.8 hi	40.8 q
52. Eagle 20EW 1.144 fl oz	14	1.0 ab	14.8 a-l	4.5 ab	3.5 a-c	8.0 a-c	7.5 a-e	2.5 a	6.0 a-g
53. Rotational Program 1	14 ^v	0.8 ab	19.8 f-j	34.8 f	18.0 e-h	33.5 f	3.0 a-e	0.5 a	2.0 a
54. Eagle 40W 0.6 oz	14	1.0 ab	8.5 ag	6.0 ab	4.5 a-c	3.3 ab	3.8 a-e	1.8 a	4.3 a-e
55. Pentathlon 75DF 6.0 oz + Aviator 1.0 fl oz	14	4.0 e	88.0 q	26.3 d-f	4.0 a-c	7.3 a-c	2.0 a-d	1.8 a	10.5 a-j
56. CGA 245704 50W 0.012 oz	21	1.8 b-d	92.3 pq	140.0 j	131.5 m	140.8 k	113.0 l	90.0 k	54.0 r
57. Daconil Ultrex 82.5SDG 1.8 oz	21	0.8 ab	35.8 k-m	62.0 g	90.0 k	112.3 ij	58.3 j	42.5 i	51.5 r
58. Daconil Ultrex 82.5SDG 3.2 oz	Var ^u	0.5 ab	6.3 a-g	0.3 a	2.3 a-c	1.8 ab	1.8 a-c	18.0 ef	29.5 n-p
59. Curalan 50EG 1.0 oz	Var ^u	0.0 a	15.8 a-i	9.3 a-c	5.0 a-d	3.5 ab	6.5 a-e	5.3 a-c	14.3 d-k
60. Banner MAXX 1.3MC 1.0 fl oz	Var ^u	0.8 ab	3.0 a-e	0.3 a	0.8 a	3.8 ab	5.3 a-e	2.3 a	4.3 a-e
61. Daconil Ultrex 82.5SDG 3.2 oz	Var ^t	2.8 c-e	1.5 a-c	3.0 ab	11.8 a-g	1.0 ab	2.0 a-d	29.5 gh	26.3 m-o
62. Curalan 50EG 1.0 oz	Var ^t	3.3 e	1.5 a-c	0.0 a	3.5 a-c	3.5 ab	10.8 a-e	3.8 ab	11.5 a-j
63. Banner MAXX 1.3MC 1.0 fl oz	Var ^t	3.0 de	3.8 a-e	2.5 ab	1.5 a	1.5 ab	6.3 a-e	5.8 a-c	4.0 a-e
64. Daconil Ultrex 82.5SDG 3.2 oz	14	1.0 ab	3.8 a-e	0.5 ab	3.3 a-c	4.5 ab	3.0 a-e	2.0 a	6.8 a-h
65. Eagle 20EW 2.29 fl oz	14 ^s	1.3 a-c	16.3 b-j	5.0 ab	1.0 a	1.8 ab	4.0 a-e	1.5 a	1.8 a
66. Eagle 20EW 4.58 fl oz	14 ^s	0.8 ab	4.3 a-f	0.8 ab	0.0 a	1.0 ab	3.3 a-e	1.0 a	1.3 a
67. Eagle 40W 1.2 oz	14 ^s	0.5 ab	2.5 a-d	1.3 ab	1.3 a	2.3 ab	6.0 a-e	4.0 ab	3.5 a-d
68. Eagle 40W 2.4 oz	14 ^s	0.8 ab	6.3 a-g	2.0 ab	2.0 a-c	1.8 ab	2.3 a-d	2.0 a	2.3 ab
69. Rotational Program 2	14 ^r	0.3 eb	10.0 a-g	0.0 a	1.8 ab	0.3 a	2.8 a-d	2.3 a	1.5 a
70. Untreated Control	---	2.8 c-e	103.8 q	137.5 j	171.3 no	168.8 l	125.8 m	106.8 l	77.5 t

INT ^q	DAT ^p	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT
7	1	3	6	1	3	6	3	3	7
14	8	3	13	1	3	13	10	7	7
21	8	17	6	15	3	13	3	14	14

(Continued)

Table 1 (continued).

^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 treatments 49, 61-63), 10 June (7 day treatment, and treatment 63), 17 June (7 and 14 day treatments, and treatments 58-60), 24 June (7 and 21 day treatments, and treatments 61-63), 1 July (7 and 14 day treatments, and treatments 49, 58-60), 8 July (7 day treatment, and treatments 59, 61), 15 July (7, 14, and 21 day treatments), 22 July (7 day treatment), 29 July (7 and 14 day treatment), 5 August (7 and 21 day treatments), 12 August (7 and 14 day treatments), 19 August (7 day treatment), 26 August (treatments 53, 69), and 9 September (treatments 53, 69).

^x For treatment 16, Concorde 82.5DF was applied on 3 June, 1 July, and 29 July, whereas Pentathlon 75DF + Aviator was applied on 17 June, 15 July, and 12 August. For treatment 17, Concorde 6F was applied on 3 June, 1 July, and 29 July, whereas Pentathlon 4LF + Aviator was applied on 17 June, 15 July, and 12 August. For treatment 21, Emerald 70WG was applied on 3 June, 1 July, and 29 July, whereas Insignia 20W was applied on 17 June, 15 July, and 12 August.

^w For treatment 49, Daconil Ultrex 82.5SDG was applied on 1 July only, whereas Velocity 80W (and experimental herbicide) was sprayed once on 14 July.

^v Rotational Program 1 was applied as follows: Eagle 40W (0.6 oz) + Fore Rainshield 80W (6.0 oz) on 3 June, Fore Rainshield 80W (6.0 oz) on 17 June, Eagle 40W (0.6 oz) + Prostar 70W (1.5 oz) on 1 July, Chipco 26GT 2SC (4.0 fl oz) + Fore Rainshield 80W (6.0 oz) on 15 July, Heritage 50WG (0.2 oz) + Curalan 50EG (1.0 oz) on 29 July, Eagle 40W (0.6 oz) + Fore Rainshield 80W (6.0 oz) on 12 August, Fore Rainshield 80W (6.0 oz) + Chipco 26GT 2SC (4.0 fl oz) on 26 August, and Eagle 40W (0.6 oz) on 9 September. All rates were per 1000 sq ft.

^u Treatments 58-60 were applied once on a preventive basis on 3 June and were not reapplied until more than three dollar spot lesion centers were observed on any replicate plot (as long as 7 days had elapsed since the last fungicide application). Daconil Ultrex 82.5SDG 3.2 oz (treatment 58) was applied on 3 June, 17 June, 1 July, 14 July, 22 July, 5 August, and 13 August. Curalan 50EG 1.0 oz (treatment 59) was applied on 3 June, 17 June, 1 July, 9 July, 5 August, and 13 August. Banner MAXX 1.3MC 1.0 fl oz (treatment 60) was applied on 3 June, 17 June, 1 July, 17 July, and 7 August.

^t Treatments 61-63 were applied on a curative basis whenever more than 10 dollar spot lesion centers were observed on any replicate plot (as long as 7 days had elapsed since last fungicide application). Daconil Ultrex 82.5SDG 3.2 oz (treatment 61) was applied on 13 June, 23 June, 8 July, 22 July, 5 August, and 13 August. Curalan 50EG 1.0 oz (treatment 62) was applied on 13 June, 23 June, 24 July, and 20 August. Banner MAXX 1.3MC 1.0 fl oz (treatment 63) was applied on 10 June, 23 June, 1 July, and 7 August.

^s Phytotoxicity on a 1-5 scale, where 1 = no injury, 2 = slight, 3 = moderate, 4 = moderate to severe, 5 = severe foliar necrosis. Foliar necrosis was observed for treatment 65 (1.8 on 9 July, 1.8 on 17 July, 1.3 on 24 July, 1.3 on 7 August, and 1.5 on 21 August), treatment 66 (1.5 on 27 June, 1.5 on 3 July, 2.3 on 9 July, 1.8 on 17 July, 1.8 on 24 July, 1.3 on 4 August, 1.3 on 7 August, and 2.0 on 15 August), treatment 67 (1.5 on 27 June, 1.8 on 9 July, 1.3 on 24 July, and 1.3 on 7 August), and treatment 68 (1.3 on 3 July, 2.0 on 9 July, and 1.3 on 15 August).

^r Rotational Program 2 was applied as follows: Banner MAXX 1.3MC (1.0 fl oz) on 3 June, Spectro 90WG (4.0 oz) on 17 June, Chipco Signature 80WG (4.0 oz) + Daconil Ultrex 82.5SDG (3.2 oz) on 1 July, Banner MAXX 1.3MC (1 fl oz) + Heritage 50WG (0.4 oz) on 15 July, Daconil Ultrex 82.5SDG (3.2 oz) + Subdue MAXX 2MC (1.0 fl oz) on 29 July, Chipco Signature 80WG (4.0 oz) + Chipco 26GT 2SC (4.0 fl oz) on 12 August, and Bayleton 50DF (0.5 oz) on 26 August. All rates were per 1000 sq ft.

^q Spray interval in days.

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

Table 2. Efficacy of selected fungicides for the control of dollar spot in creeping bentgrass, 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. CJB EXP 0207 2.0 fl oz	21	12.5 ij	14.5 j-o	6.0 b-f	23.8 ij
2. CJB EXP 0214 2.0 fl oz	21	11.3 h-j	17.5 l-q	14.5 g	30.0 j
3. RCS67 67WDG 4.0 oz	14	2.3 a-c	3.8 a-f	1.0 a-c	0.0 a
4. Spectro 90WG 4.0 oz	14	0.0 a	0.0 a	0.0 a	0.0 a
5. A13705 200SC 1.33 fl oz	14	0.0 a	0.0 a	0.0 a	0.0 a
6. A14035 440SE 9.33 fl oz	14	0.0 a	0.0 a	0.0 a	0.0 a
7. A14036 433SE 9.33 fl oz	14	0.0 a	0.0 a	0.0 a	0.0 a
8. A13817 515SE 4.2 fl oz	14	0.0 a	0.0 a	0.0 a	3.8 a-c
9. A14167 200ME 1.33 fl oz	14	0.0 a	0.0 a	0.0 a	2.5 a-c
10. A13666 660SC 1.66 fl oz	14	19.5 k	23.8 qr	0.0 a	2.5 a-c
11. Banner MAXX 1.3MC 1.0 fl oz					
+ Heritage 50WG 0.2 oz	14	0.0 a	0.0 a	0.0 a	0.0 a
12. Heritage 50WG 0.2 oz	14	11.0 g-j	20.0 n-q	0.8 ab	2.5 a-c
13. Banner MAXX 1.3MC 1.0 fl oz	14	0.0 a	0.0 a	1.8 a-d	3.8 a-c
14. Concorde 82.5SDG 3.2 oz	14	3.3 a-d	13.8 i-n	0.0 a	3.8 a-c
15. Concorde 6F 3.5 fl oz	14	5.8 a-g	13.8 i-n	0.0 a	3.8 a-c
16. Concorde 82.5SDG 3.2 oz	14				
/ Pentathlon 75DF 6.0 oz					
+ Aviator 1.0 fl oz	14 ^x	14.5 j	26.3 r	0.0 a	0.0 a
17. Concorde 6F 3.5 fl oz	14				
/ Pentathlon 4LF 10.0 fl oz					
+ Aviator 1.0 fl oz	14 ^x	7.0 c-h	14.5 j-o	0.0 a	0.0 a
18. Emerald 70WG 0.13 oz	14	1.3 ab	0.0 a	16.5 gh	13.8 d-h
19. Emerald 70WG 0.18 oz	21	2.0 a-c	4.3 a-g	29.5 j	46.3 k
20. Insignia 20WG 0.9 oz	14	8.5 d-i	10.0 f-j	0.0 a	3.8 a-c
21. Emerald 70WG 0.13 oz					
/ Insignia 20W 0.9 oz	14 ^x	0.0 a	0.5 ab	0.0 a	0.0 a
22. Propiconazole PRO 1.3MC 1.0 fl oz	14	0.0 a	0.0 a	1.0 a-c	7.5 a-f
23. Banner MAXX 1.3MC 1.0 fl oz	21	2.3 a-c	7.3 b-i	9.5 f	16.3 f-i
24. Banner MAXX 1.3MC 1.0 fl oz					
+ Heritage 50WG 0.2 oz	21	5.5 a-f	8.8 e-j	0.0 a	11.3 c-h
25. Banner MAXX 1.3MC 1.0 fl oz					
+ CGA 245704 50W 0.012 oz	21	2.5 a-c	4.8 a-h	4.3 a-e	18.8 g-i
26. Banner MAXX 1.3MC 1.0 fl oz					
+ Daconil Ultrex 82.5SDG 1.8 oz	21	3.5 a-d	4.5 a-g	0.0 a	3.8 a-c
27. CGA 245704 50W 0.012 oz	14	10.0 e-j	13.3 i-m	16.5 gh	30.0 j
28. Daconil Ultrex 82.5SDG 1.8 oz					
+ CGA 245704 50W 0.012 oz	14	1.5 a-c	7.5 c-i	0.0 a	3.8 a-c
29. Daconil Ultrex 82.5SDG 1.8 oz	14	8.5 d-i	21.3 p-r	0.0 a	3.8 a-c
30. Daconil Ultrex 82.5SDG 1.0 oz	7	3.8 a-d	13.0 i-m	0.0 a	8.8 a-f
31. Compass 50WG 0.15 oz	14	12.8 ij	17.5 l-q	0.0 a	8.8 a-f
32. Bayleton 50DF 0.50 oz	14	0.5 ab	0.0 a	4.3 a-e	15.0 e-i
33. Bayleton 50DF 1.0 oz	14	0.0 a	0.0 a	0.0 a	10.0 b-g

(Continued)

Table 2 (continued).

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.
34. Compass 50WG 0.15 oz + Bayleton 50DF 0.5 oz	14	0.0 a	0.0 a	0.0 a	7.5 a-f
35. Compass 50WG 0.15 oz + Bayleton 50DF 1.0 oz	14	0.0 a	0.0 a	0.0 a	15.0 e-i
36. Cleary 3336 4F 3 fl oz	14	4.8 a-e	8.5 d-j	6.3 c-f	15.0 e-i
37. Topsin-M 70W 2.14 oz	14	10.3 f-j	18.8 m-q	7.0 f	20.0 hi
38. TD2193-07 4.5F 2.68 fl oz	14	6.0 b-h	17.0 k-q	3.0 a-e	13.8 d-h
39. V-10114 50WDG 0.18 oz	14	0.0 a	10.0 f-j	0.0 a	6.3 a-e
40. V-10114 50WDG 0.37 oz	14	0.0 a	0.5 a	0.0 a	1.3 ab
41. V-10114 50WDG 0.55 oz	14	0.0 a	0.0 a	0.0 a	0.5 ab
42. V-10114 50WDG 0.73 oz	14	0.0 a	0.5 ab	0.0 a	0.0 a
43. V-10114 1.67SC 1.32 fl oz	14	0.0 a	0.0 a	0.0 a	1.3 ab
44. V-10116 1.67SC 0.22 fl oz	14	2.3 a-c	4.3 a-g	0.0 a	6.3 a-e
45. V-10116 1.67SC 0.44 fl oz	14	0.0 a	0.5 ab	0.0 a	6.3 a-e
46. V-10116 1.67SC 0.88 fl oz	14	0.0 a	0.0 a	0.0 a	7.5 a-f
47. V-10116 1.67SC 0.88 fl oz	21	2.8 a-c	5.0 a-h	0.0 a	11.3 c-h
48. V-10116 1.67SC 1.32 fl oz	14	0.0 a	0.0 a	0.0 a	7.5 a-f
49. Daconil Ultrex 82.5SDG 5.0 oz	14				
/ Velocity 80W 0.061 oz	Var ^w	0.0 a	4.5 a-g	0.0 a	1.3 ab
50. Rubigan 1AS 1.5 fl oz	14	6.0 b-h	17.5 l-q	2.5 a-e	15.0 e-i
51. AlgAway 60LC 0.082 fl oz	14	12.5 ij	14.3 j-o	27.8 j	43.8 k
52. Eagle 20EW 1.144 fl oz	14	0.0 a	0.0 a	0.0 a	10.0 b-g
53. Rotational Program 1	14 ^v	0.0 a	2.0 a-d	0.0 a	0.0 a
54. Eagle 40W 0.6 oz	14	0.0 a	0.0 a	0.3 a	5.0 a-d
55. Pentathlon 75DF 6.0 oz + Aviator 1.0 fl oz	14	0.0 a	0.8 ab	0.0 a	1.3 ab
56. CGA 245704 50W 0.012 oz	21	12.5 ij	11.3 h-l	40.5 k	76.3 m
57. Daconil Ultrex 82.5SDG 1.8 oz	21	15.0 j	7.5 c-i	6.8 d-f	30.0 j
58. Daconil Ultrex 82.5SDG 3.2 oz	Var ^u	2.8 a-c	12.3 i-m	1.3 a-c	3.8 a-c
59. Curalan 50EG 1.0 oz	Var ^u	4.8 a-e	10.5 f-j	23.3 i	60.0 l
60. Banner MAXX 1.3MC 1.0 fl oz	Var ^u	0.8 ab	2.3 a-e	4.0 a-e	10.0 b-g
61. Daconil Ultrex 82.5SDG 3.2 oz	Var ^t	8.3 d-i	18.3 l-q	0.0 a	1.3 ab
62. Curalan 50EG 1.0 oz	Var ^t	2.5 a-c	1.8 a-c	20.3 hi	56.3 l
63. Banner MAXX 1.3MC 1.0 fl oz	Var ^t	0.0 a	2.5 a-e	0.0 a	5.0 a-d
64. Daconil Ultrex 82.5SDG 3.2 oz	14	1.5 a-c	10.0 f-j	0.0 a	0.0 a
65. Eagle 20EW 2.29 fl oz	14 ^s	0.0 a	0.0 a	0.0 a	1.3 ab
66. Eagle 20EW 4.58 fl oz	14 ^s	0.0 a	0.0 a	0.0 a	0.0 a
67. Eagle 40W 1.2 oz	14 ^s	0.0 a	0.5 ab	1.0 a-c	7.5 a-f
68. Eagle 40W 2.4 oz	14 ^s	0.0 a	0.0 a	0.0 a	2.5 a-c
69. Rotational Program 2	14 ^r	0.0 a	0.0 a	0.0 a	0.0 a
70. Untreated Control	---	20.0 k	20.8 o-r	47.5 l	81.3 m

(Continued)

Table 2 (continued).

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.
	INT ^q	DAT ^p	DAT	DAT	DAT
	7	17	29	7	1
	14	24	36	14	8
	21	31	43	7	15

^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 treatments 49, 61-63), 10 June (7 day treatment, and treatment 63), 17 June (7 and 14 day treatments, and treatments 58-60), 24 June (7 and 21 day treatments, and treatments 61-63), 1 July (7 and 14 day treatments, and treatments 49, 58-60), 8 July (7 day treatment, and treatments 59, 61), 15 July (7, 14, and 21 day treatments), 22 July (7 day treatment), 29 July (7 and 14 day treatment), 5 August (7 and 21 day treatments), 12 August (7 and 14 day treatments), 19 August (7 day treatment), 26 August (treatments 53, 69), and 9 September (treatments 53, 69).

^x For treatment 16, Concorde 82.5DF was applied on 3 June, 1 July, and 29 July, whereas Pentathlon 75DF + Aviator was applied on 17 June, 15 July, and 12 August. For treatment 17, Concorde 6F was applied on 3 June, 1 July, and 29 July, whereas Pentathlon 4LF + Aviator was applied on 17 June, 15 July, and 12 August. For treatment 21, Emerald 70WG was applied on 3 June, 1 July, and 29 July, whereas Insignia 20W was applied on 17 June, 15 July, and 12 August.

^w For treatment 49, Daconil Ultrex 82.5SDG was applied on 1 July only, whereas Velocity 80W (and experimental herbicide) was sprayed once on 14 July.

^v Rotational Program 1 was applied as follows: Eagle 40W (0.6 oz) + Fore Rainshield 80W (6.0 oz) on 3 June, Fore Rainshield 80W (6.0 oz) on 17 June, Eagle 40W (0.6 oz) + Prostar 70W (1.5 oz) on 1 July, Chipco 26GT 2SC (4.0 fl oz) + Fore Rainshield 80W (6.0 oz) on 15 July, Heritage 50WG (0.2 oz) + Curalan 50EG (1.0 oz) on 29 July, Eagle 40W (0.6 oz) + Fore Rainshield 80W (6.0 oz) on 12 August, Fore Rainshield 80W (6.0 oz) + Chipco 26GT 2SC (4.0 fl oz) on 26 August, and Eagle 40W (0.6 oz) on 9 September. All rates were per 1000 sq ft.

^u Treatments 58-60 were applied once on a preventive basis on 3 June and were not reapplied until more than three dollar spot lesion centers were observed on any replicate plot (as long as 7 days had elapsed since the last fungicide application). Daconil Ultrex 82.5SDG 3.2 oz (treatment 58) was applied on 3 June, 17 June, 1 July, 14 July, 22 July, 5 August, and 13 August. Curalan 50EG 1.0 oz (treatment 59) was applied on 3 June, 17 June, 1 July, 9 July, 5 August, and 13 August. Banner MAXX 1.3MC 1.0 fl oz (treatment 60) was applied on 3 June, 17 June, 1 July, 17 July, and 7 August.

^t Treatments 61-63 were applied on a curative basis whenever more than 10 dollar spot lesion centers were observed on any replicate plot (as long as 7 days had elapsed since last fungicide application). Daconil Ultrex 82.5SDG 3.2 oz (treatment 61) was applied on 13 June, 23 June, 8 July, 22 July, 5 August, and 13 August. Curalan 50EG 1.0 oz (treatment 62) was applied on 13 June, 23 June, 24 July, and 20 August. Banner MAXX 1.3MC 1.0 fl oz (treatment 63) was applied on 10 June, 23 June, 1 July, and 7 August.

^s Phytotoxicity on a 1-5 scale, where 1 = no injury, 2 = slight, 3 = moderate, 4 = moderate to severe, 5 = severe foliar necrosis. Foliar necrosis was observed for treatment 65 (1.8 on 9 July, 1.8 on 17 July, 1.3 on 24 July, 1.3 on 7 August, and 1.5 on 21 August), treatment 66 (1.5 on 27 June, 1.5 on 3 July, 2.3 on 9 July, 1.8 on 17 July, 1.8 on 24 July, 1.3 on 4 August, 1.3 on 7 August, and 2.0 on 15 August), treatment 67 (1.5 on 27 June, 1.8 on 9 July, 1.3 on 24 July, and 1.3 on 7 August), and treatment 68 (1.3 on 3 July, 2.0 on 9 July, and 1.3 on 15 August).

(Continued)

Table 2 (continued).

^r Rotational Program 2 was applied as follows: Banner MAXX 1.3MC (1.0 fl oz) on 3 June, Spectro 90WG (4.0 oz) on 17 June, Chipco Signature 80WG (4.0 oz) + Daconil Ultrex 82.5SDG (3.2 oz) on 1 July, Banner MAXX 1.3MC (1 fl oz) + Heritage 50WG (0.4 oz) on 15 July, Daconil Ultrex 82.5SDG (3.2 oz) + Subdue MAXX 2MC (1.0 fl oz) on 29 July, Chipco Signature 80WG (4.0 oz) + Chipco 26GT 2SC (4.0 fl oz) on 12 August, and Bayleton 50DF (0.5 oz) on 26 August. All rates were per 1000 sq ft.

^q Spray interval in days.

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