

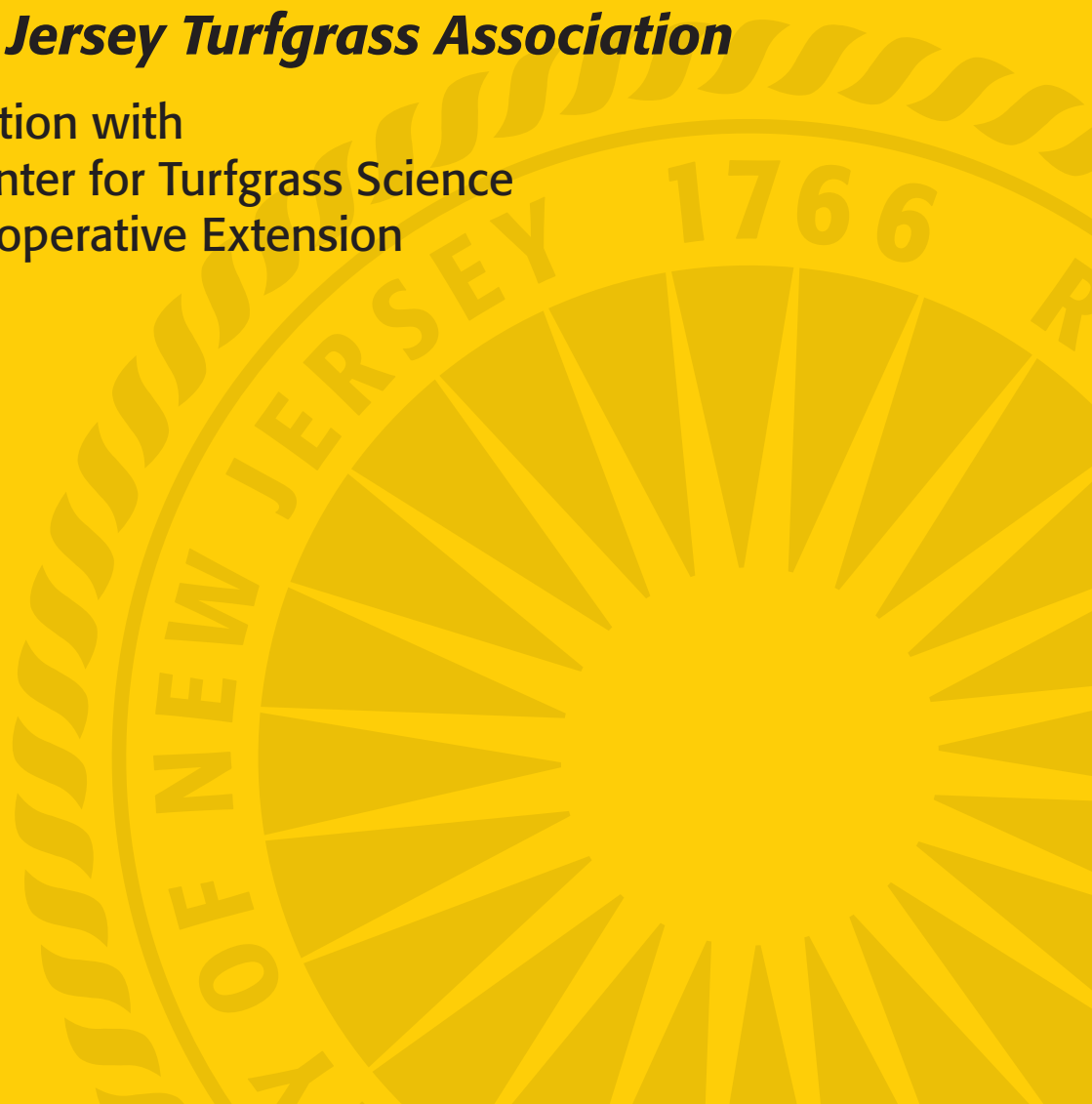
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The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State 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 2017 GREEN EXPO Turf and Landscape Conference. 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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ANTHRACNOSE CONTROL WITH FUNGIDES AND BIORATIONAL PRODUCTS ON ANNUAL BLUEGRASS PUTTING GREEN TURF – TEST 2, 2017

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Fungicides were evaluated in 2017 for their ability to control anthracnose basal rot (caused by *Colletotrichum cereale*) on an annual bluegrass (*Poa annua*) putting green turf at the Rutgers Horticultural Research Farm II in North Brunswick, NJ. The green was established in October 2004 on a Nixon loam with a pH of 6.0 by killing the existing stand of creeping bentgrass (*Agrostis stolonifera*) and annual bluegrass with Roundup Pro 3LC (3 qt per acre) and then core aerifying the site in two directions to bring dormant annual bluegrass seed to the soil surface. The site was inoculated with *C. cereale* isolate ValP-04 on 17 July 2005 using a 2 gal per 1,000 ft² water spore suspension (4 x 10⁵ conidia per ml); the disease has developed naturally on the site each year thereafter. Plots were 3 x 5 ft and were arranged in a randomized complete block with four replications. Mowing was performed daily at a height of 0.125 inches with clippings collected. The site was irrigated as needed to prevent drought stress.

Fertilizer was applied as urea (46-0-0; 0.1 lb nitrogen (N) per 1000 ft²) on 13 and 28 April, 11, 18, and 28 May, 1, 8, and 19 June, 6 and 26 July, 4 and 19 August, and 1 September; 0-30-0 (0.2 lb N per 1000 ft²) on 13 April, 11 May, 8 June, 6 July, 4 August, and 1 September; 0-0-62 (0.1 lb N per 1000 ft²) on 28 April and 0-0-62 (0.2 lb N per 1000 ft²) on 28 May, 26 July, and 19 August; and Harrell's Max Minors (micronutrient mixture; 4.0 fl oz per 1000 ft²) and Magnesium (4%; 3.0 fl oz per 1000 ft²) on 8 June. The growth regulators Primo MAXX 1ME (0.125 fl oz per 1000 ft²) + Proxy 2SL (5.0 fl oz per 1000 ft²) were sprayed over the trial on 30 March, 15 April, and 1 May to suppress seed heads, and Primo MAXX 1ME

(0.125 fl oz per 1000 ft²) was continued every 14 days from 5 May to 30 August.

Dollar spot (caused by *Clarireedia jacksonii*; syn. *Sclerotinia homoeocarpa*) was suppressed with Emerald 70WG (0.18 oz per 1000 ft²) on 22 June and Curalan 50EG (1.0 oz per 1000 ft²) on 8 May, 4 June, 9 and 26 July, and 3, 16, and 28 August. Brown ring patch (incited by *Rhizoctonia circinata*) was controlled with ProStar 70W (3.0 oz per 1000 ft²) on 18 April and 4 June. Brown patch (caused by *Rhizoctonia solani*) was prevented with ProStar 70W (3.0 oz per 1000 ft²) on 22 June, 26 July, and 3, 16, and 28 August. Algae (*Cyanobacteria* spp.) was controlled with Pentathlon 4LF (12 fl oz per 1000 ft²) on 10 July. Previous research by the authors has shown that Curalan 50EG, ProStar 70W, Pentathlon, and Emerald 70WG did not affect anthracnose development on the study site at the rates used in this study. Insect pests were controlled with Acelypryn 1.67SC (0.276 fl oz per 1000 ft²) on 4 May. Silvery thread moss (*Bryum argenteum*) was controlled with Quicksilver 1.9SC (0.046 fl oz per 1000 ft²) on 11 and 22 June, 9 and 11 July, and 5 and 21 August. Turf was topdressed with sand (2 ft³ per 1,000 ft²) on 30 March, 27 April, 10 May, 22 June, 9 July, and 7 August.

Fungicides were applied in water equivalent to 1.9 gal per 1000 ft² with a CO₂ powered sprayer at 30 psi using Tee Jet Air Induction AI8002 nozzles. Treatments (trt) were initiated on 19 May, prior to the development of anthracnose. Fungicides were reapplied at the appropriate intervals until 18 August as indicated in Tables 1A and 1B. Turf was visually evaluated for percent turf area infested with anthrac-

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nose on 2, 11, 21, and 31 July, and 10, 20, and 30 August. Turf quality was evaluated on 16 June, 14 July, and 11 August using a 1 to 9 scale, where 9 = best turf quality and 5 = acceptable quality (Table 1C). Color of foliage was visually estimated on 16 June, 14 July, and 11 August using a 1 to 10 scale, where 5 = color of healthy untreated turf, less than 5 = progressively more chlorotic/necrotic turf, and greater than 5 = progressively darker green turf (Table 1C). Phytotoxicity was assessed on 16 June 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 not shown). Data were subjected to analysis of variance and means were separated by Waller-Duncan *k*-ratio *t*-test (*k* =100).

Anthracnose developed as a natural infection and became uniformly distributed throughout the green by 2 July. Disease severity peaked on 10 August (84% turf area infested on the untreated control). Due to the severity of the epidemic, only 2017 Anthracnose Program #18 (trt 2) provided acceptable control of this disease (less than 15% turf area infested) throughout the study period (19 May through 30 August; Tables 1A and 1B). 2017 Anthracnose Program #17 (trt 1) and 2017 Anthracnose Program #19 (trt 3) also suppressed disease to an acceptable level, except on the first rating date (2 July) when 16 and 24% turf

area was infested with *C. cereale* was observed, respectively. It is interesting to note that all three of these treatments consisted of fertility programs without fungicides, further demonstrating the importance of maintaining proper fertility when managing annual bluegrass putting green turf for the control of anthracnose. Of the remaining treatments, only Torque 3.6SC (trt 8) and Signature Xtra Stressgard 60WG + Daconil Ultrex 82.5WG (trt 10) provided adequate control of anthracnose on 57% and 71% of the rating dates in 2017, respectively.

Turf quality was acceptable (greater or equal to 5.0) for most treatments in this study (Table 1C). In general, turf treated with products that provided good anthracnose control also exhibited acceptable quality on all three observation dates. Turf color was evaluated on 16 June, 14 July, and 11 August (Table 1C). Treatments with color rating greater than the untreated control on all three rating dates included the fertility treatments 2017 Anthracnose Program #17 (trt 1), 2017 Anthracnose Program #18 (trt 2), 2017 Anthracnose Program #19 (trt 3), as well as the fungicide Interface Stressgard 2.27SC (trt 12). Phytotoxicity was only observed on treatment 8, which caused slight foliar necrosis (1.3 on a 1 to 5 scale, where 1 = no injury and 2 = slight injury) on 16 June (data not shown). No additional phytotoxicity was observed during the study.

Table 1A. Anthracnose control with fungicides and biorational products on annual bluegrass putting green turf – Test 2: Rutgers University, 2017.

Treatment	Rate per 1000 sq ft	Application Schedule (days) ²	Turf Area Infested per Plot (%) ¹			
			2 July	11 July	21 July	31 July
1 2017 Anth Prog #17	Plant Food	ALT ³	16.3 fg	9.3 h	7.5 h	6.0 h
2 2017 Anth Prog #18	Plant Food	ALT ⁴	14.3 g	13.3 gh	14.5 gh	11.0 gh
3 2017 Anth Prog #19	Plant Food	VAR ⁵	24.3 d-f	14.0 gh	13.3 gh	5.8 h
4 AGS 1044 LC.....	2.94 fl oz	14	40.5 b	50.0 b	50.0 b	59.0 b
5 AGS 1044 LC.....	7.35 fl oz	14	35.5 bc	43.8 bc	45.8 bc	58.0 b
6 AGS 1044 LC.....	14.7 fl oz	14	30.8 cd	31.0 d-f	40.0 bc	51.8 bc
7 Daconil Ultrex 82.5WG	3.2 oz	14	28.8 c-e	33.0 c-f	27.0 de	25.3 ef
8 Torque 3.6SC.....	1.1 fl oz	14	6.0 h	14.0 gh	15.3 f-h	29.0 d-f
9 Signature Xtra Stressgard 60WG	4.0 oz	14	18.8 fg	36.3 c-f	20.0 e-g	40.0 cd
10 Signature Xtra Stressgard 60WG	4.0 oz	-				
+ Daconil Ultrex 82.5WG	3.2 oz	14	13.5 gh	25.3 fg	13.5 gh	21.5 fg
11 Exteris Stressgard 0.27SC.....	4.0 fl oz	14	18.8 fg	37.5 c-e	42.5 bc	53.8 b
12 Interface Stressgard 2.27SC.....	6.0 fl oz	14	5.8 h	13.3 gh	26.5 ef	29.3 d-f
13 Crossover G.....	15 lbs	14 ⁶	32.3 cd	38.5 b-e	47.8 bc	41.3 cd
14 Crossover G.....	15 lbs	-				
+ Banner Maxx 1.3ME	1.5 fl oz	14 ⁷	22.8 fe	30.0 ef	42.0 bc	40.0 cd
15 Banner Maxx 1.3ME	1.5 fl oz	14 ⁸	31.8 cd	43.0 b-d	38.3 cd	37.3 de
16 Untreated Check.....	-	-	63.3 a	77.5 a	73.8 a	82.0 a
		INT ⁹	DAT ¹⁰	DAT	DAT	DAT
		7	2	4	7	3
		14	2	11	7	3

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 19 May (all treatments, except treatments 13 to 15), 26 May (7-day treatment), 2 June (7- and 14-day treatments), 9 June (7-day treatment), 16 June (7- and 14-day treatments), 23 June (7-day treatment, and treatments 13 to 15), 30 June (7- and 14-day treatments), 7 July (7-day treatment), 14 July (7- and 14-day treatments), 21 July (7-day treatment), 28 July (7- and 14-day treatments), 4 August (7-day treatment), 11 August (7- and 14-day treatments), 18 August (7-day treatment)

(Continued)

Table 1A. Anthracnose control on annual bluegrass putting green turf – Test 2, 2017 (continued).

- ³ ALT = Alternation treatment where treatment 1 (2017 Anth Prog #17) consisted of PF 1A LC (concentrate contains: 16-0-7 (8.0 oz), 4-20-22 (4.0 oz), Impulse (4.0 oz), Kelp Plant (6.0 oz), and FloThru A+ (0.7 oz)) + Primo 1ME (0.05 fl oz) applied on 19 May, 2 June, 16 June, 30 June, 14 July, 28 July, and 11 August, and PF 1B LC (concentrate contains: Calcium Nitrate (6.0 oz), Mg Nitrate (6.0 oz), Sugar Cal (4.0 oz), Omega (1.5 oz), Impulse (4.0 oz), 6 Iron (3.0 oz), and FloThru (0.07 oz)) + Primo 1ME (0.05 fl oz) applied on 26 May, 9 June, 23 June, 7 July, 21 July, 4 August, and 18 August
- ⁴ ALT = Alternation treatment where treatment 2 (2017 Anth Prog #18) consisted of PF 2A LC (concentrate contains: 16-0-7 (8.0 oz), 4-20-22 (4.0 oz), Impulse (4.0 oz), Kelp Plant (6.0 oz), Hydration A+ (0.07 oz), Green Blade (0.35 oz)) + Primo 1ME (0.05 fl oz) applied on 19 May, 2 June, 16 June, 30 June, 14 July, 28 July, and 11 August, and PF 2B LC (concentrate contains: Calcium Nitrate (6.0 oz), Mg Nitrate (6.0 oz), Sugar Cal (4.0 oz), Omega (1.5 oz), Impulse (4.0 oz), 6 Iron (3.0 oz), Hydration (0.07 oz)) + Primo 1ME (0.05 fl oz) applied on 26 May, 9 June, 23 June, 7 July, 21 July, 4 August, and 18 August
- ⁵ VAR = Variable spray schedule where treatment 3 (2017 Anth Prog #19) consisted of PF 3 LC (concentrate contains 29-0-0 50% (6.0 oz), 4-20-22 (4.0 oz), Impulse (3.0 oz), Kelp Plant (3.0 oz), Green Blade (0.35 oz)) + Primo 1ME (0.075 fl oz) applied on 19 May, 26 May, and 2 June, and PF 3 LC (concentrate contained 29-0-0 50% (6.0 oz), 4-20-22 (4.0 oz), Impulse (3.0 oz), Kelp Plant (3.0 oz), Green Blade (0.35 oz)) + Primo 1ME (0.075 fl oz) + Greenblade LC (0.13 fl oz) + Hydration A+ (0.7 fl oz) applied on 9 June, 16 June, 23 June, 30 June, 7 July, 14 July, 21 July, 28 July, 4 August, 11 August, and 18 August
- ⁶ Treatment 13 was applied on 23 June and 7 July
- ⁷ Treatment 14 consisted of Crossover G (15 lb) applied on 23 June and 7 July and Banner Maxx 1.3ME (1.5 fl oz) applied on 23 June, 7 and 21 July, and 4 and 18 August
- ⁸ Treatment 15 consisted of Banner Maxx 1.3ME (1.5 fl oz) applied on 23 June, 7 and 21 July, and 4 and 18 August
- ⁹ INT = Spray interval in days
- ¹⁰ DAT = Days after the last treatment

Table 1B. Anthracnose control with fungicides and biorational products on annual bluegrass putting green turf – Test 2: Rutgers University, 2017.

Treatment	Rate per 1000 sq ft	Application Schedule (days) ²	Turf Area Infested per Plot (%) ¹		
			10 Aug.	20 Aug. 30 Aug.	
1 2017 Anth Prog #17	Plant Food	ALT ³	9.3 ij	5.0 f	7.8 f
2 2017 Anth Prog #18	Plant Food	ALT ⁴	13.3 ij	8.0 f	6.8 f
3 2017 Anth Prog #19	Plant Food	VAR ⁵	4.8 j	4.5 f	7.5 f
4 AGS 1044 LC.....	2.94 fl oz	14	76.3 ab	59.3 b	56.5 b
5 AGS 1044 LC.....	7.35 fl oz	14	72.5 bc	47.5 bc	36.5 c
6 AGS 1044 LC.....	14.7 fl oz	14	60.0 de	47.8 bc	35.0 c
7 Daconil Ultrex 82.5WG	3.2 oz	14	30.0 h	30.5 d	27.0 cd
8 Torque 3.6SC.....	1.1 fl oz	14	19.0 i	7.5 f	9.3 f
9 Signature Xtra Stressgard 60WG ...	4.0 oz	14	45.8 fg	26.0 de	27.0 cd
10 Signature Xtra Stressgard 60WG ...	4.0 oz	–	–	–	–
+ Daconil Ultrex 82.5WG	3.2 oz	14	13.5 ij	5.5 f	10.0 f
11 Exteris Stressgard 0.27SC.....	4.0 fl oz	14	63.8 cd	48.3 bc	34.8 c
12 Interface Stressgard 2.27SC.....	6.0 fl oz	14	48.8 f	37.3 cd	34.0 c
13 Crossover G	15 lbs	14 ⁶	38.5 gh	28.0 de	14.8 ef
14 Crossover G	15 lbs	–	–	–	–
+ Banner Maxx 1.3ME	1.5 fl oz	14 ⁷	31.5 h	15.8 ef	9.0 f
15 Banner Maxx 1.3ME	1.5 fl oz	14 ⁸	53.8 ef	28.0 de	22.5 de
16 Untreated Check.....	–	–	83.8 a	76.0 a	69.5 a

	INT ⁹	DAT ¹⁰	DAT	DAT
	7	6	2	12
	14	13	9	19

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 19 May (all treatments, except treatments 13 to 15), 26 May (7-day treatment), 2 June (7- and 14-day treatments), 9 June (7-day treatment), 16 June (7- and 14-day treatments), 23 June (7-day treatment, and treatments 13 to 15), 30 June (7- and 14-day treatments), 7 July (7-day treatment), 14 July (7- and 14-day treatments), 21 July (7-day treatment), 28 July (7- and 14-day treatments), 4 August (7-day treatment), 11 August (7- and 14-day treatments), 18 August (7-day treatment)

(Continued)

Table 1B. Anthracnose control on annual bluegrass putting green turf – Test 2, 2017 (continued).

- ³ ALT = Alternation treatment where treatment 1 (2017 Anth Prog #17) consisted of PF 1A LC (concentrate contains: 16-0-7 (8.0 oz), 4-20-22 (4.0 oz), Impulse (4.0 oz), Kelp Plant (6.0 oz), and FloThru A+ (0.7 oz)) + Primo 1ME (0.05 fl oz) applied on 19 May, 2 June, 16 June, 30 June, 14 July, 28 July, and 11 August, and PF 1B LC (concentrate contains: Calcium Nitrate (6.0 oz), Mg Nitrate (6.0 oz), Sugar Cal (4.0 oz), Omega (1.5 oz), Impulse (4.0 oz), 6 Iron (3.0 oz), and FloThru (0.07 oz)) + Primo 1ME (0.05 fl oz) applied on 26 May, 9 June, 23 June, 7 July, 21 July, 4 August, and 18 August
- ⁴ ALT = Alternation treatment where treatment 2 (2017 Anth Prog #18) consisted of PF 2A LC (concentrate contains: 16-0-7 (8.0 oz), 4-20-22 (4.0 oz), Impulse (4.0 oz), Kelp Plant (6.0 oz), Hydration A+ (0.07 oz), Green Blade (0.35 oz)) + Primo 1ME (0.05 fl oz) applied on 19 May, 2 June, 16 June, 30 June, 14 July, 28 July, and 11 August, and PF 2B LC (concentrate contains: Calcium Nitrate (6.0 oz), Mg Nitrate (6.0 oz), Sugar Cal (4.0 oz), Omega (1.5 oz), Impulse (4.0 oz), 6 Iron (3.0 oz), Hydration (0.07 oz)) + Primo 1ME (0.05 fl oz) applied on 26 May, 9 June, 23 June, 7 July, 21 July, 4 August, and 18 August
- ⁵ VAR = Variable spray schedule where treatment 3 (2017 Anth Prog #19) consisted of PF 3 LC (concentrate contains 29-0-0 50% (6.0 oz), 4-20-22 (4.0 oz), Impulse (3.0 oz), Kelp Plant (3.0 oz), Green Blade (0.35 oz)) + Primo 1ME (0.075 fl oz) applied on 19 May, 26 May, and 2 June, and PF 3 LC (concentrate contained 29-0-0 50% (6.0 oz), 4-20-22 (4.0 oz), Impulse (3.0 oz), Kelp Plant (3.0 oz), Green Blade (0.35 oz)) + Primo 1ME (0.075 fl oz) + Greenblade LC (0.13 fl oz) + Hydration A+ (0.7 fl oz) applied on 9 June, 16 June, 23 June, 30 June, 7 July, 14 July, 21 July, 28 July, 4 August, 11 August, and 18 August
- ⁶ Treatment 13 was applied on 23 June and 7 July
- ⁷ Treatment 14 consisted of Crossover G (15 lb) applied on 23 June and 7 July and Banner Maxx 1.3ME (1.5 fl oz) applied on 23 June, 7 and 21 July, and 4 and 18 August
- ⁸ Treatment 15 consisted of Banner Maxx 1.3ME (1.5 fl oz) applied on 23 June, 7 and 21 July, and 4 and 18 August
- ⁹ INT = Spray interval in days
- ¹⁰ DAT = Days after the last treatment

Table 1C. Anthracnose control with fungicides and biorational products on annual bluegrass putting green turf – Test 2: Rutgers University, 2017.

Treatment	Rate per 1000 sq ft	Application Schedule (days) ⁴	Turf Quality ^{1,2}			Color ³		
			16 June	14 July	11 Aug.	16 June	14 July	11 Aug.
1 2017 Anth Prog #17	Plant Food	ALT ⁵	7.3 ab	8.2 a	7.6 ab	7.6 a	6.9 a	7.4 ab
2 2017 Anth Prog #18	Plant Food	ALT ⁶	7.8 a	7.1 b	6.7 bc	7.6 a	6.7 a	7.5 a
3 2017 Anth Prog #19	Plant Food	VAR ⁷	6.9 a-e	7.3 ab	8.2 a	7.5 a	6.5 ab	7.6 a
4 AGS 1044 LC.....	2.94 fl oz	14	5.6 c-f	4.0 fg	3.0 g	5.0 f	5.3 cd	5.5 e-g
5 AGS 1044 LC.....	7.35 fl oz	14	5.2 ef	4.1 e-g	3.2 fg	5.0 f	5.3 cd	5.5 e-g
6 AGS 1044 LC.....	14.7 fl oz	14	5.7 b-f	4.8 d-f	4.0 de	5.0 f	5.3 cd	5.8 d-f
7 Daconil Ultrex 82.5WG	3.2 oz	14	5.5 d-f	4.7 e-g	4.8 d	5.1 f	5.0 d	5.3 fg
8 Torque 3.6SC	1.1 fl oz	14	7.0 a-d	6.8 bc	6.1 c	5.3 d-f	6.2 ab	7.0 ab
9 Signature Xtra Stressgard 60WG	4.0 oz	14	6.6 a-e	4.0 fg	4.1 de	5.1 ef	5.4 cd	5.3 fg
10 Signature Xtra Stressgard 60WG	4.0 oz	-	-	-	-	-	-	-
+ Daconil Ultrex 82.5WG	3.2 oz	14	7.2 a-c	5.1 de	7.3 ab	5.5 cd	5.0 d	5.1 fg
11 Exeris Stressgard 0.27SC.....	4.0 fl oz	14	6.9 a-e	3.7 g	3.9 d-g	5.9 bc	5.3 cd	6.0 de
12 Interface Stressgard 2.27SC.....	6.0 fl oz	14	7.9 a	5.8 cd	4.4 d	6.1 b	5.6 bc	6.4 cd
13 Crossover G	15 lbs	14 ⁸	5.4 d-f	4.1 e-g	4.2 de	5.5 cd	5.0 d	5.0 g
14 Crossover G	15 lbs	-	-	-	-	-	-	-
+ Banner Maxx 1.3ME	1.5 fl oz	14 ⁹	6.2 b-f	4.4 e-g	4.7 d	5.5 cd	5.5 bc	5.0 g
15 Banner Maxx 1.3ME	1.5 fl oz	14 ¹⁰	5.9 b-f	4.3 e-g	4.3 de	5.1 ef	5.5 bc	6.8 b
16 Untreated Check.....	-	-	4.7 f	3.9 fg	3.4 e-g	5.0 f	5.0 d	5.3 fg
		INT ¹¹	DAT ¹²	DAT	DAT	DAT	DAT	DAT
		7	7	7	7	7	7	7
		14	14	14	14	14	14	14

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 Color of foliage on a scale of 1 to 10, where 5 = color of healthy untreated turf, less than 5 = progressively more chlorotic/hecrotic turf, and greater than 5 = progressively darker green turf

(Continued)

Table 1C. Anthracnose control on annual bluegrass putting green turf – Test 2, 2017 (continued).

- ⁴ Fungicides were applied on 19 May (all treatments, except treatments 13 to 15), 26 May (7-day treatment), 2 June (7- and 14-day treatments), 9 June (7-day treatment), 16 June (7- and 14-day treatments), 23 June (7-day treatment, and treatments 13 to 15), 30 June (7- and 14-day treatments), 7 July (7-day treatment), 14 July (7- and 14-day treatments), 21 July (7-day treatment), 28 July (7- and 14-day treatments), 4 August (7-day treatment), 11 August (7- and 14-day treatments), 18 August (7-day treatment)
- ⁵ ALT = Alternation treatment where treatment 1 (2017 Anth Prog #17) consisted of PF 1A LC (concentrate contains: 16-0-7 (8.0 oz), 4-20-22 (4.0 oz), Impulse (4.0 oz), Kelp Plant (6.0 oz), and FloThru A+ (0.7 oz)) + Primo 1ME (0.05 fl oz) applied on 19 May, 2 June, 16 June, 30 June, 14 July, 28 July, and 11 August, and PF 1B LC (concentrate contains: Calcium Nitrate (6.0 oz), Mg Nitrate (6.0 oz), Sugar Cal (4.0 oz), Omega (1.5 oz), Impulse (4.0 oz), 6 Iron (3.0 oz), and FloThru (0.07 oz)) + Primo 1ME (0.05 fl oz) applied on 26 May, 9 June, 23 June, 7 July, 21 July, 4 August, and 18 August
- ⁶ ALT = Alternation treatment where treatment 2 (2017 Anth Prog #18) consisted of PF 2A LC (concentrate contains: 16-0-7 (8.0 oz), 4-20-22 (4.0 oz), Impulse (4.0 oz), Kelp Plant (6.0 oz), Hydration A+ (0.07 oz), Green Blade (0.35 oz)) + Primo 1ME (0.05 fl oz) applied on 19 May, 2 June, 16 June, 30 June, 14 July, 28 July, and 11 August, and PF 2B LC (concentrate contains: Calcium Nitrate (6.0 oz), Mg Nitrate (6.0 oz), Sugar Cal (4.0 oz), Omega (1.5 oz), Impulse (4.0 oz), 6 Iron (3.0 oz), Hydration (0.07 oz)) + Primo 1ME (0.05 fl oz) applied on 26 May, 9 June, 23 June, 7 July, 21 July, 4 August, and 18 August
- ⁷ VAR = Variable spray schedule where treatment 3 (2017 Anth Prog #19) consisted of PF 3 LC (concentrate contains 29-0-0 50% (6.0 oz), 4-20-22 (4.0 oz), Impulse (3.0 oz), Kelp Plant (3.0 oz), Green Blade (0.35 oz)) + Primo 1ME (0.075 fl oz) applied on 19 May, 26 May, and 2 June, and PF 3 LC (concentrate contained 29-0-0 50% (6.0 oz), 4-20-22 (4.0 oz), Impulse (3.0 oz), Kelp Plant (3.0 oz), Green Blade (0.35 oz)) + Primo 1ME (0.075 fl oz) + Greenblade LC (0.13 fl oz) + Hydration A+ (0.7 fl oz) applied on 9 June, 16 June, 23 June, 30 June, 7 July, 14 July, 21 July, 28 July, 4 August, 11 August, and 18 August
- ⁸ Treatment 13 was applied on 23 June and 7 July
- ⁹ Treatment 14 consisted of Crossover G (15 lb) applied on 23 June and 7 July and Banner Maxx 1.3ME (1.5 fl oz) applied on 23 June, 7 and 21 July, and 4 and 18 August
- ¹⁰ Treatment 15 consisted of Banner Maxx 1.3ME (1.5 fl oz) applied on 23 June, 7 and 21 July, and 4 and 18 August
- ¹¹ INT = Spray interval in days
- ¹² DAT = Days after the last treatment