

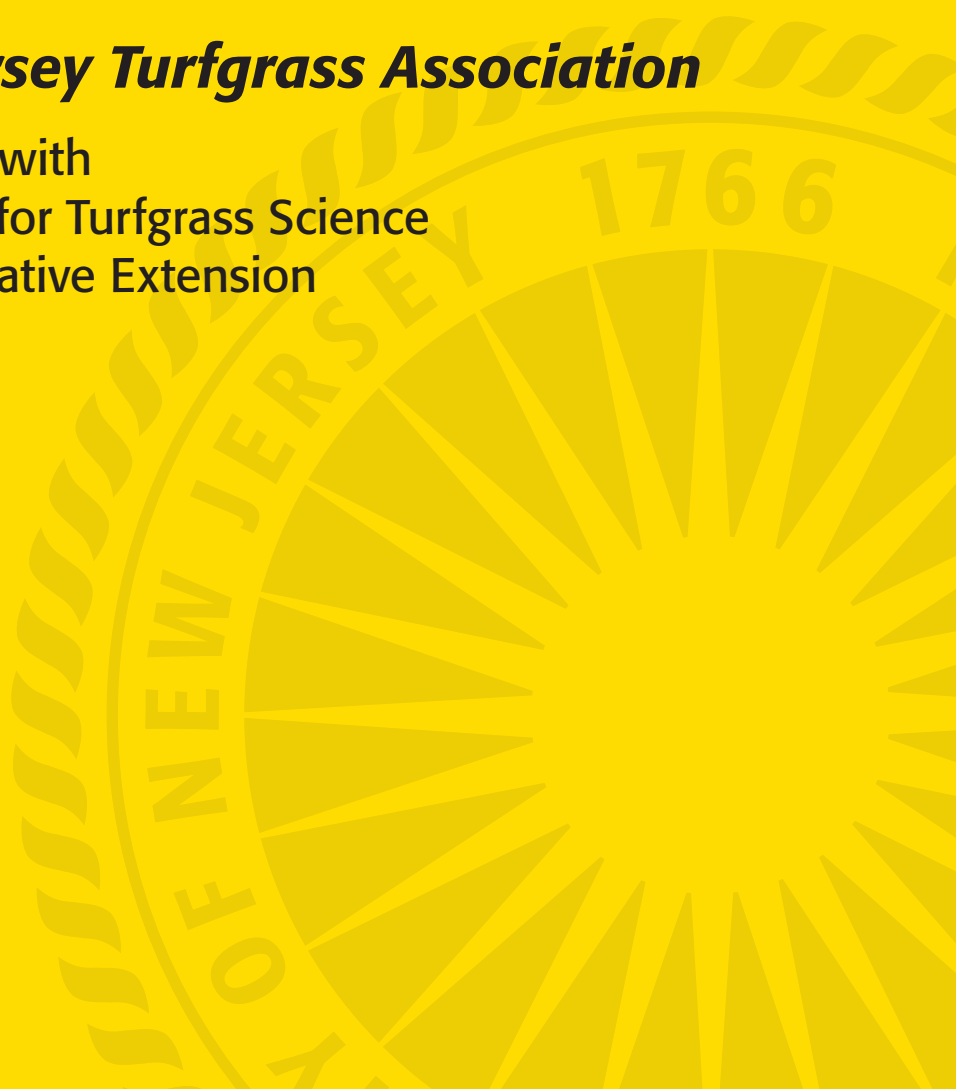
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The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State 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 2010 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
Dr. Bruce B. Clarke, Coordinator

EVALUATION OF GRANULAR AND FOLIAR APPLIED FUNGICIDES ON THE DEVELOPMENT OF BROWN PATCH ON A TALL FESCUE LAWN, 2009

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Fungicides were evaluated in 2009 for their ability to control brown patch (caused by *Rhizoctonia solani*) on tall fescue (*Festuca arundinacea* cv. Barlexus) at the Plant Science Research and Extension Farm in Adelphia, NJ. The study was established in September 2006 on a Freehold sandy loam with a pH of 6.1. Turf was mowed twice a week at a height of 2.5 inches and clippings were returned. The site was irrigated as needed to prevent drought stress and encourage disease.

Fertilizer was applied as 16-4-8 (0.75 lb nitrogen (N)/1000 ft²) on 13 April and 26 June. Lime (2000 lb/A) was broadcast over the site on 27 April. Dimension 1E (1.5 pt/A) was applied for pre-emergence weed control on 17 April. The site was inoculated with three isolates of *R. solani* (i.e., COBGBP1, COBGBP2, and Rh76) on 25 June using 0.2 g/m² of oat-infested inoculum from each isolate. Plots were 3 x 9 ft and were arranged in a randomized complete block with four replications.

Products 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 9 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 7, 16, and 24 July and 5, 17, and 27 August, and the number of lesion centers infested with dollar spot (caused by *Sclerotinia homoeocarpa*) on 5 and 27 August. Turf quality was rated on 16 July and 17 and 27 August 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 using the Waller-Duncan *k*-ratio *t*-test (*k* = 100).

Brown patch was first observed on 1 July and became uniform throughout the study by 7 July (Table 1A). Disease severity ranged from 17 to 84% turf area infested with *R. solani* on untreated turf, which was considered a moderate to severe level of brown patch infestation, respectively (Table 1A). Less than 10% turf area infested per plot represented an acceptable level of disease control. All treatments in the study provided acceptable control of brown patch through 24 July when disease severity was moderate (17 to 20% turf area infested on untreated turf), except for Heritage G 0.31G @ 4.0 lb every 35 days (trt 12) and Endorse 2.5W (trt 28). Under more severe disease pressure (84% turf area infested on untreated turf), only A17630 0.96G @ 4.0 lb (trt 4), Headway 1.39EC @ 2.0 fl oz (trt 6), Insignia 20WG + Trinity 1.67SC (trt15), Insignia 20WG (trt 16), and Heritage TL 0.8ME @ 2.0 fl oz (trt 26) afforded season-long suppression of brown patch (9 June to 27 August). Several additional products also provided good residual disease control but only until 17 August, 27 days post-treatment [Headway 1.39EC @ 1.5 fl oz (trt 5) and Triton Flo 3.1SC @ 0.75 fl oz (trt 20) and 1.0 fl oz (trt 21)]. A17629 1.16G (trts 1, 2), A17630 0.96G @ 3.0 lb (trt 3), Heritage G 0.31G @ 4.0 lb every 28 days (trt 11), Triton Flo 3.1SC @ 0.5 fl oz (trt 19), Banner MAXX 1.3ME (trt 22), Disarm 480SC (trt 24), and Heritage TL 0.8ME @ 1.5 fl oz (trt 25) also provided acceptable control of brown patch through the treatment period (9 June to 4 August).

Turf quality was acceptable (greater or equal to 5.0) for all entries in this study through 17 August (Table 1B) and was inversely associated with brown

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patch severity. Most treatments provided acceptable control of dollar spot (less than or equal to 10 lesion centers per plot) during this study except for single product entries containing Heritage (Heritage G 0.31G (trts 10 to 12) or Heritage TL 0.8ME (trt 25, 26), BAS 67300F 0.81G @ 2.25 lb (trt 13), Disarm G or 480SC (trts 7 and 24, respectively), ProStar 70W (trt 27), and Endorse 2.5W (trt 28). No phytotoxicity was observed for any of the products evaluated.

Table 1A. Effect of granular and foliar applied fungicides on the development of brown patch on a tall fescue lawn: Rutgers University, 2009.

| Treatment | Rate per 1000 sq ft | Application Interval (days) ² | Turf Area Infected (%) per Plot ¹ | | | | | |
|---------------------------|---------------------|--|--|---------|---------|---------|----------|----------|
| | | | 7 July | 16 July | 24 July | 5 Aug. | 17 Aug. | 27 Aug. |
| 1 A17629 1.16G..... | 3.0 lb | 21 ³ | 2.0 c-f | 2.5 c-e | 3.8 c-f | 6.0 gh | 15.0 f-h | 19.8 g |
| 2 A17629 1.16G..... | 4.0 lb | 21 ³ | 1.3 d-f | 0.0 e | 0.0 f | 1.8 h | 12.5 g-j | 8.3 i-m |
| 3 A17630 0.96G..... | 3.0 lb | 21 ³ | 1.8 c-f | 3.8 c-e | 1.3 ef | 2.5 h | 12.5 g-j | 13.0 g-l |
| 4 A17630 0.96G..... | 4.0 lb | 21 ³ | 0.0 f | 3.8 c-e | 3.8 c-f | 1.0 h | 10.0 h-j | 6.5 j-m |
| 5 Headway 1.39EC..... | 1.5 floz | 21 | 0.0 f | 3.0 c-e | 0.0 f | 0.5 h | 7.5 jk | 14.3 g-j |
| 6 Headway 1.39EC..... | 2.0 floz | 28 | 0.0 f | 0.0 e | 0.0 f | 0.8 h | 3.8 kl | 4.3 lm |
| 7 Disarm G 0.25G..... | 2.3 lb | 21 ³ | 2.0 c-f | 3.8 c-e | 3.8 c-f | 39.0 bc | 27.5 bc | 34.5 f |
| 8 Prophesy 0.72G..... | 3.0 lb | 21 ³ | 6.3 b | 5.0 c-e | 6.3 c-e | 34.3 c | 23.8 b-d | 52.0 cd |
| 9 Prophesy 0.72G..... | 4.0 lb | 21 ³ | 4.5 bc | 3.8 c-e | 1.3 ef | 26.5 d | 22.5 c-e | 45.3 de |
| 10 Heritage G 0.31G..... | 3.0 lb | 28 ³ | 2.5 c-f | 4.3 c-e | 3.8 c-f | 12.5 fg | 22.5 c-e | 9.0 h-m |
| 11 Heritage G 0.31G..... | 4.0 lb | 28 ³ | 1.3 d-f | 3.3 c-e | 2.5 d-f | 7.3 gh | 15.0 f-h | 4.8 k-m |
| 12 Heritage G 0.31G..... | 4.0 lb | 35 ³ | 3.8 b-e | 11.3 b | 2.5 d-f | 24.0 de | 26.3 bc | 49.0 d |
| 13 BAS 67300F 0.81G..... | 2.25 lb | 28 ³ | 2.5 c-f | 6.8 bc | 0.0 f | 18.8 ef | 20.0 d-f | 15.3 g-j |
| 14 BAS 67300F 0.81G..... | 3.0 lb | 28 ³ | 2.5 c-f | 4.3 c-e | 0.0 f | 18.0 ef | 16.3 fg | 11.0 g-l |
| 15 Insignia 20WG..... | 0.9 oz | — | — | — | — | — | — | — |
| + Trinity 1.67SC..... | 1.0 floz | 28 | 0.5 f | 0.0 e | 0.0 f | 2.8 h | 10.0 h-j | 6.0 j-m |
| 16 Insignia 20WG..... | 0.9 oz | 28 | 0.8 ef | 0.0 e | 1.3 ef | 1.8 h | 7.5 jk | 8.5 i-m |
| 17 RU 22112-09C G..... | 2.0 lb | 28 ³ | 4.3 b-d | 5.3 cd | 7.5 cd | 43.3 b | 22.5 c-e | 58.8 c |
| 18 RU 22112-09C G..... | 4.0 lb | 28 ³ | 3.0 c-f | 3.0 c-e | 5.0 c-f | 38.3 bc | 8.8 i-k | 18.3 gh |
| 19 Triton Flo 3.1SC..... | 0.5 floz | 21 | 0.0 f | 2.5 c-e | 0.0 f | 4.5 h | 20.0 d-f | 48.3 d |
| 20 Triton Flo 3.1SC..... | 0.75 floz | 21 | 0.0 f | 1.3 de | 0.0 f | 0.8 h | 0.0 l | 35.0 f |
| 21 Triton Flo 3.1SC..... | 1.0 floz | 21 | 0.0 f | 1.3 de | 0.0 f | 0.5 h | 0.0 l | 37.0 ef |
| 22 Banner MAXX 1.3ME..... | 2.0 floz | 21 | 0.0 f | 2.5 c-e | 6.3 c-e | 2.8 h | 13.8 g-i | 45.8 de |
| 23 Medallion 50W..... | 0.5 oz | 21 | 1.8 c-f | 5.0 c-e | 1.3 ef | 16.5 f | 23.8 b-d | 68.3 b |
| 24 Disarm 480SC..... | 0.27 floz | 21 | 2.3 c-f | 3.8 c-e | 0.0 f | 5.8 gh | 12.5 g-j | 17.3 g-i |
| 25 Heritage TL 0.8ME..... | 1.5 floz | 21 | 2.5 c-f | 3.8 c-e | 2.5 d-f | 2.3 h | 17.5 e-g | 10.8 g-m |
| 26 Heritage TL 0.8ME..... | 2.0 floz | 28 | 1.3 d-f | 5.0 c-e | 2.5 d-f | 0.8 h | 10.0 h-j | 1.5 m |
| 27 ProStar 70W..... | 3.0 oz | 21 | 1.3 d-f | 2.5 c-e | 6.3 c-e | 12.3 fg | 16.3 fg | 14.0 g-k |
| 28 Endorse 2.5W..... | 4.0 oz | 21 | 1.8 c-f | 11.3 b | 0.0 f | 17.0 f | 28.8 b | 82.3 a |
| 29 Untreated check..... | — | — | 17.5 a | 20.0 a | 17.5 a | 83.5 a | 68.8 a | 84.5 a |

(Continued)

Table 1A (continued).

| Treatment | Rate per 1000 sq ft | Application Interval (days) ² | Turf Area Infected (%) per Plot ¹ | | | | | |
|-----------|---------------------------|--|--|---------|---------|--------|---------|---------|
| | | | 7 July | 16 July | 24 July | 5 Aug. | 17 Aug. | 27 Aug. |
| | | INT ⁴ | DAT ⁵ | DAT | DAT | DAT | DAT | DAT |
| | | 21 | 7 | 16 | 3 | 15 | 27 | 37 |
| | | 28 | 28 | 9 | 17 | 1 | 13 | 23 |
| | | 35 | 28 | 2 | 10 | 22 | 34 | 44 |

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 9 June (all treatments), 30 June (21-day treatment), 7 July (28-day treatment), 14 July (35-day treatment), 21 July (21-day treatment), and 4 August (28-day treatment).

³ Treatments 1 to 4, 7 to 14, 17, and 18 were applied to dry foliage and then immediately irrigated with 0.25 gal of water per plot.

⁴ Spray interval in days.

⁵ Days after the last treatment.

Table 1B. Effect of granular and foliar applied fungicides on the development of brown patch on a tall fescue lawn: Rutgers University, 2009.

| Treatment | Rate per 1000 sq ft | Application Schedule (days) ³ | Number of Dollar Spot Lesion Centers per Plot ¹ | | | Turf Quality ² | | |
|---------------------------|---------------------------|--|---|----------|---------|---------------------------|---------|--|
| | | | 5 Aug. | 27 Aug. | 16 July | 17 Aug. | 27 Aug. | |
| 1 A17629 1.16G..... | 3.0 lb | 21 ⁴ | 1.5 ij | 1.0 j-l | 7.3 a-c | 6.8 b-d | 6.5 b | |
| 2 A17629 1.16G..... | 4.0 lb | 21 ⁴ | 0.8 ij | 0.8 kl | 7.5 ab | 7.3 b | 7.3 ab | |
| 3 A17630 0.96G..... | 3.0 lb | 21 ⁴ | 1.3 ij | 2.5 h-l | 6.5 b-d | 7.0 bc | 7.0 ab | |
| 4 A17630 0.96G..... | 4.0 lb | 21 ⁴ | 0.5 ij | 0.8 kl | 7.0 a-c | 6.8 b-d | 7.3 ab | |
| 5 Headway 1.39EC..... | 1.5 fl oz | 21 | 0.0 j | 2.0 i-l | 7.8 a | 7.3 b | 7.0 ab | |
| 6 Headway 1.39EC..... | 2.0 fl oz | 28 | 0.0 j | 0.0 l | 7.3 a-c | 7.3 b | 7.8 a | |
| 7 Disarm G 0.25G..... | 2.3 lb | 21 ⁴ | 8.0 e-g | 15.8 c-e | 7.0 a-c | 5.8 ef | 5.3 cd | |
| 8 Prophesy 0.72G..... | 3.0 lb | 21 ⁴ | 4.5 f-j | 4.5 g-l | 6.5 b-d | 6.0 d-f | 4.0 e-g | |
| 9 Prophesy 0.72G..... | 4.0 lb | 21 ⁴ | 2.3 h-j | 2.3 h-l | 6.8 a-d | 5.8 ef | 4.5 d-f | |
| 10 Heritage G 0.31G..... | 3.0 lb | 28 ⁴ | 11.0 de | 15.5 de | 7.0 a-c | 6.0 d-f | 6.5 b | |
| 11 Heritage G 0.31G..... | 4.0 lb | 28 ⁴ | 8.8 ef | 15.0 d-f | 7.3 a-c | 6.5 b-e | 7.0 ab | |
| 12 Heritage G 0.31G..... | 4.0 lb | 35 ⁴ | 23.5 a | 30.0 a | 6.3 cd | 5.8 ef | 3.8 f-h | |
| 13 BAS 67300F 0.81G..... | 2.25 lb | 28 ⁴ | 14.0 b-d | 15.8 c-e | 7.0 a-c | 6.3 c-e | 5.3 cd | |
| 14 BAS 67300F 0.81G..... | 3.0 lb | 28 ⁴ | 4.0 g-j | 6.8 g-j | 7.0 a-c | 6.8 b-d | 5.5 c | |
| 15 Insignia 20WG..... | 0.9 oz | | | | | | | |
| + Trinity 1.67SC..... | 1.0 fl oz | 28 | 0.0 j | 0.0 l | 6.8 a-d | 6.5 b-e | 7.8 a | |
| 16 Insignia 20WG..... | 0.9 oz | 28 | 1.8 h-j | 6.3 g-k | 7.8 a | 7.0 bc | 7.0 ab | |
| 17 RU 22112-09C G..... | 2.0 lb | 28 ⁴ | 3.8 g-j | 7.3 g-i | 6.3 cd | 5.8 ef | 4.5 d-f | |
| 18 RU 22112-09C G..... | 4.0 lb | 28 ⁴ | 6.0 f-h | 8.0 gh | 6.8 a-d | 6.8 b-d | 5.3 cd | |
| 19 Triton Flo 3.1SC..... | 0.5 fl oz | 21 | 0.3 ij | 3.3 h-l | 7.0 a-c | 7.3 b | 4.3 e-g | |
| 20 Triton Flo 3.1SC..... | 0.75 fl oz | 21 | 0.0 j | 0.5 kl | 7.5 ab | 8.8 a | 4.8 c-e | |
| 21 Triton Flo 3.1SC..... | 1.0 fl oz | 21 | 0.3 ij | 0.8 kl | 7.0 a-c | 8.5 a | 4.8 c-e | |
| 22 Banner MAXX 1.3ME..... | 2.0 fl oz | 21 | 0.0 j | 0.8 kl | 6.8 a-d | 6.8 b-d | 4.3 e-g | |
| 23 Medallion 50W..... | 0.5 oz | 21 | 1.5 ij | 9.3 fg | 6.5 b-d | 6.0 d-f | 4.0 e-g | |
| 24 Disarm 480SC..... | 0.27 fl oz | 21 | 2.0 h-j | 14.5 d-f | 6.3 cd | 7.3 b | 7.0 ab | |
| 25 Heritage TL 0.8ME..... | 1.5 fl oz | 21 | 8.0 e-g | 16.0 cd | 7.3 a-c | 6.8 b-d | 6.8 b | |
| 26 Heritage TL 0.8ME..... | 2.0 fl oz | 28 | 16.0 bc | 10.0 e-g | 7.0 a-c | 7.0 bc | 7.3 ab | |
| 27 ProStar 70W..... | 3.0 oz | 21 | 11.8 c-e | 14.8 d-f | 7.5 ab | 6.3 c-e | 6.8 b | |
| 28 Endorse 2.5W..... | 4.0 oz | 21 | 16.5 b | 21.5 bc | 6.5 b-d | 5.3 fg | 3.5 gh | |

(Continued)

Table 1B. Effect of granular and foliar applied fungicides on the development of brown patch on a tall fescue lawn: Rutgers University, 2009.

| Treatment | Rate per 1000 sq ft | Application Schedule (days) ³ | Number of Dollar Spot Lesion Centers per Plot ¹ | | Turf Quality ² | | |
|-------------------------|---------------------------|--|---|---------|---------------------------|---------|---------|
| | | | 5 Aug. | 27 Aug. | 16 July | 17 Aug. | 27 Aug. |
| 29 Untreated check..... | — | — | 17.3 b | 27.3 ab | 5.8 d | 4.8 g | 3.0 h |
| | | INT ⁵ | DAT ⁶ | DAT | DAT | DAT | DAT |
| | | 21 | 15 | 37 | 16 | 27 | 37 |
| | | 28 | 1 | 23 | 9 | 13 | 23 |
| | | 35 | 22 | 44 | 2 | 34 | 44 |

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 Fungicides were applied on 9 June (all treatments), 30 June (21-day treatment), 7 July (28-day treatment), 14 July (35-day treatment), 21 July (21-day treatment), and 4 August (28-day treatment).

⁴ Treatments 1 to 4, 7 to 14, 17, and 18 were applied to dry foliage and then immediately irrigated with 0.25 gal of water per plot.

⁵ Spray interval in days.

⁶ Days after the last treatment.