

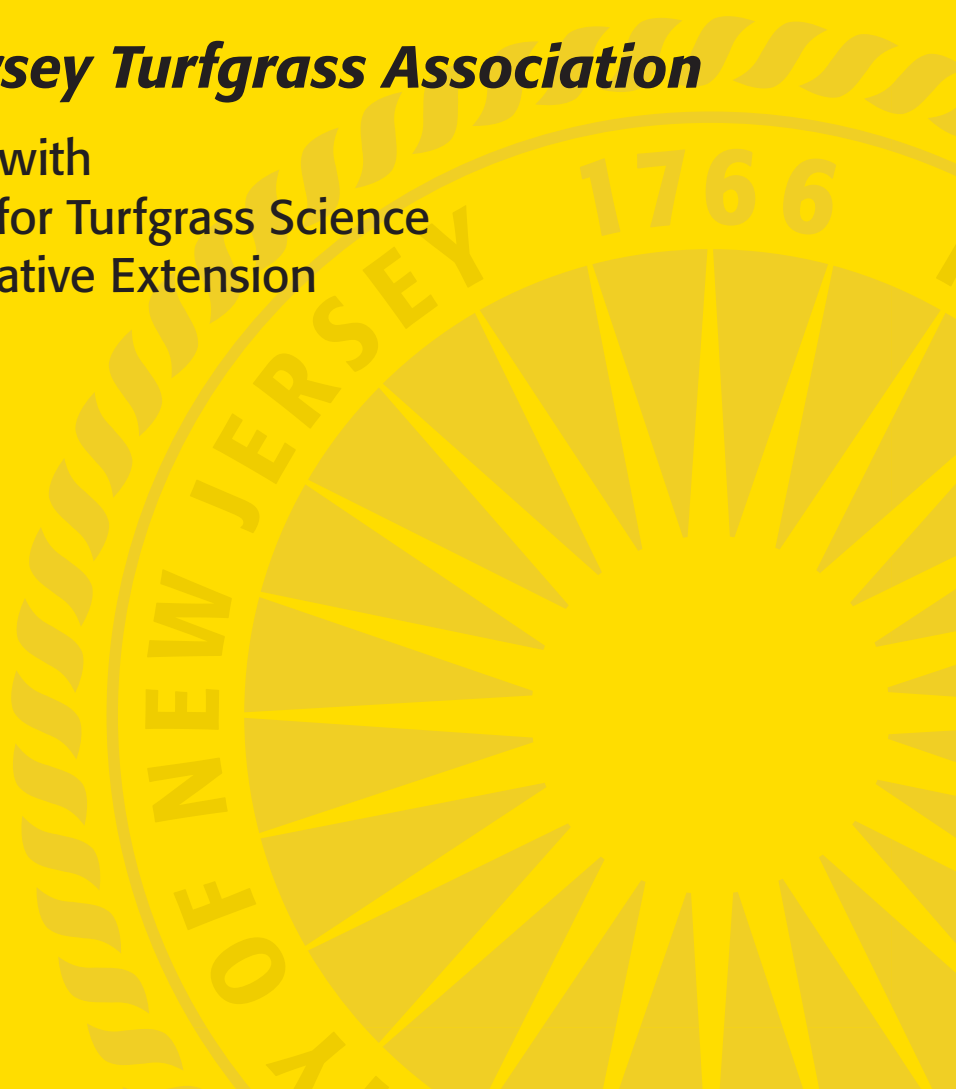
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The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State 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 2006 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

IMPACT OF FUNGICIDES AND FERTILIZERS FOR THE CONTROL OF SUMMER PATCH ON KENTUCKY BLUEGRASS

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Fungicides were evaluated in 2006 for their ability to control summer patch (caused by *Magnaporthe poae*) on Kentucky bluegrass (*Poa pratensis* cv. Baron) at the Rutgers Turf Research Farm in North Brunswick, New Jersey. Turf was established in September 2002 on a Norton loam soil with a pH of 6.2. Mowing was performed two times weekly at a height of 1.5 inches with clippings returned. The site was irrigated as needed to prevent drought stress and to encourage disease.

Fertilizer was applied as 15-0-0 (0.75 lb nitrogen (N)/1000 ft²) on 31 May. Dimension 0.15G (32 oz/A) was applied on 20 April for pre-emergence weed control. Broadleaf weeds were controlled with Trimec Classic 1.3L (1.5 fl oz/1000 ft²) on 20 April and Drive 75DF (1 lb/A) on 22 August. Insect pests were suppressed with Merit 75WSP (0.16 oz/1000 ft²) on 29 June. Yellow nutsedge was controlled with Manage 75WG (1.0 oz/A) on 14 June and 22 August. Plots were 3 x 9 ft and treatments were arranged in a randomized complete block with four replications. Turf on the site was inoculated on 15 May 2004 by removing 3-inch wide x 3-inch deep sod cores with a cup cutter, placing 25 cc of oat grain infested with *Magnaporthe poae* isolate OAK A-5 into each hole, replacing the cores, and irrigating the site to encourage rooting. Three inoculations (1.5 ft apart) were made per plot.

Fungicides were applied in water equivalent to 4 gal/1000 ft² with a CO₂ powered sprayer at 30 psi using TeeJet 8003VS flat fan nozzles. Treatments (trt) were initiated on 30 May when the maximum soil temperature at a 2-inch depth exceeded 65 °F for five consecutive days. Fungicides were reapplied at the appropriate intervals as indicated in Table 1. Turf area exhibiting foliar summer patch symptoms was

assessed as a disease severity index (DSI) on 14 and 24 July, 4, 14, and 24 August, and 7 September. The DSI was calculated by multiplying the patch diameter of each infection center by the disease intensity of that patch. Disease intensity was assessed on a 0 to 3 scale, where 0 = no visual foliar necrosis, 1 = 1 to 33% necrotic foliage, 2 = 34 to 66% necrotic foliage, and 3 = 67 to 100% necrotic foliage. Patch diameter was recorded as the mean of two perpendicular measurements per infection center. Disease severity values were averaged for each plot. Turf quality was rated on 18 August using a 1 to 9 scale, where 9 = best turf quality and 6 = acceptable quality. Data were subjected to analysis of variance and means were separated by Waller-Duncan *k*-ratio *t*-test (*k* = 100).

Summer patch symptoms were first noticed on 10 July and became uniform throughout the study by 24 July (Table 1). The DSI for untreated turf in the study (trt 44) ranged from 20 to 49, which was considered a moderate to severe summer patch infestation, respectively. A DSI of less than 17 represented an acceptable level of disease control. Due to the severity of this summer patch epidemic, only 14% of the treatments in the trial provided excellent disease control throughout the evaluation period (14 July to 7 September; 30 to 44 DAT [days after the last treatment was applied]). These products included Insignia 20WG + Propiconazole Pro 1.3MC (trt 2), CL-EXP-9 (trt 23), Headway 1.39EC @ 2.25 fl oz every 28 days (trt 25), Heritage 50WG @ 0.4 oz every 28 days (trts 35 and 36), and RU21196A-06 (0.66 fl oz) + RU21196B-06 (0.69 oz) every 28 days (trt 40) and consisted of QoI, DMI, and experimental fungicides. Good residual activity was also observed (16 to 30 DAT) for Heritage 50WG @ 0.2 oz every 14 days (trt 16), Disarm 480SC @ 0.36 fl oz every 28 days (trt

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17), Headway 1.39EC @ 1.5 fl oz every 14 days (trt 24), RU21196A-06 (0.44 fl oz) + RU21196B-06 (0.46 oz) every 28 days (trt 39), and RU21196C-06 (trts 42 and 43). Disarm 480SC + Banner MAXX 1.3ME + TM-90109 (trt 20) and Banner MAXX 1.3ME @ 4.0 oz every 28 (trt 26) or 2.0 oz every 14 days (trt 31), respectively, also provided good control during the application period (30 May to 8 August).

Post treatment irrigation (trts 34 and 35) did not enhance efficacy. One curative application of ammonium sulfate @ 0.2 lb N/1000ft² on 18 July reduced disease severity on 4 August (17 DAT) compared to the untreated check (trt 44), but not after that date. Daconil Ultrex 82.5WDG @ 3.2 oz every 14 days (trt 27) did not intensify summer patch in this study.

All treatments exhibited acceptable (> 6.0) turfgrass quality on 17 August except for 3336 Plus 19.4F @ 6.0 fl oz every 21 days (trt 21) and Daconil Ultrex 82.5WDG @ 3.2 oz every 14 days (trt 27). No phytotoxicity was observed.

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The authors thank Mr. Bill Dickson and Joseph Clark and their staff for assistance in conducting and maintaining this field study. This work was supported by the New Jersey Agricultural Experiment Station, Rutgers Center for Turfgrass Science, and private grants.

Table 1. Impact of fungicides and fertilizers for the control of summer patch on Kentucky bluegrass: New Brunswick, NJ, 2006.

Treatment	Rate per 1000 sq ft)	Spray Interval (days) ³	Disease Severity Index ¹					Turf Quality ² 18 Aug.	
			14 July	24 July	4 Aug.	14 Aug.	24 Aug.		7 Sept.
1 Insignia 20WG	0.9 oz	28	3.1 a-c	6.9 a-g	17.4 b-j	26.1 e-j	29.5 a-k	28.6 a-c	7.5 c-e
2 Insignia 20WG + Propiconazole Pro	0.5 oz								
1.3MC	1.0 fl oz	28	3.7 a-c	4.3 a-e	14.3 a-h	14.7 a-g	12.0 a-e	16.3 a-c	8.0 c-e
3 V-10116 50WDG	0.18 oz	14	5.2 a-c	8.8 a-h	19.3 b-k	22.7 c-i	23.8 a-j	28.3 a-c	7.5 c-e
4 V-10116 50WDG	0.37 oz	14	5.3 a-d	6.8 a-g	15.3 a-i	21.8 b-i	22.2 a-i	22.0 a-c	8.3 c-e
5 V-10190 2FL	0.26 fl oz	14	8.5 a-e	11.1 a-h	27.5 f-l	38.0 i-m	40.4 e-l	32.2 a-c	7.0 b-d
6 V-10190 2FL	0.52 fl oz	14	7.3 a-e	11.6 a-h	30.1 h-l	42.6 j-m	37.8 d-l	26.6 a-c	7.8 c-e
7 V-10190 2FL	0.78 fl oz	14	4.9 a-c	10.5 a-h	27.4 f-l	36.6 h-m	35.1 c-l	26.1 a-c	7.3 b-e
8 RU42116A-06	0.5 fl oz	14	6.7 a-d	8.9 a-h	19.0 b-k	24.1 c-i	27.0 a-k	26.5 a-c	8.8 de
9 RU42116A-06	0.5 fl oz	28	8.1 a-e	12.5 b-h	28.6 g-l	29.8 g-k	35.3 c-l	25.3 a-c	8.3 c-e
10 RU42116A-06	1.0 fl oz	14	6.3 a-d	12.7 c-h	19.7 b-k	20.5 b-i	24.8 a-j	18.7 a-c	8.8 de
11 RU42116A-06	1.0 fl oz	28	10.7 b-e	17.2 f-i	22.8 d-k	25.8 d-j	39.4 d-l	45.3 c	8.3 c-e
12 RU42116A-06	2.0 fl oz	14	3.0 a-c	7.7 a-g	19.4 b-k	30.4 g-k	33.1 b-l	17.2 a-c	8.0 c-e
13 RU42116A-06	2.0 fl oz	28	17.1 e	26.2 i	24.8 e-l	26.3 e-j	48.2 i-l	42.9 bc	8.3 c-e
14 RU42116B-06	0.417 oz	14	3.6 a-c	8.5 a-h	15.3 a-i	20.3 b-i	25.2 a-j	23.7 a-c	8.5 c-e
15 RU42116C-06	0.417 oz	14	12.0 c-e	20.0 hi	34.6 kl	37.8 i-m	43.4 g-l	46.0 c	8.8 de
16 Heritage 50WG	0.2 oz	14	0.8 ab	2.9 a-d	9.2 a-e	15.2 a-g	15.6 a-g	28.8 a-c	8.5 c-e
17 Disarm 480SC	0.36 fl oz	28	2.2 a-c	6.5 a-g	12.8 a-g	19.9 b-i	16.1 a-g	28.6 a-c	8.3 c-e
18 Disarm 480SC	0.18 fl oz								
+ Banner MAXX 1.3ME	1.0 fl oz	28	2.5 a-c	11.3 a-h	21.3 c-k	31.7 g-l	35.3 c-l	34.9 a-c	8.0 c-e
19 Disarm 480SC	0.27 fl oz	28	4.1 a-c	10.8 a-h	24.4 e-k	30.8 g-l	35.8 c-l	37.1 a-c	7.8 c-e
+ Banner MAXX 1.3ME	1.0 fl oz								
+ TM-90109	4.0 fl oz	28	0.7 ab	3.3 a-e	7.2 a-d	19.3 a-h	14.1 a-f	4.9 a	8.0 c-e
21 3336 Plus 19.4F	6.0 fl oz	21	6.1 a-d	9.8 a-h	28.6 g-l	46.2 k-m	51.8 j-l	44.3 c	5.8 ab
22 3336 Plus 19.4F	8.0 fl oz	21	4.0 a-c	9.0 a-h	21.5 c-k	31.8 g-l	35.3 c-l	15.5 a-c	8.5 c-e
23 CL-EXP-9	1.2 oz	21	0.0 a	2.2 a-c	4.4 ab	9.3 a-e	10.8 a-d	6.0 a	7.5 c-e
24 Headway 1.39EC	1.5 fl oz	14	0.0 a	0.8 ab	6.5 a-c	6.5 a-c	7.0 a-c	26.5 a-c	8.3 c-e

(Continued)

Table 1 (continued).

Treatment	Rate per 1000 sq ft)	Spray Interval (days) ³	Disease Severity Index ¹					Turf Quality ² 18 Aug.	
			14 July	24 July	4 Aug.	14 Aug.	24 Aug.		7 Sept.
25 Headway 1.39EC	2.25 fl oz	28	1.3 ab	0.0 a	4.3 dab	3.9 ab	5.1 ab	7.8 a	8.8 de
26 Banner MAXX 1.3ME	4.0 fl oz	28	0.8 ab	1.8 a-c	11.1 a-e	19.2 a-h	24.0 a-j	10.3 ab	8.0 c-e
27 Daconil Ultrex 82.5WDG	3.2 oz	14	15.3 de	17.9 g-i	31.3 i-l	53.8 m	61.5 l	37.3 a-c	4.8 a
28 Ammonium Sulfate									
21:0:0	0.2 lb N	Cur/Once ⁴	6.2 a-d	9.0 a-h	23.2 d-k	32.1 g-l	42.2 f-l	22.3 a-c	6.8 b-c
29 Rutgers Program #1	—	Var ⁶	2.8 a-c	3.0 a-d	10.0 a-e	22.1 b-i	24.2 a-j	26.0 a-c	7.5 c-e
30 Banner MAXX 1.3ME	1.0 fl oz	28	5.6 a-d	15.0 e-i	31.1 i-l	45.6 k-m	47.8 i-l	31.3 a-c	8.3 c-e
31 Banner MAXX 1.3ME	2.0 fl oz	14	4.0 a-c	4.3 a-e	10.3 a-e	18.1 a-g	15.8 a-g	20.0 a-c	8.5 c-e
32 Banner MAXX 1.3ME	3.0 fl oz	21	0.9 ab	3.3 a-e	10.3 a-e	17.3 a-g	54.8 kl	20.7 a-c	8.3 c-e
33 Chipco 26GT 2SC	4.0 fl oz	14	5.0 a-c	10.8 a-h	21.1 c-k	25.1 d-j	32.6 b-l	35.5 a-c	7.0 b-d
34 Banner MAXX 1.3ME	4.0 fl oz	28 ⁶	0.8 ab	5.0 a-e	11.7 a-f	18.8 a-h	22.6 a-j	18.5 a-c	8.8 de
35 Heritage 50WG	0.4 oz	28 ⁶	0.0 a	0.0 a	0.8 a	1.4 a	1.1 a	7.8 a	8.0 c-e
36 Heritage 50WG	0.4 oz	28	0.0 a	0.0 a	4.5 ab	7.4 a-d	5.7 ab	8.9 a	8.5 c-e
37 RU21196A-06	0.53 fl oz	28	2.8 a-c	6.0 a-f	14.6 a-h	15.8 a-g	17.9 a-h	23.8 a-c	8.5 c-e
38 RU21196A-06	0.88 fl oz	28	6.3 a-d	14.3 d-h	31.8 j-l	38.3 i-m	45.4 h-l	36.3 a-c	8.3 c-e
39 RU21196A-06	0.44 fl oz								
+ RU21196B-06	0.46 oz	28	0.6 a	1.0 a-c	6.2 a-c	8.4 a-e	7.1 a-c	17.9 a-c	8.0 c-e
40 RU21196A-06	0.66 fl oz								
+ RU21196B-06	0.69 oz	28	0.0 a	2.7 a-d	9.7 a-e	14.8 a-g	13.0 a-f	16.5 a-c	8.8 de
41 RU21196A-06	0.88 fl oz								
+ RU21196B-06	0.92 oz	28	1.6 ab	4.3 a-e	16.4 a-j	28.0 f-k	32.3 b-l	23.0 a-c	9.0 e
42 RU21196C-06	0.83 oz	28	0.0 a	2.8 a-d	10.1 a-e	16.1 a-g	15.6 a-g	26.7 a-c	8.0 c-e
43 RU21196C-06	1.1 oz	28	0.5 a	3.0 a-d	9.5 a-e	11.3 a-f	16.2 a-g	19.8 a-c	8.3 c-e
44 Untreated Check	—	—	8.3 a-e	19.8 hi	40.6 l	49.1 lm	46.5 h-l	37.8 a-c	7.3 b-e

INT ⁷	DAT ⁸	DAT	DAT	DAT	DAT	DAT	DAT	DAT
Once	—	6	17	27	37	51	31	
14	3	13	10	6	16	30	10	
21	3	13	3	13	23	37	17	
28	17	27	10	20	30	44	24	

(Continued)

Table 1 (continued).

- 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 ($k=100$). All fungicides were applied in 4.0 gal H₂O/1000 sq ft with a CO₂ compressed air sprayer, T-Jet nozzle 8003E, at 30 psi. Disease severity index = patch diameter x disease intensity. Disease intensity was rated on a 0 to 3 scale, where 0 = no visual foliar necrosis, 1 = 1 to 33% necrotic foliage, 2 = 34 to 66% necrotic foliage, and 3 = 67 to 100% necrotic foliage. Patch diameter was recorded as the mean of two perpendicular measurements per infection center. Three locations were inoculated per 3 X 9 ft replicate plot with *Magnaporthe poae* isolate OAK A-5 on 15 May 2004. Disease severity values were averaged for each plot.
- ² Turf quality on a 1 to 9 scale, where 9 = best turf quality and 6 = commercially acceptable quality.
- ³ Fungicides were applied on 30 May (all treatments), 13 June (14-day treatment), 20 June (21-day treatment), 27 June (14- and 28-day treatments), 11 July (14- and 21-day treatments), 25 July (14- and 28-day treatments), 1 August (21-day treatment), and 8 August (14-day treatment).
- ⁴ Treatment 28 was applied once on a curative basis on 18 July in 20 gal water/1,000 sq ft.
- ⁵ Variable application schedule, where treatment 29 (Rutgers Program #1) received Banner MAXX 1.3 ME (4.0 fl oz) on 30 May, Heritage TL 0.8 ME (1.0 fl oz) + Cleary 3336 4F (4.0 fl oz) on 27 June, Chipco 26GT 2SC (4.0 fl oz) + Banol 6SC (2.0 fl oz) on 11 July, Cleary 3336 4F (6.0 fl oz) + Chipco Signature 80WG (4.0 oz) on 25 July, and Banner MAXX 1.3ME (2.0 fl oz) + Subdue MAXX 2ME (1.0 fl oz) + Heritage TL 0.8ME (1.0 fl oz) on 8 August.
- ⁶ Treatments 34 and 35 were applied to wet foliage (0.1 gal/plot) and then irrigated immediately with 1 gal water/plot.
- ⁷ Spray interval in days.
- ⁸ Days after the last treatment.



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