SNOW MOLD CONTROL IN A MIXED CREEPING BENTGRASS AND ANNUAL BLUEGRASS FAIRWAY WITH VARIOUS FUNGICIDES, 2010-2011

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INTRODUCTION

Gray snow mold (*Typhula incarnata*) is a common winter disease in Pennsylvania and the surrounding regions. Depending on snow cover, damage from this disease may be apparent in the spring following snow melt. Since the length of snow cover is not predictable with any certainty prior to winter, golf course superintendents must rely on preventive applications of single or tank-mixed fungicides for the suppression of the disease. The objective of this field study was to determine the efficacy of various commercially available and experimental fungicides on gray snow mold.

MATERIALS & METHODS

This field trial was initiated 22 November 2010 on the 17th fairway at Yahnundasis Golf Club in New Hartford, NY. The fairways consisted of a mixed stand of creeping bentgrass (*Agrostis stolonifera*) and annual bluegrass (*Poa annua*). The site was selected due to the prolonged period of snow cover from extensive shade provided by a large planting of pine trees (*Pinus* spp.) to the south of the study. The study area was not treated with any fungicide as part of the golf course's preventative fungicide applications for snow mold management. Soil at the site was a loamy clay with a pH of 5.8.

All sprayable treatments were applied with a CO_2 pressurized (40 psi) sprayer equipped with a flat-fan nozzle (AI9508E) that was calibrated to deliver either 1.0 or 2.0 gal water per 1000 ft^2. Granular treatments were applied by hand. Treatments were applied once on 22 November 2010. At the time of application, air and soil temperatures were 46F and 42F, respectively. Although no dew was present, the area received a small amount of precipitation in the form of a light drizzle during the application of treatments and a steady rain began within an hour of applying the final treatment.

Plots measured 3 ft x 6 ft, and were arranged in a randomized complete block with four replications. Ratings were conducted on 7 April 2011. Due to an overspray of the existing fairway into the study site, several treatments within block 4 were eliminated from the analysis. Plots within block 4 that were not sprayed with the fungicide, however, were included in the statistical analysis. Percent of plot area blighted by snow mold (predominantly *Typhula incarnata*, but trace levels of *Microdochium nivale* were present) was assessed visually on a linear 0 to 100% scale where 0 = entire plot area green and healthy, and 100 = entire plot area blighted. Although disease pressure was variable, treatments resulting in ≤ 5% or ≤ 10% were considered to have provided excellent or acceptable disease control, respectively. No injury was present in any plot and therefore those data were not assessed.

RESULTS & DISCUSSION

Snow cover was prolonged at the study site relative to previous years and disease pressure was considered severe. Percent disease was assessed on 7 April, but according to the

superintendents, minor recovery of the turf started the week prior to ratings. Despite this recover, as much as 84% snow mold was observed in select plots on the 7 April rating date. The greatest suppression of snow mold (0% disease) was observed in plots treated with QP Chlorothalonil + QP Ipro + QP Tebuconazole with or without Foursome. Excellent suppression (≤ 5%) of snow mold was observed within plots treated with Torque + Spectro, Interface (6.0 fl oz) + Triton FLO, Fresh Seal + Insignia + Trinity, Insignia + Trinity, Fresh Seal + Insignia + Trinity + Daconil Ultrex, QP Chlorothalonil + QP Ipro + QP Tebuconazole, QP Ipro + QP Tebuconazole, and QP TM/C + QP Tebuconazole. Treatments considered to provide acceptable suppression (≤ 10%) of snow mold included Headway G, S_Confidential, S_Confidential + Daconil WeatherStik, S_Confidential + Medallion, Torque + Affirm, Interface (4.0 fl oz) + Triton FLO, Insignia + Trinity + Daconil Ultrex, and QP_Confidential. Plots treated with Concert + Banner MAXX or Medallion, Renown, Torque + 26/36, V_Confidential + Tourney, QP Chlorothalonil + QP Ipro + QP Fludioxonil, QP_Confidential + Foursome, and QP Chlorothalonil + QP Ipro + QP Fludioxonil + Foursome >10% snow mold, but were not statistically different than those treatments providing complete disease suppression. Moderate disease suppression (less control than those providing complete control, but greater suppression than the untreated controls) was observed within plots treated with Concert (both rates), Instrata (both rates), QP Ipro + QP Propiconazole, and PCNB (6.0 fl oz). Treatments in which disease levels were statistically similar to the untreated control plots included Daconil WeatherStik, QP TM/C + QP Ipro + QP Propiconazole with or without Foursome, QP Ipro + QP Fludioxonil, QP TM/C + QP Fludioxonil, and PCNB (12 fl oz).

While variation in treatments were visible in the study area, several treatments provided excellent to acceptable suppression of gray snow mold. A factor that may have played an important role in the success or failure of select products to suppress gray snow mold may have been the occurrence of significant precipitation within an hour following the final application of treatments. This can be observed within plots treated with PCNB which would normally be considered a standard fungicide for the gray snow mold suppression. In this study, greater disease suppression was observed within plots treated with the 6.0 fl oz of PCNB when compared to plots treated with 12.0 fl oz of the same product (the lower rate was applied several minutes prior to the higher rate). The precipitation following the completion of treatments may have prevented or inhibited the fungicides' effectiveness. Regardless, results of this study remain very useful for golf course superintendents who wish to select effective alternatives to PCNB or who need to apply fungicides in less than ideal weather conditions.

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Table 1. Percent snow mold in a creeping bentgrass and annual bluegrass fairway following the application of various fungicide, 7 April 2011.

	Treatment and rate per 1000 sq ft[z]	Snow mold[y]
1	Concert 5.0 fl oz	22 f-k
2	Concert 8.5 fl oz	27 e-i
3	Concert 8.5 fl oz + Banner MAXX 1.0 fl oz	18 g-m
4	Concert 8.5 fl oz + Medallion 0.25 oz	18 g-m
5	Instrata 5.0 fl oz	28 e-i
6	Instrata 9.0 fl oz	20 g-l
7	Headway G 4.0 lb	10 i-m
8	Renown 4.5 fl oz	15 h-m
9	S_Confidential 1.3 fl oz	6 klm
10	S_Confidential 1.3 fl oz + Daconil WeatherStik 5.5 fl oz	6 klm
11	Daconil WeatherStik 5.5 fl oz	40 c-f
12	S_Confidential 1.3 fl oz + Medallion 0.25 oz	10 i-m
13	Torque 0.6 fl oz + Spectro 3.67 oz	4 klm
14	Torque 0.6 fl oz + 26/36 4.0 fl oz	18 g-m
15	Torque 0.6 fl oz + Affirm 0.9 oz	9 i-m
16	Interface 4.0 fl oz + Triton Flo 0.85 fl oz	6 klm
17	Interface 6.0 fl oz + Triton Flo 0.85 fl oz	2 lm
18	V_Confidential 0.6 fl oz + Tourney 0.28 oz	11 i-m
19	Fresh Seal Br 10% v/v + Insignia SC 0.54 fl oz + Trinity 1.0 fl oz[w]	2 lm
20	Insignia SC 0.54 fl oz + Trinity 1.0 fl oz[w]	1 lm
21	Fresh Seal Br 10% v/v + Insignia SC 0.54 fl oz + Trinity 1.0 fl oz + Daconil Ultrex 3.2 oz[w]	1 lm
22	Insignia SC 0.54 fl oz + Trinity 1.0 fl oz + Daconil Ultrex 3.2 oz[w]	10 i-m
23	QP TM/C 6.0 oz + QP Ipro 2 SE 4.0 fl oz + QP Propiconazole 14.3 2.0 fl oz	36 c-g
24	QP_Confidential 11.75 fl oz	7 j-m
25	QP Chlorothalonil 720 5.5 fl oz + QP Ipro 2 SE 4.0 fl oz + QP Tebuconazole 0.69 fl oz	1 m
26	QP Chlorothalonil 720 4.76 fl oz + QP Ipro 2 SE 2.23 fl oz + QP Fludioxonil 0.36 fl oz	15 h-m
27	QP TM/C 6.0 oz + QP Ipro 2 SE 4.0 fl oz + QP Propiconazole 14.3 2.0 fl oz + Foursome 0.4 fl oz	46 b-e
28	QP_Confidential 11.75 fl oz + Foursome 0.4 fl oz	16 h-m
29	QP Chlorothalonil 720 5.5 fl oz + QP Ipro 2 SE 4.0 fl oz + QP Tebuconazole 0.69 fl oz + Foursome 0.4 fl oz	0 m
30	QP Chlorothalonil 720 4.76 fl oz + QP Ipro 2 SE 2.23 fl oz + QP Fludioxonil 0.36 fl oz + Foursome 0.4 fl oz	19 g-m
31	QP Chlorothalonil DF 1.8 oz + QP Ipro 2 SE 4.0 fl oz + QP Tebuconazole 0.69 fl oz	0 m
32	QP Ipro 2 SE 2.23 fl oz + QP Fludioxonil 0.36 fl oz	32 d-h
33	QP Ipro 2 SE 4.0 fl oz + QP Tebuconazole 0.69 fl oz	5 klm
34	QP Ipro 2 SE 2.23 fl oz + QP Propiconazole 14.3 2.0 fl oz	25 f-j
35	QP TM/C 6.0 oz + QP Fludioxonil 0.36 fl oz	55 bc
36	QP TM/C 6.0 oz + QP Tebuconazole 0.69 fl oz	5 klm
37	QP TM/C 6.0 oz + QP Propiconazole 14.3 2.0 fl oz	76 a

Table 1. Percent snow mold in a creeping bentgrass and annual bluegrass fairway following the application of various fungicide, 7 April 2011.

	Treatment and rate per 1000 sq ft[z]	Snow mold[y]
38	PCNB 6.0 fl oz.....	22 f-k
39	PCNB 12.0 fl oz.....	44 b-e
40	Untreated	48 bcd
41	Untreated	45 b-e
42	Untreated	60 ab

[z] Treatments were applied on 2 Dec 2009.

[y] Percent of plot area blighted by snow mold was assessed visually on a linear 0 to 100% scale where 0 = entire plot area green and healthy, > 10 = unacceptable disease pressure for a golf course fairway, and 100 = entire plot area blighted.

[x] Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ level according to the Fisher's protected least significant difference t-test.

[w] Designated treatments were applied in 1.0 gal of water per 1000 sq ft.