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Fungicides for Control of Snow Mold Disease in Cool-Season Turf 2020-21 Report

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Fungicides for Control of Snow Mold Disease in Cool-Season Turf 2020-21 Report

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The Bottom Line: Fourteen combinations of commercially available fungicide treatments were tested against an untreated control for their ability to prevent the development of pink snow mold (*Microdochium nivale*) and/or gray snow mold (*Typhula* spp.) diseases in a mixed stand of kentucky bluegrass (*Poa pratensis*) and annual bluegrass (*Poa annua*) on both fairway and rough turf at the Martis Camp Club in Truckee, CA. All treatments were applied preventatively and once on November 23, 2020. Upon permanent snowmelt in early April 2021, disease cover was not as uniform as wanted and more prominent in rough compared to fairway turf. Typically at Martis Camp, a combination of pink and gray snow mold contribute to disease cover in the rough; whereas, mostly pink snow mold is found on the fairways. In general, all of the fungicide treatments significantly reduced snow mold disease cover compared to the untreated control as evidenced by disease cover in the rough. Although few significant differences were observed among fungicide treatments, Premion + Secure + Foursome and Traction + 26/36 + Par SG provided the lowest disease cover and highest turf quality numerically in this study. Overall, results of this study demonstrated several fungicides and combinations that are effective against snow mold diseases on fairway and rough turf. The most effective treatments were related by inclusion of pentachloronitrobenzene (PCNB).

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Introduction

Gray snow mold (GSM) caused by the fungi *Typhula incarnata* or *T. ishikariensis*, is a cool-season turfgrass disease in areas with prolonged snow cover (usually 60 days or longer). Gray snow mold is most severe when heavy snow falls on unfrozen ground. In severe cases, GSM can kill large areas of turf, and recovery can be extremely slow. Typically, disease activity and resultant turf injury are related to the length of snow cover, under which the symptoms of the disease develop. Gray snow mold symptoms usually appear as circular or irregular patches up to 3 feet or more in diameter. Turf within these patches turns

Cover photo taken on May 1, 2019. Truckee, CA.

white or gray and matted together and small, tan or brown fruiting bodies (sclerotia) can be seen on infected leaves or imbedded within foliage. Control of GSM on large areas like golf course fairways with extended snow cover normally involves one timely application before the first significant snowfall event. Pentachloronitrobenzene (PCNB), demethylation inhibitor (DMI), quinone outside inhibitor (QoI), dicarboximide, and chloronitrile fungicides are typically used to manage this disease.

Pink snow mold (PSM) or *Microdochium* patch caused by *Microdochium nivale* can also develop during periods of snow cover, with symptoms of the disease becoming evident as the snow melts. However, unlike GSM, snow cover is not necessary for extensive pink snow mold infection. Disease symptoms include roughly circular patches from 2 inches to 1 foot in diameter that are white or light tan in color. A ring of pink-colored growth is present on the outer edge of patches when the disease is actively developing. Infected leaves within the patches are usually collapsed and matted down. Many of the same fungicide classes are effective against both GSM and PSM.

Objectives

This study was conducted to evaluate efficacy of 15 different fungicide treatments to control gray snow mold (*Typhula* spp.) and pink snow mold (*Microdochium nivale*) diseases preventively in kentucky bluegrass (*Poa pratensis*) and annual bluegrass (*Poa annua*) turf maintained as a golf course fairway or rough.

Materials and Methods

The study was conducted on the fairway and adjacent rough of the practice facility at the Martis Camp Club in Truckee. Turf was a mix of kentucky bluegrass (*Poa pratensis*) and annual bluegrass (*Poa annua*). Fungicide treatments were applied preventively on November 23, 2020, just after the first significant snowfall of the season. In fact, some snow had to be shoveled off the turf before applications were made. Treatments (Table 1) were applied using a CO_2-powered backpack sprayer equipped with TeeJet 8003VS nozzles calibrated to deliver 2 gallons/1000 ft^2 of carrier. Experimental design was a complete randomized block with 4 replications [replicated for each height of cut (HOC)]. Plot size was 4 ft × 6 ft with 2-ft alleys.

Plots were evaluated for overall disease cover (0-100%) as well as for turfgrass visual quality (1-9; 9=best) by separate evaluators on April 2 and 8, 2021. Data were analyzed using analysis of variance for each evaluated trait and rating event separately and the means were compared using the Fisher's protected least significant difference (LSD) test at the 0.05 probability level ($P \leq 0.05$).

Results

The winter of 2020-21 in the Sierra was characterized by lower-than-average snowfall with intermittent rainfall and periods of alternate freezing and thawing, which resulted in significant winter injury to turf in lower areas of the golf course or where ice cover could not be removed in a timely manner. There was also a greater than normal incidence of snow mold disease throughout the golf course on fairways, approaches, and in the rough. Upon permanent snowmelt in early April 2021, disease cover on the study area was not as uniform as wanted and more prominent in rough compared to fairway turf (Tables 2 and 3; Figs. 1-3). No winter injury occurred in the study area. Typically at Martis Camp, a combination of pink and gray snow mold contribute to disease cover in the rough; whereas, mostly pink snow mold is found on the fairways. In general, all of the fungicide treatments significantly reduced snow mold disease cover

compared to the untreated control as evidenced by disease cover in the rough (Table 2). Although few significant differences were observed among fungicide treatments, Premion + Secure + Foursome and Traction + 26/36 + Par SG provided the lowest disease cover and highest turf quality numerically in this study (Tables 2 and 3). Evidence of rapid turf recovery from snow mold disease was observed one week later and from no statistical differences found among treatments (Table 3; Fig. 3). Overall, results of this study demonstrated several fungicides and combinations that are effective against snow mold diseases on fairway and rough turf. The most effective treatments were related by inclusion of pentachloronitrobenzene (PCNB).

Tables and Figures

Table 1. Fungicide treatments tested against gray snow mold and pink snow mold diseases in Truckee, CA. 2020-21.

No.	Treatment	Active ingredient	Company	Rate		Timing
1	Untreated Control	-	-			-
2	Daconil WeatherStik	chlorothalonil	Syngenta	5.0	oz/M	A
	Banner Maxx II	propiconazole	Syngenta	3.0	oz/M	
3	Premion	pentachloronitrobenzene (PCNB), tebuconazole	AMVAC	10.0	oz/M	A
	Previa	chlorothalonil	AMVAC	4.0	oz/M	
	Foursome	*pigment*	Quali-Pro	0.5	oz/M	
4	Premion	pentachloronitrobenzene (PCNB), tebuconazole	AMVAC	10.0	oz/M	A
	Secure	fluazinam	Syngenta	0.5	oz/M	
	Foursome	*pigment*	Quali-Pro	0.5	oz/M	
5	Concert II	chlorothalonil, propiconazole	Syngenta	5.5	oz/M	A
	Turfcide 400	pentachloronitrobenzene (PCNB)	AMVAC	6.0	oz/M	
	Foursome	*pigment*	Quali-Pro	0.5	oz/M	
6	Concert II	chlorothalonil, propiconazole	Syngenta	5.5	oz/M	A
	Turfcide 400	pentachloronitrobenzene (PCNB	AMVAC	8.0	oz/M	
	Foursome	*pigment*	Quali-Pro	0.5	oz/M	
7	Concert II	chlorothalonil, propiconazole	Syngenta	8.3	oz/M	A
	Turfcide 400	pentachloronitrobenzene (PCNB	AMVAC	8.0	oz/M	
	Foursome	*pigment*	Quali-Pro	0.5	oz/M	
8	Insignia SC Intrinsic	pyraclostrobin	BASF	0.9	oz/M	A
	Trinity	triticonazole	BASF	1.0	oz/M	
9	Insignia SC Intrinsic	pyraclostrobin	BASF	0.9	oz/M	A
	Trinity	triticonazole	BASF	1.0	oz/M	
	Daconil WeatherStik	chlorothalonil	Syngenta	5.0	oz/M	
10	Interface Stressgard	iprodione, trifloxystrobin	Bayer	6.0	oz/M	A
	Mirage Stressgard	tebuconazole	Bayer	2.0	oz/M	
11	Traction	fluazinam, tebuconazole	Nufarm	1.3	oz/M	A
	26/36	thiophanate-methyl, iprodione	Nufarm	6.0	oz/M	
12	Traction	fluazinam, tebuconazole	Nufarm	1.3	oz/M	A
	26/36	thiophanate-methyl, iprodione	Nufarm	6.0	oz/M	
	Par SG	*pigment*	Harrell's	0.1	oz/M	
13	Traction	fluazinam, tebuconazole	Nufarm	1.3	oz/M	A
	26/36	thiophanate-methyl, iprodione	Nufarm	4.0	oz/M	
	Banner Maxx II	propiconazole	Syngenta	2.0	oz/M	
14	Instrata	chlorothalonil, propiconazole, fludioxonil	Syngenta	7.0	oz/M	
15	Instrata	chlorothalonil, propiconazole, fludioxonil	Syngenta	11.0	oz/M	A

Application codes (timing):
A – 11/23/2020

Table 2. Effects of height of cut (HOC) and fungicide treatments on overall disease cover (0-100%) and turfgrass visual quality (1-9; 9=best) on April 2, 2021 (18 WAIT[**]), evaluated on mixed stand of kentucky bluegrass (*Poa pratensis*) and annual bluegrass (*Poa annua*). Truckee, CA.

No.	Treatment	Disease Cover (0-100%)		
		FAIRWAY	ROUGH	COMBINED
1	Untreated Control	34[*]	55 A[*]	44 A[*]
2	Daconil WeatherStik[***] + Banner Maxx II	33	10 B	21 B
3	Premion + Previa + Foursome	11	0 B	5 CD
4	Premion + Secure + Foursome	5	1 B	3 D
5	Concert II + Turfcide 400 + Foursome	6	5 B	6 CD
6	Concert II + Turfcide 400 + Foursome	11	2 B	7 B-D
7	Concert II + Turfcide 400 + Foursome	12	14 B	13 B-D
8	Insignia SC Intrinsic + Trinity	25	10 B	17 B-D
9	Insignia SC Intrinsic + Trinity + Daconil WeatherStik	15	1 B	8 B-D
10	Interface Stressgard + Mirage Stressgard	16	12 B	14 B-D
11	Traction + 26/36	13	2 B	8 B-D
12	Traction + 26/36 + Par SG	8	0 B	4 CD
13	Traction + 26/36 + Banner Maxx II	16	18 B	17 B-D
14	Instrata	28	1 B	14 B-D
15	Instrata	24	12 B	18 BC

No.	Treatment	Visual Quality (1-9; 9=best)		
		FAIRWAY	ROUGH	COMBINED
1	Untreated Control	4.2 B-D[*]	4.2 D[*]	4.5 E[*]
2	Daconil WeatherStik[***] + Banner Maxx II	4.8 B-D	5.2 B-D	5.0 C-E
3	Premion + Previa + Foursome	5.8 A-C	7.0 A	6.4 AB
4	Premion + Secure + Foursome	6.2 A	6.8 A	6.5 A
5	Concert II + Turfcide 400 + Foursome	6.0 AB	6.5 AB	6.2 AB
6	Concert II + Turfcide 400 + Foursome	5.5 A-D	6.8 A	6.1 AB
7	Concert II + Turfcide 400 + Foursome	5.0 A-D	6.0 A-C	5.5 B-D
8	Insignia SC Intrinsic + Trinity	4.2 D	5.8 A-C	5.0 C-E
9	Insignia SC Intrinsic + Trinity + Daconil WeatherStik	4.8 B-D	5.2 B-D	5.0 C-E
10	Interface Stressgard + Mirage Stressgard	5.8 A-C	5.8 A-C	5.8 A-C
11	Traction + 26/36	5.0 A-D	6.0 A-C	5.5 B-D
12	Traction + 26/36 + Par SG	5.5 A-D	7.0 A	6.2 AB
13	Traction + 26/36 + Banner Maxx II	5.0 A-D	4.8 CD	4.9 C-E
14	Instrata	4.2 D	5.8 A-C	5.0 C-E
15	Instrata	4.5 CD	5.0 CD	4.8 DE

[*] Means followed by the same letter or by no letter in a column are not significantly different (P=0.05).

[**] WAIT – weeks after initial treatment.

[***] For fungicides rates, refer to Table 1.

Table 3. Effects of height of cut (HOC) and fungicide treatments on overall disease cover (0-100%) and turfgrass visual quality (1-9; 9=best) on April 8, 2021 (19 WAIT[**]), evaluated on mixed stand of kentucky bluegrass (*Poa pratensis*) and annual bluegrass (*Poa annua*). Truckee, CA.

No.	Treatment	Disease Cover (0-100%)		
		FAIRWAY	ROUGH	COMBINED
1	Untreated Control	22[*]	34[*]	28[*]
2	Daconil WeatherStik[***] + Banner Maxx II	13	28	21
3	Premion + Previa + Foursome	18	5	11
4	Premion + Secure + Foursome	9	3	6
5	Concert II + Turfcide 400 + Foursome	14	14	14
6	Concert II + Turfcide 400 + Foursome	14	3	8
7	Concert II + Turfcide 400 + Foursome	14	15	14
8	Insignia SC Intrinsic + Trinity	22	15	18
9	Insignia SC Intrinsic + Trinity + Daconil WeatherStik	7	8	7
10	Interface Stressgard + Mirage Stressgard	2	24	13
11	Traction + 26/36	11	6	9
12	Traction + 26/36 + Par SG	5	4	5
13	Traction + 26/36 + Banner Maxx II	12	20	16
14	Instrata	21	6	13
15	Instrata	23	16	20

No.	Treatment	Visual Quality (1-9; 9=best)		
		FAIRWAY	ROUGH	COMBINED
1	Untreated Control	5.5[*]	4.5[*]	5.0[*]
2	Daconil WeatherStik[***] + Banner Maxx II	5.8	5.0	5.4
3	Premion + Previa + Foursome	5.5	6.0	5.8
4	Premion + Secure + Foursome	6.5	6.3	6.4
5	Concert II + Turfcide 400 + Foursome	5.8	5.8	5.8
6	Concert II + Turfcide 400 + Foursome	6.3	6.3	6.3
7	Concert II + Turfcide 400 + Foursome	5.3	6.0	5.6
8	Insignia SC Intrinsic + Trinity	5.5	5.5	5.5
9	Insignia SC Intrinsic + Trinity + Daconil WeatherStik	6.3	5.3	5.8
10	Interface Stressgard + Mirage Stressgard	6.8	5.0	5.9
11	Traction + 26/36	5.8	5.5	5.6
12	Traction + 26/36 + Par SG	6.3	6.0	6.1
13	Traction + 26/36 + Banner Maxx II	5.8	4.5	5.1
14	Instrata	5.3	5.8	5.5
15	Instrata	4.5	5.0	4.8

[*] Means followed by the same letter or by no letter in a column are not significantly different (P=0.05).
[**] WAIT – weeks after initial treatment.
[***] For fungicides rates, refer to Table 1.

Figure 1. Snow mold disease pressure on plots in fairway (red flags) at Martis Camp Club, Truckee, CA. Note line delineating plot overspray (right) and disease (left). Photo taken on April 2, 2021.

Figure 2. Snow mold disease pressure in untreated control plot (golf ball) in rough (white flags) at Martis Camp Club, Truckee, CA. Plots on left and right sides of control were treatments 5 and 14, respectively. Photo taken on April 2, 2021.

Figure 3. Overview of snow mold disease fungicide trial area at Martis Camp Club, Truckee, CA. Plots in fairway surrounded by red flags and in rough by white flags. Photo taken on April 8, 2021.