

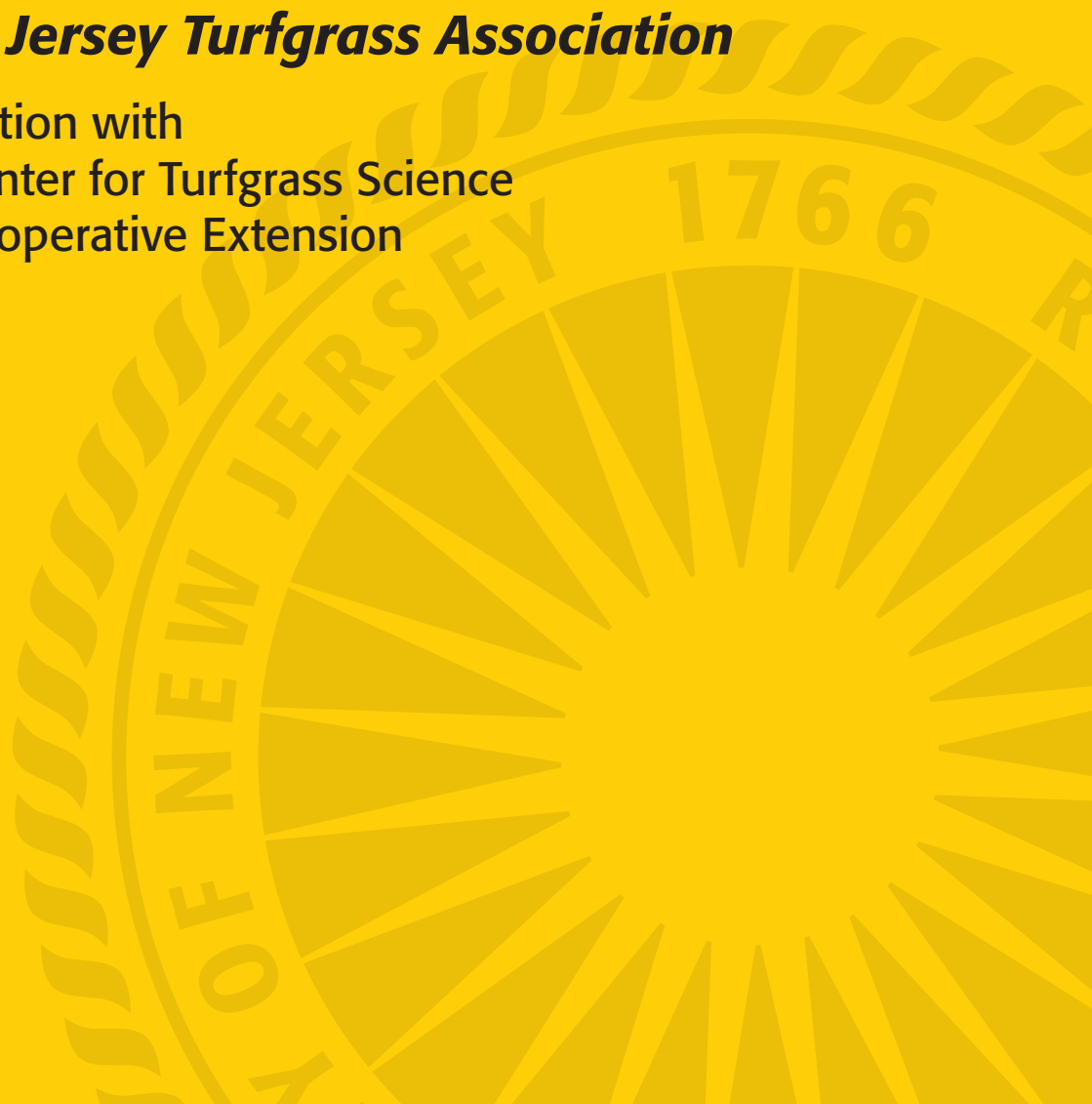
# RUTGERS

New Jersey Agricultural  
Experiment Station

## **2015 Turfgrass Proceedings**

***The New Jersey Turfgrass Association***

In Cooperation with  
Rutgers Center for Turfgrass Science  
Rutgers Cooperative Extension



# **2015 RUTGERS TURFGRASS PROCEEDINGS**

of the

## **GREEN EXPO Turf and Landscape Conference**

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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 2015 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

## CONTROL OF PINK SNOW MOLD ON PERENNIAL RYEGRASS WITH FUNGICIDES AND BIORATIONAL PRODUCTS, 2014-2015

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Fungicides were evaluated for their ability to control pink snow mold (caused by *Microdochium nivale*) on two perennial ryegrass (*Lolium perenne*) tees (#3 and #8) and a fairway (#8) at the Peace Pipe Country Club in Denville, NJ. Turf was established on a sandy loam with a pH of 6.7 in 1995 (both tees) and 2008 (fairway #8). Tees and fairway were cut five and three times per week at a height of 0.562 and 0.625 inches, respectively, and clippings were collected during the growing season (late April through mid-November). Fertilizer was applied to all study areas as 46-0-0 (0.5 lb N per 1000 ft<sup>2</sup>) on 29 August 2014 and as 18-3-17 (0.55 lb N per 1000 ft<sup>2</sup>) on 30 September 2014. Plots were 3 x 5 ft and were arranged in a randomized complete block with four replications. Turf was irrigated to avoid drought stress.

Fungicides were applied in water equivalent to 1.89 gal per 1000 ft<sup>2</sup> with a CO<sub>2</sub> powered sprayer at 30 psi using 85025 air induction nozzles. Treatments (trt) were applied to all three studies on 20 November 2014 when environmental conditions were conducive to pink snow mold development (Tables 1A and 1B [fairway #8], 2A and 2B [tee #8], and 3A and 3B [tee #3]). A second application had been scheduled for certain treatments in January 2015 on both the upper (#8) and lower (#3) tee studies, but this application was delayed until 30 March 2015 due to extensive snow cover during in January, February, and March (Tables 2A and 2B, and 3A and 3B). Turf was inoculated on 26 November 2014 with oat seed (5.2 g per 3 x 5 ft plot) infested with an isolate of *M. nivale* previously obtained from the Peace Pipe Golf Course, and was then covered with two layers of an

Evergreen EVS Turf Cover (Evergreen, Inc., Mississauga, Ontario) to encourage disease development. Turf covers were removed from all three study sites on 30 March 2015 and plots were visually evaluated for percent turf area infested with pink snow mold, as well as rated for turf quality, color, and phytotoxicity (Tables 1A, 2A, and 3A). A second set of visual evaluations were collected for disease severity and the other turf characteristics on 15 April 2015 (Tables 1B, 2B, and 3B). Less than 10% turf area infested with pink snow mold represented an acceptable level of disease control. Turf quality was assessed using a 1 to 9 scale, where 9 = best turf quality and 5 = acceptable quality. Color of foliage was evaluated on a scale of 1 to 10, where 5 = color of healthy untreated turf, less than 5 = progressively more chlorotic or necrotic turf, and greater than 5 = progressively darker green turf. Phytotoxicity was evaluated 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 necrotic or dead turf. Data were subjected to analysis of variance and means were separated using the Waller-Duncan *k*-ratio *t*-test (*k* = 100).

Pink snow mold was first observed on 30 March 2015 when turf covers were removed. The average diameter of pink snow mold patches in all three studies was 3.5 inches. Disease severity of untreated turf on 30 March 2016 was 82, 72, and 68% on fairway #8 (trt 23; Table 1A), tee #8 (trt 20; Table 2A), and tee #3 (trt 22; Table 3A), respectively. This was considered a high level of snow mold infestation and thus a stringent test of a product's ability to control this disease on a perennial ryegrass fairway and tees. In general,

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in comparison to the first disease assessment made on 30 March 2015, pink snow mold on all three studies either decreased slightly or remained at similar levels by the second rating on 15 April 2015.

On the fairway trial, 64 and 73% of the treatments provided good to excellent pink snow mold control on 30 March and 15 April 2015, respectively (Tables 1A and 1B). These included the following products and product combinations: Interface 2.27SC (trt 1), RU-2125-14J SC + RU-2125-14K SC (trt 6), Interface 2.27SC + Mirage 2SC (trts 7, 8), Tartan 2.4SC + Interface 2.27SC (trt 9), Tartan 2.4SC (trt 11), Turfcide 400F 4F + Foursome 100SL (trts 13, 14), Interface 2.27SC + Triton 3F (trt 15), Interface 2.27SC + Turfcide 400F 4F + Foursome 100SL (trt 16), Concert II 4.3L + Turfcide 400F 4F + Foursome 100SL (trt 18), Insignia 2.08SC + Turfcide 400F 4F + Foursome 100SL (trt 20), Torque 3.6SC + 26/36 3.8EC (trt 21), and Torque 3.6SC + Turfcide 400F 4F + Foursome 100SL (trt 22). When the study was re-evaluated on 15 April (16 days after turf covers were removed), two additional treatments, RU-2125-14J SC @ 8 fl oz (trt 5) and Turfcide 400F 4F @ 8 fl oz + Foursome 100SL @ 0.5 fl oz (trt 12), recovered to an acceptable level of disease control (Table 1B). Turf quality was acceptable (greater or equal to 5.0) for all entries that provided acceptable pink snow mold control (less than 10% turf area infested with *M. nivale*; Tables 1A and 1B). Turf color was rather chlorotic for all treatments due to chlorophyll breakdown in response to low temperatures during the winter (Tables 1A and 1B). Only one treatment, Instrata 3.6XL (trt 10), caused a slight phytotoxicity (foliar tip burn) in this study (Tables 1A and 1B).

On tee #8, only 16% of treatments provided an acceptable level of pink snow mold control (both rating dates). These included Interface 2.27SC @ 4.0 fl oz (trt 5), which was also effective in suppressing the disease in the fairway study, RU-2125-14I SC + RU-2125-14K SC (trt 10), and RU-2125-14L SC (trt

11) (Tables 2A and 2B). Of the products that were reapplied on 30 March 2015 on tee #8, none provided acceptable recovery from disease by 15 April 2015 (16 DAT). Turf quality was acceptable (greater or equal to 5.0) for all entries that provided adequate disease control (Tables 2A and 2B). No differences in turf color were observed between treatments on 30 March; however, by 15 April 2015, RU-2125-14X + RU-2125-14M SC (trt 19) provided the greatest improvement in turf color (Table 2B). No phytotoxicity was observed on in the tee #8 study.

On tee #3, 43% of treatments provided an acceptable level of disease control on 30 March 2015 (Table 3A). These treatments included: Disarm C 4.24SC + Chipco 26GT 2SC (trt 1), Disarm T SC (trt 2), Disarm 480SC + Daconil Ultrex 82.5WDG + Chipco 26GT 2SC (trt 3), Disarm T SC + Turf Screen (trt 4), A 13705W 1.6SC (trt 6), Interface 2.27SC (trt 10), Tartan 2.4SC (trt 12), Tartan 2.4SC + Interface 2.27SC (trt 13), and Turfcide 400F 4F (trt 20). Products and product combinations that provided an acceptable level of disease control on 30 March resulted in a slight reduction or a similar level of disease severity when evaluated on 15 April 2015 (Table 3B). Turf quality was acceptable (greater or equal to 5.0) for all entries that provided adequate pink snow mold control, except for Turfcide 400F 4F (trt 20), which had unacceptable turf quality due to a moderate level of phytotoxicity on plots treated with this product (Table 3A). However, phytotoxicity was short-lived and turf quality recovered to an acceptable level by 15 April 2015 (Table 3B). Additionally, a slight foliar tip burn was observed in plots treated with Concert II 4.3L (trt 8) or Instrata 3.6XL (trt 9) on both rating dates (Table 3A and 3B). Turf color was improved (i.e., darker green color) by the application of Interface 2.27SC (trt 10) when turf was evaluated on 30 March, and by Interface 2.27SC (trt 10) and Instrata 3.6XL (trt 11) on 15 April when compared to untreated turf (trt 22) (Tables 3A and 3B).

Table 1A. Control of pink snow mold on fairway #8, Peace Pipe Golf Course, Denville, NJ: Rutgers University, 2014-2015.

Treatment	Rate per 1000 sq ft	Application Schedule <sup>6</sup>	Disease Severity <sup>1,2</sup>	Turf Quality <sup>3</sup>	Color <sup>4</sup>	Phytotoxicity <sup>5</sup>
1 Interface 2.27SC.....	4.0 fl oz	Nov	6.5 g-j	6.6 c-e	3.0 ab	1.0 b
2 RU-2125-14J SC.....	4.0 fl oz	Nov	35.5 b	3.8 hi	2.8 bc	1.0 b
3 RU-2125-14J SC.....	5.0 fl oz	Nov	31.5 bc	4.4 g-i	2.8 bc	1.0 b
4 RU-2125-14J SC.....	6.0 fl oz	Nov	25.8 cd	4.5 gh	2.8 bc	1.0 b
5 RU-2125-14J SC.....	8.0 fl oz	Nov	11.8 fg	6.3 de	2.5 cd	1.0 b
6 RU-2125-14J SC.....	5.0 fl oz	—	—	—	—	—
+ RU-2125-14K SC.....	1.0 fl oz	Nov	0.5 k	7.4 a-c	2.9 a-c	1.0 b
7 Interface 2.27SC.....	3.0 fl oz	—	—	—	—	—
+ Mirage 2SC.....	1.5 fl oz	Nov	4.5 h-k	6.9 b-d	3.0 ab	1.0 b
8 Interface 2.27SC.....	4.0 fl oz	—	—	—	—	—
+ Mirage 2SC.....	1.5 fl oz	Nov	3.8 h-k	7.4 a-c	3.0 ab	1.0 b
9 Tartan 2.4SC.....	1.0 fl oz	—	—	—	—	—
+ Interface 2.27SC.....	3.0 fl oz	Nov	0.0 k	8.0 a	3.3 a	1.0 b
10 Instrata 3.6XL.....	7.0 fl oz	Nov	17.5 ef	4.4 g-i	2.1 d	1.8 a
11 Tartan 2.4SC.....	1.0 fl oz	Nov	7.5 g-i	6.6 c-e	2.9 a-c	1.0 b
12 Turfcide 400F 4F.....	8.0 fl oz	—	—	—	—	—
+ Foursome 100SL.....	0.5 fl oz	Nov	20.3 de	4.9 fg	2.8 bc	1.0 b
13 Turfcide 400F 4F.....	12.0 fl oz	—	—	—	—	—
+ Foursome 100SL.....	0.5 fl oz	Nov	9.0 gh	5.8 ef	2.8 bc	1.0 b
14 Turfcide 400F 4F.....	16.0 fl oz	—	—	—	—	—
+ Foursome 100SL.....	0.5 fl oz	Nov	5.7 h-k	6.5 c-e	2.8 bc	1.0 b
15 Interface 2.27SC.....	3.0 fl oz	—	—	—	—	—
+ Triton 3F.....	0.75 fl oz	Nov	8.5 gh	6.1 de	2.8 bc	1.0 b
16 Interface 2.27SC.....	3.0 fl oz	—	—	—	—	—
+ Turfcide 400F 4F.....	8.0 fl oz	—	—	—	—	—
+ Foursome 100SL.....	0.5 fl oz	Nov	1.0 jk	7.0 b-d	2.8 bc	1.0 b
17 Concert II 4.3L.....	8.5 fl oz	—	—	—	—	—
+ Banner Maxx 1.3ME.....	1.0 fl oz	Nov	25.0 d	4.6 gh	2.5 cd	1.0 b

(Continued)

Table 1A. Pink snow mold on fairway #8, Peace Pipe Golf Course, Denville, NJ (continued).

Treatment	Rate per 1000 sq ft	Application Schedule <sup>6</sup>	Disease Severity <sup>1,2</sup> 30 March	Turf Quality <sup>3</sup> 30 March	Color <sup>4</sup> 30 March	Phytotoxicity <sup>5</sup> 30 March
18 Concert II 4.3L.....	8.5 fl oz	—				
+ Turfcide 400F 4F.....	8.0 fl oz	—				
+ Foursome 100SL.....	0.5 fl oz	Nov	2.5 i-k	6.6 c-e	2.9 a-c	1.0 b
19 Insignia 2.08SC.....	0.7 fl oz	—				
+ Trinity 1.69L.....	1.0 fl oz	Nov	36.8 b	3.5 i	2.6 bc	1.0 b
20 Insignia 2.08SC.....	0.7 fl oz	—				
+ Turfcide 400F 4F.....	8.0 fl oz	—				
+ Foursome 100SL.....	0.5 fl oz	Nov	1.3 jk	7.8 ab	2.9 a-c	1.0 b
21 Torque 3.6SC.....	0.9 fl oz	—				
+ 26/36 3.8EC.....	4.0 fl oz	Nov	3.5 h-k	6.1 de	2.5 cd	1.0 b
22 Torque 3.6SC.....	0.9 fl oz	—				
+ Turfcide 400F 4F.....	8.0 fl oz	—				
+ Foursome 100SL.....	0.5 fl oz	Nov	4.8 h-k	6.9 b-d	2.9 a-c	1.0 b
23 Untreated Check.....	—	—	82.3 a	1.5 j	3.0 ab	1.0 b
			DAT <sup>7</sup> 130	DAT 130	DAT 130	DAT 130

<sup>1</sup> 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).

<sup>2</sup> Percent turf area infested with pink snow mold per 3 x 5-ft plot. Fungicides were applied in 1.89 gal H<sub>2</sub>O per 1,000 sq ft at 30 psi applied with an air induction 85025 nozzle on 20 November 2014. Turf was inoculated on 27 November with 5.2 g of oat seed per plot infested with an isolate of *Microdochium nivale* obtained from the Peace Pipe Golf Course. Turf was covered with two layers of a permeable turf cover to enhance disease development.

<sup>3</sup> Turf quality on a 1 to 9 scale, where 9 = best quality and 5 = commercially acceptable quality.

<sup>4</sup> Color of foliage on a 1 to 10 scale, where 5 = color of untreated turf, <5 = increasingly chlorotic turf, and >5 = increasingly dark green turf.

(Continued)

Table 1A. Pink snow mold on fairway #8, Peace Pipe Golf Course, Denville, NJ (continued).

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<sup>5</sup> Phytotoxicity on a 1 to 5 scale, where 1 = no discoloration, 2 = slight foliar chlorosis or necrosis, 3 = moderate chlorosis or necrosis, 4 = severe chlorosis or necrosis, and 5 = all turf dead.

<sup>6</sup> Fungicides were applied on 20 November 2014.

<sup>7</sup> DAT = Days after the last treatment.

Table 1B. Control of pink snow mold on fairway #8, Peace Pipe Golf Course, Denville, NJ: Rutgers University, 2014-2015.

Treatment	Rate per 1000 sq ft	Application Schedule <sup>6</sup>	Disease Severity <sup>1,2</sup>		Turf Quality <sup>3</sup>		Color <sup>4</sup>		Phytotoxicity <sup>5</sup>	
			15 April	15 April	15 April	15 April	15 April	15 April	15 April	15 April
1 Interface 2.27SC	4.0 fl oz	Nov	7.0 ef	6.5 d-h	3.0 ab	3.0 ab	1.0 a	1.0 a	1.0 a	1.0 a
2 RU-2125-14J SC	4.0 fl oz	Nov	33.5 b	4.0 j	2.9 ab	2.9 ab	1.0 a	1.0 a	1.0 a	1.0 a
3 RU-2125-14J SC	5.0 fl oz	Nov	26.8 cd	4.8 ij	2.9 ab	2.9 ab	1.0 a	1.0 a	1.0 a	1.0 a
4 RU-2125-14J SC	6.0 fl oz	Nov	24.3 cd	4.4 j	2.8 b	2.8 b	1.0 a	1.0 a	1.0 a	1.0 a
5 RU-2125-14J SC	8.0 fl oz	Nov	7.5 ef	6.0 f-h	2.9 ab	2.9 ab	1.0 a	1.0 a	1.0 a	1.0 a
6 RU-2125-14J SC	5.0 fl oz	—	—	—	—	—	—	—	—	—
+ RU-2125-14K SC	1.0 fl oz	Nov	0.3 g	7.9 ab	3.0 ab	3.0 ab	1.0 a	1.0 a	1.0 a	1.0 a
7 Interface 2.27SC	3.0 fl oz	—	—	—	—	—	—	—	—	—
+ Mirage 2SC	1.5 fl oz	Nov	4.8 e-g	6.6 c-h	3.1 ab	3.1 ab	1.0 a	1.0 a	1.0 a	1.0 a
8 Interface 2.27SC	4.0 fl oz	—	—	—	—	—	—	—	—	—
+ Mirage 2SC	1.5 fl oz	Nov	3.8 fg	7.0 b-f	3.1 ab	3.1 ab	1.0 a	1.0 a	1.0 a	1.0 a
9 Tartan 2.4SC	1.0 fl oz	—	—	—	—	—	—	—	—	—
+ Interface 2.27SC	3.0 fl oz	Nov	1.0 g	7.6 a-c	3.0 ab	3.0 ab	1.0 a	1.0 a	1.0 a	1.0 a
10 Instrata 3.6XL	7.0 fl oz	Nov	21.5 d	4.4 j	2.8 b	2.8 b	1.5 b	1.5 b	1.5 b	1.5 b
11 Tartan 2.4SC	1.0 fl oz	Nov	2.8 fg	7.1 a-e	2.8 b	2.8 b	1.0 a	1.0 a	1.0 a	1.0 a
12 Turfcide 400F 4F	8.0 fl oz	—	—	—	—	—	—	—	—	—
+ Foursome 100SL	0.5 fl oz	Nov	10.0 e	5.6 hi	2.9 ab	2.9 ab	1.0 a	1.0 a	1.0 a	1.0 a
13 Turfcide 400F 4F	12.0 fl oz	—	—	—	—	—	—	—	—	—
+ Foursome 100SL	0.5 fl oz	Nov	4.0 fg	6.9 b-g	2.9 ab	2.9 ab	1.0 a	1.0 a	1.0 a	1.0 a
14 Turfcide 400F 4F	16.0 fl oz	—	—	—	—	—	—	—	—	—
+ Foursome 100SL	0.5 fl oz	Nov	3.0 fg	6.8 b-g	2.9 ab	2.9 ab	1.0 a	1.0 a	1.0 a	1.0 a
15 Interface 2.27SC	3.0 fl oz	—	—	—	—	—	—	—	—	—
+ Triton 3F	0.75 fl oz	Nov	10.0 e	5.9 g-i	3.0 ab	3.0 ab	1.0 a	1.0 a	1.0 a	1.0 a
16 Interface 2.27SC	3.0 fl oz	—	—	—	—	—	—	—	—	—
+ Turfcide 400F 4F	8.0 fl oz	—	—	—	—	—	—	—	—	—
+ Foursome 100SL	0.5 fl oz	Nov	0.8 g	7.4 a-d	3.0 ab	3.0 ab	1.0 a	1.0 a	1.0 a	1.0 a
17 Concert II 4.3L	8.5 fl oz	—	—	—	—	—	—	—	—	—
+ Banner Maxx 1.3ME	1.0 fl oz	Nov	23.0 d	4.8 ij	3.0 ab	3.0 ab	1.0 a	1.0 a	1.0 a	1.0 a

(Continued)



Table 1B. Pink snow mold on fairway #8, Peace Pipe Golf Course, Denville (continued).

Treatment	Rate per 1000 sq ft	Application Schedule <sup>6</sup>	Disease Severity <sup>1,2</sup>	Turf Quality <sup>3</sup>	Color <sup>4</sup>	Phytotoxicity <sup>5</sup>
18 Concert II 4.3L.....	8.5 fl oz	—				
+ Turfcide 400F 4F.....	8.0 fl oz	—				
+ Foursome 100SL.....	0.5 fl oz	Nov	0.3 g	7.0 b-f	3.0 ab	1.0 a
19 Insignia 2.08SC.....	0.7 fl oz	—				
+ Trinity 1.69L.....	1.0 fl oz	Nov	29.3 bc	3.9 j	2.8 b	1.0 a
20 Insignia 2.08SC.....	0.7 fl oz	—				
+ Turfcide 400F 4F.....	8.0 fl oz	—				
+ Foursome 100SL.....	0.5 fl oz	Nov	1.3 g	8.2 a	3.3 a	1.0 a
21 Torque 3.6SC.....	0.9 fl oz	—				
+26/36 3.8EC.....	4.0 fl oz	Nov	3.3 fg	6.3 e-h	2.9 ab	1.0 a
22 Torque 3.6SC.....	0.9 fl oz	—				
+ Turfcide 400F 4F.....	8.0 fl oz	—				
+ Foursome 100SL.....	0.5 fl oz	Nov	2.3 fg	7.4 a-d	3.0 ab	1.0 a
23 Untreated Check.....	—	—	75.0 a	1.6 k	3.0 ab	1.0 a

<sup>1</sup> 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).

<sup>2</sup> Percent turf area infested with pink snow mold per 3 x 5-ft plot. Fungicides were applied in 1.89 gal H<sub>2</sub>O per 1,000 sq ft at 30 psi applied with an air induction 85025 nozzle on 20 November 2014. Turf was inoculated on 27 November with 5.2 g of oat seed per plot infested with an isolate of *Microdochium nivale* obtained from the Peace Pipe Golf Course. Turf was covered with two layers of a permeable turf cover to enhance disease development.

<sup>3</sup> Turf quality on a 1 to 9 scale, where 9 = best quality and 5 = commercially acceptable quality.

<sup>4</sup> Color of foliage on a 1 to 10 scale, where 5 = color of untreated turf, <5 = increasingly chlorotic turf, and >5 = increasingly dark green turf.

(Continued)

Table 1B. Pink snow mold on fairway #8, Peace Pipe Golf Course, Denville (continued).

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<sup>5</sup> Phytotoxicity on a 1 to 5 scale, where 1 = no discoloration, 2 = slight foliar chlorosis or necrosis, 3 = moderate chlorosis or necrosis, 4 = severe chlorosis or necrosis, and 5 = all turf dead.

<sup>6</sup> Fungicides were applied on 20 November 2014.

<sup>7</sup> DAT = Days after the last treatment.

Table 2A. Control of pink snow mold on golf course upper tee #8, Peace Pipe Golf Course, Denville, NJ: Rutgers University, 2014-2015.

Treatment	Rate per 1000 sq ft	Application Schedule <sup>6</sup>	Disease Severity <sup>1,2</sup>	Turf Quality <sup>3</sup>	Color <sup>4</sup>	Phytotoxicity <sup>5</sup>
1 UTC.....	—	—	71.8 a	1.5 h	3.0 a	1.0 a
2 UTC.....	—	—	77.0 a	1.6 h	3.0 a	1.0 a
3 Turfcide 400F 4F.....	8.0 fl oz	Nov	29.0 de	4.4 cd	3.0 a	1.0 a
4 Chipco 26GT 2SC.....	4.0 fl oz	—	14.3 f	5.8 b	3.0 a	1.0 a
+ Daconil Ultrex 82.5WG .....	5.0 oz	Nov	2.8 g	7.6 a	3.4 a	1.0 a
5 Interface 2.27SC .....	4.0 fl oz	Nov	47.3 b	3.1 fg	3.0 a	1.0 a
6 RU-2125-14I SC .....	3.0 fl oz	Nov	42.3 bc	3.0 fg	3.0 a	1.0 a
7 RU-2125-14I SC .....	4.0 fl oz	Nov	44.8 bc	3.3 e-g	2.8 a	1.0 a
8 RU-2125-14I SC .....	5.0 fl oz	Nov	45.5 bc	3.3 e-g	3.0 a	1.0 a
9 RU-2125-14I SC .....	6.0 fl oz	Nov	—	—	—	—
10 RU-2125-14I SC .....	4.0 fl oz	—	4.0 fg	7.9 a	3.1 a	1.0 a
+ RU-2125-14K SC .....	1.0 fl oz	Nov	1.5 g	8.0 a	3.1 a	1.0 a
11 RU-2125-14L SC .....	5.0 fl oz	Nov	46.3 b	2.6 g	3.0 a	1.0 a
12 RU-2125-14X .....	0.157 fl oz	Nov	42.5 bc	3.6 d-f	3.0 a	1.0 a
13 RU-2125-14X .....	0.2356 fl oz	Nov	39.3 b-d	3.6 d-f	3.0 a	1.0 a
14 RU-2125-14X .....	0.314 fl oz	Nov	34.8 c-e	4.0 c-e	3.4 a	1.0 a
15 RU-2125-14X .....	0.471 fl oz	Nov	43.0 bc	2.8 g	3.0 a	1.0 a
16 RU-2125-14X .....	0.157 fl oz	Nov/March <sup>7</sup>	39.5 b-d	3.1 fg	3.1 a	1.0 a
17 RU-2125-14X .....	0.2356 fl oz	Nov/March <sup>7</sup>	42.5 bc	3.4 e-g	2.9 a	1.0 a
18 RU-2125-14X .....	0.314 fl oz	Nov/March <sup>7</sup>	—	—	—	—
19 RU-2125-14X .....	0.2356 fl oz	Nov/March <sup>7</sup>	28.3 e	4.8 c	3.5 a	1.0 a
+ RU-2125-14M SC .....	2.0 fl oz	Nov/March <sup>7</sup>	71.5 a	1.5 h	3.0 a	1.0 a
20 Untreated Check.....	—	—	—	—	—	—
			DAT <sup>8</sup> 130	DAT 130	DAT 130	DAT 130

(Continued)

Table 2A. Pink snow mold on on golf course upper tee #8, Peace Pipe Golf Course, Denville, NJ (continued).

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- <sup>1</sup> Values are means of four replicates. Means followed by the same letter are not significantly different according to Waller-Duncan k-ratio t-test ( $k=100$ ).
  - <sup>2</sup> Percent turf area infested with pink snow mold per 3 x 5-ft plot. Fungicides were applied in 1.89 gal H<sub>2</sub>O per 1,000 sq ft at 30 psi applied with an air induction 85025 nozzle on 20 November 2014 and for treatments 16 to 19 on 30 March 2015. Turf was inoculated on 27 November with 5.2g of oat seed per plot infested with an isolate of *Microdochium nivale* obtained from the Peace Pipe Golf Course. Turf was covered with two layers of a permeable turf cover to enhance disease development.
  - <sup>3</sup> Turf quality on a 1 to 9 scale, where 9 = best quality and 5 = commercially acceptable quality.
  - <sup>4</sup> Color of foliage on a 1 to 10 scale, where 5 = color of untreated turf, <5 = increasingly chlorotic turf, and >5 = increasingly dark green turf.
  - <sup>5</sup> Phytotoxicity on a 1 to 5 scale, where 1 = no discoloration, 2 = slight foliar chlorosis or necrosis, 3 = moderate chlorosis or necrosis, 4 = severe chlorosis or necrosis, and 5 = all turf dead.
  - <sup>6</sup> Fungicides were applied on 20 November 2014.
  - <sup>7</sup> For treatments 16 to 19, a second application was scheduled for January 2015, but due to extensive snow cover, that application was delayed to 30 March.
  - <sup>8</sup> DAT = Days after the last treatment.

Table 2B. Control of pink snow mold on golf course upper tee #8, Peace Pipe Golf Course, Denville, NJ: Rutgers University, 2014-2015.

Treatment	Rate per 1000 sq ft	Application Schedule <sup>6</sup>	Disease Severity <sup>1,2</sup>		Turf Quality <sup>3</sup>		Color <sup>4</sup>		Phytotoxicity <sup>5</sup>	
			15 April	15 April	15 April	15 April	15 April	15 April	15 April	15 April
1 UTC.....	—	—	73.8 a	1.6 e	2.9 c	1.0 a	2.9 c	1.0 a	1.0 a	1.0 a
2 UTC.....	—	—	72.3 a	1.8 e	3.0 bc	1.0 a	3.0 bc	1.0 a	1.0 a	1.0 a
3 Turfcide 400F 4F.....	8.0 fl oz	Nov	18.8 gh	4.9 b-d	3.0 bc	1.0 a	3.0 bc	1.0 a	1.0 a	1.0 a
4 Chipco 26GT 2SC.....	4.0 fl oz	—								
+ Daconil Ultrex 82.5WG .....	5.0 oz	Nov	11.8 hi	5.8 b	3.1 a-c	1.0 a	3.1 a-c	1.0 a	1.0 a	1.0 a
5 Interface 2.27SC.....	4.0 fl oz	Nov	3.0 ij	7.9 a	3.4 ab	1.0 a	3.4 ab	1.0 a	1.0 a	1.0 a
6 RU-2125-14I SC.....	3.0 fl oz	Nov	43.5 b-d	3.6 cd	2.9 c	1.0 a	2.9 c	1.0 a	1.0 a	1.0 a
7 RU-2125-14I SC.....	4.0 fl oz	Nov	39.5 c-e	4.1 cd	3.0 bc	1.0 a	3.0 bc	1.0 a	1.0 a	1.0 a
8 RU-2125-14I SC.....	5.0 fl oz	Nov	34.3 d-f	4.5 b-d	3.0 bc	1.0 a	3.0 bc	1.0 a	1.0 a	1.0 a
9 RU-2125-14I SC.....	6.0 fl oz	Nov	33.0 ef	4.4 b-d	3.0 bc	1.0 a	3.0 bc	1.0 a	1.0 a	1.0 a
10 RU-2125-14I SC.....	4.0 fl oz	—								
+ RU-2125-14K SC.....	1.0 fl oz	Nov	1.0 j	8.1 a	3.0 bc	1.0 a	3.0 bc	1.0 a	1.0 a	1.0 a
11 RU-2125-14L SC.....	5.0 fl oz	Nov	1.8 ij	8.1 a	3.3 a-c	1.0 a	3.3 a-c	1.0 a	1.0 a	1.0 a
12 RU-2125-14X.....	0.157 fl oz	Nov	49.8 b	3.6 cd	3.1 bc	1.0 a	3.1 bc	1.0 a	1.0 a	1.0 a
13 RU-2125-14X.....	0.2356 fl oz	Nov	42.3 b-e	3.8 cd	3.1 bc	1.0 a	3.1 bc	1.0 a	1.0 a	1.0 a
14 RU-2125-14X.....	0.314 fl oz	Nov	44.8 bc	4.0 cd	3.0 bc	1.0 a	3.0 bc	1.0 a	1.0 a	1.0 a
15 RU-2125-14X.....	0.471 fl oz	Nov	27.0 fg	4.6 b-d	3.4 ab	1.0 a	3.4 ab	1.0 a	1.0 a	1.0 a
16 RU-2125-14X.....	0.157 fl oz	Nov/March <sup>7</sup>	46.8 bc	3.6 cd	3.1 a-c	1.0 a	3.1 a-c	1.0 a	1.0 a	1.0 a
17 RU-2125-14X.....	0.2356 fl oz	Nov/March <sup>7</sup>	42.0 b-e	3.3 de	3.0 bc	1.0 a	3.0 bc	1.0 a	1.0 a	1.0 a
18 RU-2125-14X.....	0.314 fl oz	Nov/March <sup>7</sup>	41.3 b-e	3.5 cd	3.0 bc	1.0 a	3.0 bc	1.0 a	1.0 a	1.0 a
19 RU-2125-14X.....	0.2356 fl oz	—								
+ RU-2125-14M SC.....	2.0 fl oz	Nov/March <sup>7</sup>	24.3 fg	5.1 bc	3.6 a	1.0 a	3.6 a	1.0 a	1.0 a	1.0 a
20 Untreated Check.....	—	—	71.5 a	1.6 e	3.1 bc	1.0 a	3.1 bc	1.0 a	1.0 a	1.0 a
			DAT <sup>8</sup> 146	DAT 146	DAT 146	DAT 146	DAT 146	DAT 146	DAT 146	DAT 146

(Continued)

Table 2B. Pink snow mold on golf course upper tee #8, Peace Pipe Golf Course, Denville, NJ (continued).

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- <sup>1</sup> Values are means of four replicates. Means followed by the same letter are not significantly different according to Waller-Duncan *k*-ratio *t*-test ( $k=100$ ).
- <sup>2</sup> Percent turf area infested with pink snow mold per 3 x 5-ft plot. Fungicides were applied in 1.89 gal H<sub>2</sub>O per 1,000 sq ft at 30 psi applied with an air induction 85025 nozzle on 20 November 2014 and for treatments 16 to 19 on 30 March 2015. Turf was inoculated on 27 November with 5.2g of oat seed per plot infested with an isolate of *Microdochium nivale* obtained from the Peace Pipe Golf Course. Turf was covered with two layers of a permeable turf cover to enhance disease development.
- <sup>3</sup> Turf quality on a 1 to 9 scale, where 9 = best quality and 5 = commercially acceptable quality.
- <sup>4</sup> Color of foliage on a 1 to 10 scale, where 5 = color of untreated turf, <5 = increasingly chlorotic turf, and >5 = increasingly dark green turf.
- <sup>5</sup> Phytotoxicity on a 1 to 5 scale, where 1 = no discoloration, 2 = slight foliar chlorosis or necrosis, 3 = moderate chlorosis or necrosis, 4 = severe chlorosis or necrosis, and 5 = all turf dead.
- <sup>6</sup> Fungicides were applied on 20 November 2014.
- <sup>7</sup> For treatments 16 to 19, a second application was scheduled for January 2015, but due to extensive snow cover, that application was delayed to 30 March.
- <sup>8</sup> DAT = Days after the last treatment.

Table 3A. Control of pink snow mold on golf course lower tee #3, Peace Pipe Golf Course, Denville, NJ: Rutgers University, 2014-2015.

Treatment	Rate per 1000 sq ft	Application Schedule <sup>6</sup>	Disease Severity <sup>1,2</sup>		Turf Quality <sup>3</sup>		Color <sup>4</sup>		Phytotoxicity <sup>5</sup>	
			30 March	30 March	30 March	30 March	30 March	30 March	30 March	30 March
1 Disarm C 4.24SC.....	5.9 fl oz	—								
+ Chipco 26GT 2SC.....	4.0 fl oz	Nov	0.8 h	7.5 ab	2.9 b	1.0 c				
2 Disarm T SC.....	0.89 fl oz	Nov	1.0 h	7.8 ab	3.0 b	1.0 c				
3 Disarm 480SC.....	0.36 fl oz	—								
+ Daconil Ultrex 82.5WDG.....	5.0 oz	—								
+ Chipco 26GT 2SC.....	4.0 fl oz	Nov	1.3 h	7.3 ab	3.0 b	1.0 c				
4 Disarm T SC.....	0.89 fl oz	—								
+ Turf Screen.....	3.0 oz	Nov	2.8 h	7.9 a	3.3 b	1.0 c				
5 Varnimo WP.....	0.735 oz	—								
+ KaPre Remede8 LC.....	3.0 fl oz	Nov/March <sup>7</sup>	48.0 b	3.3 gh	2.9 b	1.0 c				
6 A 13705W 1.6SC.....	2.6 fl oz	Nov	0.0 h	7.4 ab	3.0 b	1.0 c				
7 A 20744B WG.....	0.5 oz	Nov	62.0 a	1.9 i	3.0 b	1.0 c				
8 Concert II 4.3L.....	5.0 fl oz	Nov	21.0 fg	4.3 c-e	2.9 b	1.8 b				
9 Instrata 3.6XL.....	7.0 fl oz	Nov	22.3 fg	4.3 c-e	3.0 b	1.8 b				
10 Interface 2.27SC.....	6.0 fl oz	Nov	6.0 h	7.5 ab	3.9 a	1.0 c				
11 Instrata 3.6XL.....	7.0 fl oz	Nov	18.0 g	4.9 c	2.9 b	1.0 c				
12 Tartan 2.4SC.....	2.0 fl oz	Nov	3.8 h	7.5 ab	3.1 b	1.0 c				
13 Tartan 2.4SC.....	1.0 fl oz	—								
+ Interface 2.27SC.....	3.0 fl oz	Nov	5.0 h	7.0 b	3.0 b	1.0 c				
14 RU-22112-14F.....	0.47 fl oz	Nov	45.3 b	2.8 h	3.0 b	1.0 c				
15 RU-22112-14F.....	0.71 fl oz	Nov	31.0 c-e	3.4 f-h	2.9 b	1.0 c				
16 RU-22112-14F.....	0.94 fl oz	Nov	27.3 d-f	3.5 e-h	3.0 b	1.0 c				
17 RU-22112-14G.....	0.47 fl oz	Nov	36.8 c	3.5 e-h	3.0 b	1.0 c				
18 RU-22112-14G.....	0.71 fl oz	Nov	34.3 cd	3.4 f-h	2.9 b	1.0 c				
19 RU-22112-14G.....	0.94 fl oz	Nov	31.0 c-e	4.0 d-g	3.1 b	1.0 c				
20 Turfcide 400F 4F.....	12.0 fl oz	Nov	4.5 h	4.5 cd	2.4 c	2.5 a				
21 Chipco 26GT 2SC.....	4.0 fl oz	—								
+ Daconil Ultrex 82.5WDG.....	5.0 oz	Nov	25.5 e-g	4.1 c-f	3.0 b	1.0 c				

(Continued)

Table 3A. Pink snow mold on golf course lower tee #3, Peace Pipe Golf Course, Denville, NJ (continued).

Treatment	Rate per 1000 sq ft	Application Schedule <sup>6</sup>	Disease Severity <sup>1,2</sup>	Turf Quality <sup>3</sup>	Color <sup>4</sup>	Phytotoxicity <sup>5</sup>
			30 March	30 March	30 March	30 March
22 Untreated Check.....	—	—	67.8 a	1.8 i	3.0 b	1.0 c
			DAT <sup>8</sup> 130	DAT 130	DAT 130	DAT 130

<sup>1</sup> 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).

<sup>2</sup> Percent turf area infested with pink snow mold per 3 x 5-ft plot. Fungicides were applied in 1.89 gal H<sub>2</sub>O per 1,000 sq ft at 30 psi applied with an air induction 85025 nozzle on 20 November 2014 and for treatment 5 on 30 March 2015. Turf was inoculated on 27 November with 5.2 g of oat seed per plot infested with an isolate of *Microdochium nivale* obtained from the Peace Pipe Golf Course. Turf was covered with two layers of a permeable turf cover to enhance disease development.

<sup>3</sup> Turf quality on a 1 to 9 scale, where 9 = best quality and 5 = commercially acceptable quality.

<sup>4</sup> Color of foliage on a 1 to 10 scale, where 5 = color of untreated turf, <5 = increasingly chlorotic turf, and >5 = increasingly dark green turf.

<sup>5</sup> Phytotoxicity on a 1 to 5 scale, where 1 = no discoloration, 2 = slight foliar chlorosis or necrosis, 3 = moderate chlorosis or necrosis, 4 = severe chlorosis or necrosis, and 5 = all turf dead.

<sup>6</sup> Fungicides were applied on 20 November 2014.

<sup>7</sup> For treatment 5, a second application was scheduled for January 2015, but due to extensive snow cover, that application was delayed to 30 March. This treatment was irrigated with 0.5 gal H<sub>2</sub>O after application.

<sup>8</sup> DAT = Days after the last treatment.



Table 3B. Control of pink snow mold on golf course lower tee #3, Peace Pipe Golf Course, Denville, NJ: Rutgers University, 2014-2015.

Treatment	Rate per 1000 sq ft	Application Schedule <sup>6</sup>	Disease Severity <sup>1,2</sup>		Turf Quality <sup>3</sup>		Color <sup>4</sup>		Phytotoxicity <sup>5</sup>	
			15 April	15 April	15 April	15 April	15 April	15 April	15 April	15 April
1 Disarm C 4.24SC.....	5.9 fl oz	—								
+ Chipco 26GT 2SC.....	4.0 fl oz	Nov	0.0 g	7.3 bc	3.3 ab	1.0 a				
2 Disarm T SC.....	0.89 fl oz	Nov	0.0 g	8.0 ab	2.9 c	1.0 a				
3 Disarm 480SC.....	0.36 fl oz	—								
+ Daconil Ultrex 82.5WDG.....	5.0 oz	—								
+ Chipco 26GT 2SC.....	4.0 fl oz	Nov	0.0 g	7.3 bc	3.0 bc	1.0 a				
4 Disarm T SC.....	0.89 fl oz	—								
+ Turf Screen.....	3.0 oz	Nov	0.3 g	8.5 a	3.1 bc	1.0 a				
5 Varnimo WP.....	0.735 oz	—								
+ KaPre Remede8 LC.....	3.0 fl oz	Nov/March <sup>7</sup>	44.8 b	3.4 fg	3.0 bc	1.0 a				
6 A 13705W 1.6SC.....	2.6 fl oz	Nov	0.0 g	7.8 a-c	3.0 bc	1.0 a				
7 A 20744B WG.....	0.5 oz	Nov	65.0 a	2.0 h	3.0 bc	1.0 a				
8 Concert II 4.3L.....	5.0 fl oz	Nov	25.5 c-e	4.2 d-f	3.1 bc	1.4 b				
9 Instrata 3.6XL.....	7.0 fl oz	Nov	21.8 d-e	4.5 de	3.0 bc	1.5 b				
10 Interface 2.27SC.....	6.0 fl oz	Nov	2.5 g	7.5 a-c	3.6 a	1.0 a				
11 Instrata 3.6XL.....	7.0 fl oz	Nov	15.3 f	4.8 d	3.3 b	1.0 a				
12 Tartan 2.4SC.....	2.0 fl oz	Nov	0.8 g	8.4 a	3.2 bc	1.0 a				
13 Tartan 2.4SC.....	1.0 fl oz	—								
+ Interface 2.27SC.....	3.0 fl oz	Nov	1.3 g	8.0 ab	3.1 bc	1.0 a				
14 RU-22112-14F.....	0.47 fl oz	Nov	51.5 b	2.4 gh	3.0 bc	1.0 a				
15 RU-22112-14F.....	0.71 fl oz	Nov	34.3 c	3.5 ef	3.0 bc	1.0 a				
16 RU-22112-14F.....	0.94 fl oz	Nov	32.5 c	3.5 ef	2.9 c	1.0 a				
17 RU-22112-14G.....	0.47 fl oz	Nov	34.5 c	4.0 d-f	2.9 c	1.0 a				
18 RU-22112-14G.....	0.71 fl oz	Nov	33.8 c	3.5 ef	3.0 bc	1.0 a				
19 RU-22112-14G.....	0.94 fl oz	Nov	30.0 cd	3.5 ef	3.1 bc	1.0 a				
20 Turfcide 400F 4F.....	12.0 fl oz	Nov	1.8 g	6.8 c	2.9 c	2.0 c				
21 Chipco 26GT 2SC.....	4.0 fl oz	—								
+ Daconil Ultrex 82.5WDG.....	5.0 oz	Nov	19.0 ef	4.1 d-f	3.0 bc	1.0 a				

(Continued)

Table 3B. Pink snow mold on golf course lower tee #3, Peace Pipe Golf Course, Denville, NJ (continued).

Treatment	Rate per 1000 sq ft	Application Schedule <sup>6</sup>	Disease Severity <sup>1,2</sup>	Turf Quality <sup>3</sup>	Color <sup>4</sup>	Phytotoxicity <sup>5</sup>
22 Untreated Check.....	—	—	73.8 a	1.4 h	2.9 c	1.0 a
			DAT <sup>8</sup> 146	DAT 146	DAT 146	DAT 146

<sup>1</sup> 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).

<sup>2</sup> Percent turf area infested with pink snow mold per 3 x 5-ft plot. Fungicides were applied in 1.89 gal H<sub>2</sub>O per 1,000 sq ft at 30 psi applied with an air induction 85025 nozzle on 20 November 2014 and for treatment 5 on 30 March 2015. Turf was inoculated on 27 November with 5.2 g of oat seed per plot infested with an isolate of *Microdochium nivale* obtained from the Peace Pipe Golf Course. Turf was covered with two layers of a permeable turf cover to enhance disease development.

<sup>3</sup> Turf quality on a 1 to 9 scale, where 9 = best quality and 5 = commercially acceptable quality.

<sup>4</sup> Color of foliage on a 1 to 10 scale, where 5 = color of untreated turf, <5 = increasingly chlorotic turf, and >5 = increasingly dark green turf.

<sup>5</sup> Phytotoxicity on a 1 to 5 scale, where 1 = no discoloration, 2 = slight foliar chlorosis or necrosis, 3 = moderate chlorosis or necrosis, 4 = severe chlorosis or necrosis, and 5 = all turf dead.

<sup>6</sup> Fungicides were applied on 20 November 2014.

<sup>7</sup> For treatment 5, a second application was scheduled for January 2015, but due to extensive snow cover, that application was delayed to 30 March. This treatment was irrigated with 0.5 gal H<sub>2</sub>O after application.

<sup>8</sup> DAT = Days after the last treatment.