

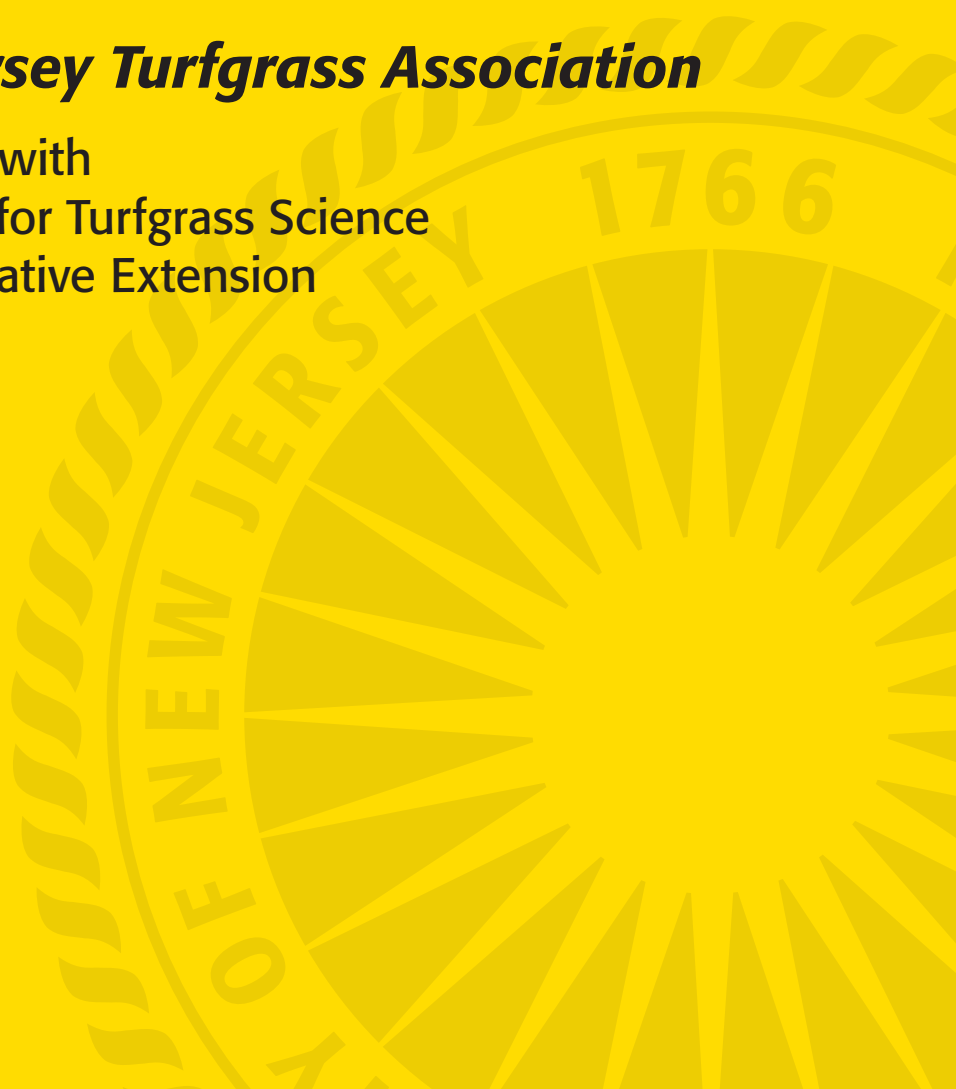
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The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State 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 2008 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

INFLUENCE OF FUNGICIDES AND BIORATIONAL PRODUCTS ON THE DEVELOPMENT OF SUMMER PATCH IN KENTUCKY BLUEGRASS, 2007

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Fungicides were evaluated in 2007 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, NJ. Turf was established in September 2002 on a Norton loam soil with a pH of 6.1. 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 (0.8 lb nitrogen (N)/1000 ft²) on 26 April. Dimension 1E (28 fl oz/A) and Dimension 40WP (6.3 fl oz/A) were applied on 10 May and 27 June, respectively, for pre-emergence weed control. Broadleaf weeds were controlled with Trimec Classic 1.3L (1.5 fl oz/1000 ft²) and Drive 75DF (1 lb/A) on 14 June. Insect pests were suppressed with Merit 75WSP (0.185 oz/1000 ft²) on 27 June. Yellow nutsedge was controlled with Manage 75WG (1.0 oz/A) on 15 July. 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 diameter x 3-inch deep circular sod cores with a cup cutter, placing 25 cc of oat grains infested with *M. 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 symptoms of summer patch was assessed as a disease severity index (DSI) on 25 July, 9 and 22 August, and 4, 17, and 26 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 4 September using a 1 to 9 scale, where 9 = best turf quality and 5 = 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 15 July and became uniform throughout the study by 25 July (Table 1). The epidemic peaked at a DSI of 87 for untreated turf (trt 40) on 4 September, which was considered a severe summer patch infestation. ADSI of less than 17 represented an acceptable level of disease control. All products in this study provided good to excellent disease control throughout the treatment period (30 May to 8 August), except for Bayleton 4SC (trt 7) and Lynx 2SC (trt 8) applied twice @1.5 fl oz, 3336 Plus 19.4F (trt 19), CI EXP8 50WP (trt 22), LEM17 20SC (trt 23), and LEM17 50WDG (trts 24 to 26). Bayleton 4SC, Lynx 2SC, and Tartan II 2SC were more efficacious on several rating dates when applied three (trts 2 to 4) than two times (trts 7 to 9), respectively, during the study.

Good residual activity was observed on 22 August (14 to 28 days after the last application) for Tartan

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2.4SC (trts 1, 6), Insignia 20WG + Trinity 1.67SC (trt 16), 3336 4F (trt 20), and LEM17 50WDG + DPXYT669 22.5SC (trt 27). Season-long control of summer patch (30 May to 26 September) was afforded turf sprayed with Bayleton 4SC (trt 2), Lynx 2SC (trt 3), Tartan II 2SC (trts 4, 9), Disarm 480SC (trt 11), ARY 0534001 SC + Disarm 480SC (trt 12), Tourney 50WDG @ 0.37 oz (trt 13), Insignia 20WG @ 0.9 oz (trt 15) or 0.5 oz (trt 18), Trinity 1.67SC (trt 17), CL EXP9 WG (trt 21), Heritage TL 0.8ME @ 1.0 oz every 14 days (trt 29) or 1.5 oz every 21 days (trt 36), or Headway 1.39EC @ 1.5 fl oz every 14 days (trt 30). Headway 1.39EC @ 2.0 fl oz every 28 days (trts 5, 10), Tourney 50WDG @ 0.44 oz (trt 14), Banner MAXX 1.3ME (trt 31), and Heritage TL 0.8ME @ 2.0 oz every 28 days (trt 29) also adequately suppressed

this disease through 26 September with only a slight reduction in control (DSI > 17) when activity peaked on 4 September.

One curative application of ammonium sulfate @ 0.2 lb N/1000 ft² on 1 August (trt 32) reduced disease severity on 22 August and 4 September, and Daconil Ultrex 82.5WDG @ 3.2 oz every 14 days (trt 34) intensified summer patch by the end of the study (17 and 26 September) compared to untreated turf.

Turf quality was acceptable (greater or equal to 5.0) for all entries in this study on 29 August (Table 1C) and was inversely associated with summer patch severity. No phytotoxicity was observed for any of the products evaluated.

Table 1. Efficacy of selected fungicides and fertilizers for the control of summer patch on Kentucky bluegrass: Rutgers University, 2007.

Treatment	Rate per 1000 sq ft)	Spray Interval (days) ³	Disease Severity Index ¹						Turf Quality ² 4 Sept.
			25 July	9 Aug.	22 Aug.	4 Sept.	17 Sept.	26 Sept.	
1 Tartan 2.4SC	2.0 fl oz	28 ⁴	3.7 be	14.4 dh	7.4 fl	29.4 ei	17.3 go	9.6 ei	7.0 ae
2 Bayleton 4SC	1.5 fl oz	28 ⁴	3.7 be	10.6 dh	3.8 il	16.7 ho	10.9 lq	5.9 gi	7.5 ac
3 Lynx 2SC.....	1.5 fl oz	28 ⁴	3.9 be	5.8 eh	3.3 jl	7.6 np	7.9 mq	4.7 gi	8.0 a
4 Tartan II 2SC	2.0 fl oz	28 ⁴	3.3 be	5.3 eh	3.1 jl	13.3 jp	11.3 lq	7.1 gi	6.0 cf
5 Headway 1.39EC.....	2.0 fl oz	28 ⁴	5.7 be	11.6 dh	4.5 il	18.5 ho	11.2 lq	7.9 gi	6.8 af
6 Tartan 2.4SC	2.0 fl oz	28 ^{4,5}	5.9 ae	15.5 dh	9.9 el	24.6 gl	26.1 dj	18.9 cg	7.0 ae
7 Bayleton 4SC	1.5 fl oz	28 ^{4,5}	14.1 ad	25.2 bd	21.6 ce	41.5 bf	36.8 ce	26.3 bc	5.5 ef
8 Lynx 2SC.....	1.5 fl oz	28 ^{4,5}	9.5 ae	19.5 cg	12.3 el	27.3 fj	29.6 dh	13.9 ci	6.0 cf
9 Tartan II 2SC	2.0 fl oz	28 ^{4,5}	2.5 be	10.6 dh	4.7 hl	11.0 kp	12.7 iq	10.2 ei	6.5 af
10 Headway 1.39EC.....	2.0 fl oz	28 ^{4,5}	7.3 ae	13.7 dh	10.2 el	26.0 gk	14.8 ip	5.5 gi	6.3 bf
11 Disarm 480SC.....	0.36 fl oz	28	0.6 de	2.2 gh	1.6 kl	7.1 np	4.7 oq	2.3 hi	6.3 bf
12 ARY 0534001 SC.....	0.35 fl oz								
+ Disarm 480SC.....	0.1 fl oz	28	0.8 ce	5.6 eh	3.6 il	11.8 kp	4.5 oq	1.4 hi	6.5 af
13 Tourney 50WDG	0.37 oz	14	2.7 be	12.3 dh	6.9 fl	11.9 jp	13.5 iq	0.0 i	7.0 ae
14 Tourney 50WDG	0.44 oz	14	4.6 be	11.4 dh	9.6 el	21.7 gn	10.8 lq	5.6 gi	7.0 ae
15 Insignia 20WG	0.9 oz	28	1.0 ce	9.0 dh	5.7 gl	16.4 ho	16.8 ho	10.8 di	6.8 af
16 Insignia 20WG	0.5 oz								
+ Trinity 1.67SC	1.0 fl oz	28	5.7 be	13.0 dh	10.8 el	34.8 eg	22.3 fm	16.3 ch	6.5 af
17 Trinity 1.67SC	1.0 fl oz	28	4.7 be	7.4 dh	6.1 gl	14.1 ip	8.7 lq	1.9 hi	7.3 ad
18 Insignia 20WG	0.5 oz	14	4.2 be	11.3 dh	7.7 fl	12.4 jp	11.6 kq	4.9 gi	7.8 ab
19 3336 Plus 19.4F.....	6.0 fl oz	21	11.0 ae	24.9 bd	19.2 cf	29.7 eh	22.6 el	19.5 cg	5.8 df
20 3336 4F.....	6.0 fl oz	21	0.9 ce	13.6 dh	7.0 fl	23.3 gm	23.0 el	8.4 ei	7.0 ae
21 CL EXP9 WG	1.2 oz	21	0.5 de	3.2 fh	1.7 kl	3.2 op	0.0 q	0.0 i	7.0 ae
22 CL EXP8 50WP.....	4.0 oz	21 ⁶	5.9 ae	20.3 cg	16.4 ei	42.7 be	31.4 cg	13.9 ci	6.8 af
23 LEM17 20SC.....	0.47 fl oz	14	7.5 ae	21.6 bf	17.6 dh	35.8 cg	29.4 dh	13.8 ci	6.3 bf
24 LEM17 50WDG	0.2 oz	14	10.5 ae	21.4 bf	14.9 ej	30.5 eh	26.7 di	13.3 ci	6.5 af
25 LEM17 50WDG	0.3 oz	14	14.3 ac	23.2 be	18.4 cg	35.2 dg	25.6 dk	15.8 ch	6.8 af
26 LEM17 50WDG	0.4 oz	14	10.9 ae	18.2 ch	13.8 ek	29.0 ei	27.0 di	12.3 ci	6.5 af
27 LEM17 50WDG	0.2 oz								
+ DPXYT669 22.5SC	0.28 fl oz	14	6.8 ae	10.8 dh	6.5 fl	24.9 gl	19.5 gn	12.6 ci	7.5 ac

(Continued)

Table 1 (continued).

Treatment	Rate per 1000 sq ft)	Spray Interval (days) ³	Disease Severity Index ¹						Turf Quality ² 4 Sept.
			25 July	9 Aug.	22 Aug.	4 Sept.	17 Sept.	26 Sept.	
28 DPXYT669 22.5SC	0.28 fl oz	14	4.8 be	17.1 ch	11.5 el	26.0 gk	26.2 dj	14.3 ci	6.8 af
29 Heritage TL 0.8ME	1.0 fl oz	14	3.2 be	3.9 fh	2.8 jl	10.5 lp	4.4 oq	1.3 hi	7.0 ae
30 Headway 1.39EC	1.5 fl oz	14	0.0 e	0.0 h	0.0 l	0.5 p	0.0 q	0.0 i	7.0 ae
31 Banner MAXX 1.3ME	4.0 fl oz	28	4.6 be	13.0 dh	4.9 hl	18.3 ho	12.2 jq	3.1 hi	6.3 bf
32 Ammonium Sulfate 21-0-0	0.2 lb	CUR ⁷	12.8 ae	20.9 cg	13.0 el	34.2 eg	34.9 cf	14.5 ci	7.0 ae
33 Rutgers SP Program #1	—	Var ⁸	2.8 be	4.8 eh	3.7 il	8.1 mp	1.8 pq	0.6 i	7.5 ac
34 Daconil Ultrex 82.5WDG	3.2 oz	14	6.7 ae	52.1 a	52.9 a	82.3 a	84.5 a	80.3 a	5.3 f
35 Heritage TL 0.8ME	2.0 fl oz	28	2.5 be	6.5 dh	2.6 jl	18.0 ho	7.3 nq	3.2 hi	6.5 af
36 Heritage TL 0.8ME	1.5 fl oz	21	0.6 de	3.3 fh	3.3 jl	11.7 kp	3.1 oq	2.1 hi	6.5 af
37 Untreated Check	—	—	9.3 ae	21.8 bf	21.6 ce	50.8 bc	44.3 bc	23.1 be	5.8 df
38 Untreated Check	—	—	12.4 ae	40.2 ab	30.9 bc	55.2 b	45.3 bc	25.8 bd	5.8 df
39 Untreated Check	—	—	15.1 ab	34.5 ac	30.3 bd	50.3 bd	38.4 cd	22.2 bf	5.5 ef
40 Untreated Check	—	—	19.5 a	44.2 a	43.1 ab	87.3 a	54.3 b	36.8 b	5.5 ef
		INT ⁹	DAT ¹⁰	DAT	DAT	DAT	DAT	DAT	DAT
		Once	—	8	21	34	47	56	34
		14	14	1	14	27	40	49	27
		21	14	8	21	34	47	56	34
		28	28	15	28	41	54	63	41

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 per 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 5 = commercially acceptable quality.

(Continued)

Table 1 (continued).

- ³ Fungicides were applied on 30 May (all treatments, except treatments 6 to 10), 13 June (14-day treatment, and trts 6 to 10), 20 June (21-day treatment), 27 June (14- and 28-day treatments), 11 July (14- and 21-day treatments, and trts 6 to 10), 25 July (14- and 28-day treatments), 1 August (21- day treatment and treatment 32), and 8 August (14- day treatment).
- ⁴ Treatments 1 to 10 were irrigated immediately after application with 0.5 gal water per plot.
- ⁵ Treatments 6 to 10 were only applied on 13 June and 11 July.
- ⁶ CLEXP8 (treatment 22) was applied as a 25WP on 30 May and as a 50WP from 20 June to 1 August.
- ⁷ Treatment 32 was applied once on a curative basis on 1 August in 20 gal water per 1,000 sq ft.
- ⁸ Variable application schedule, where treatment 33 (Rutgers SP Program #1) received Banner MAXX 1.3 ME (2.0 fl oz) on 30 May, Insignia 20WG (0.5 oz) on 13 June, 3336 Plus 19.4F (6.0 fl oz) + Banol 6SC (2.0 fl oz) on 27 June, Chipco Signature 80WG (4.0 oz) + Lynx 2SC (1.5 fl oz) on 11 July, Heritage TL 0.8ME (1.0 fl oz) on 25 July, and 3336 Plus 19.4F (6.0 fl oz) + Subdue MAXX 2ME (1.0 fl oz) on 8 August.
- ⁹ Spray intervals in days.
- ¹⁰ Days after treatment (DAT) for each spray interval.



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