



**2019-2020 Snow Mold Timing Evaluation:  
OJ Noer Research Facility – Madison, WI  
Wausau Country Club – Schofield, WI  
Timber Ridge Golf Club – Minocqua, WI**

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## **OBJECTIVE**

To evaluate optimal timing of fungicide applications and efficacy of alternative products to control gray snow mold (*Typhula incarnata*), speckled snow mold (*T. ishkariensis*), and Microdochium patch (*Microdochium nivale*) on fairway height turfgrass.

## **MATERIALS AND METHODS**

This evaluation was conducted at three locations: the OJ Noer Turfgrass Research and Education Facility in Madison, WI on an ‘Alpha’ creeping bentgrass (*Agrostis stolonifera*) fairway maintained at a height of 0.5 inches, and at Wausau Country Club in Schofield, WI and at Timber Ridge Golf Club in Minocqua, WI on a creeping bentgrass and annual bluegrass (*Poa annua*) golf course fairway maintained at a height of 0.5 inches. Individual plots measured 3 ft x 10 ft and were arranged in a randomized complete block design with four replications. Individual treatments were applied at a nozzle pressure of 40 psi using a CO<sub>2</sub>-pressurized boom sprayer equipped with two AI8004 Teejet air induction nozzles. All fungicides were agitated by hand and applied in the equivalent of 1.5 gallons of water per 1000 ft<sup>2</sup>. Disease severity, turf quality, and turf color were evaluated on 23 Mar 2020 in Madison, on 2 Apr 2020 in Schofield, and on 9 Apr 2020 in Minocqua. Disease severity was visually rated as percent area affected and turfgrass quality was visually rated on a 1-9 scale with 6 being acceptable. Treatment means were analyzed using Fisher’s LSD method and are presented in the following tables.

## **RESULTS AND DISCUSSION**

All three locations exhibited strong disease pressure with non-treated controls averaging 56% in Madison, 89% in Wausau, and 98% in Minocqua. The primary snow mold disease present in Madison was gray snow mold (*T. incarnata*), in Wausau it was pink snow mold (*M. nivale*), and in Minocqua it was speckled snow mold (*T. ishkariensis*). Each trial also showed a sharp drop off in disease severity between successive treatment timings. The sharp drop off occurred on 10/26/19 in both Minocqua and Wausau, and on 10/14/19 in Madison, which roughly correlated with HDD surpassing 150 at each site. The alternative products tested failed to provide snow mold suppression at any of the three sites despite 6 applications made throughout the fall. Turf quality and turf color mostly mirrored disease severity. Phytotoxicity was not observed with any treatment, though the iron sulfate treatment was very dark at the end of the study.

**Table 1. Mean snow mold severity and turf quality were assessed on March 23, 2020 at the OJ Noer Turfgrass Research and Education Facility in Madison, WI.**

	Treatment	Rate	Application Timing <sup>a</sup>	Disease Severity <sup>b</sup>	Turf Quality <sup>c</sup>	Turf Color <sup>d</sup>
1	Non-treated control			56.3ab	3.0cd	129.0-
2	Instrata	9.3 fl oz/1000 ft <sup>2</sup>	A	70.0a	2.5d	126.0-
3	Instrata	9.3 fl oz/1000 ft <sup>2</sup>	B	13.8c	5.3b	181.3-
4	Instrata	9.3 fl oz/1000 ft <sup>2</sup>	C	2.5c	6.8a	175.0-
5	Instrata	9.3 fl oz/1000 ft <sup>2</sup>	D	3.8c	6.5a	175.3-
6	Instrata	9.3 fl oz/1000 ft <sup>2</sup>	E	0.0c	7.0a	180.0-
7	Instrata	9.3 fl oz/1000 ft <sup>2</sup>	F	0.0c	7.0a	175.5-
8	Banner Maxx	2.0 fl oz/1000 ft <sup>2</sup>	ABCDEF	0.0c	7.0a	170.8-
9	Duraphite	6.0 fl oz/1000 ft <sup>2</sup>	ABCDEF	42.5b	3.8c	164.5-
10	Extreme Green 20	6.0 oz/1000 ft <sup>2</sup>	ABCDEF	52.5ab	3.3cd	171.5-
11	Duraphite	6.0 fl oz/1000 ft <sup>2</sup>	ABCDEF	40.0b	3.5cd	176.5-
	Extreme Green 20 Ambient Plus	6.0 oz/1000 ft <sup>2</sup> 0.37 fl oz/1000 ft <sup>2</sup>				
LSD P=.05				20.73	1.21	41.32

<sup>a</sup>Application codes: A=9/30/19, B=10/15/19, C=11/4/19, D=11/15/19, E=12/2/19, F=12/6/19

<sup>b</sup>Mean percent diseased area assessed on March 23, 2020. Means followed by the same letter are not statistically different.

<sup>c</sup>Quality was visually assessed where 1 = dead, 6 = acceptable, 9 = dark green.

<sup>d</sup>Color was assessed using a FieldScout CM1000 Chlorophyll Meter from Spectrum Technologies, Inc.

**Table 2: Heating Degree Days and 2-inch soil temperature at the OJ Noer Turfgrass Research Facility in Madison, WI in 2019-2020.**

Trt #	Application Date(s)	HDD <sup>z</sup>	2" Soil Temp (F)
1	Non-treated	NA	NA
2	Sep 30	0	67.8
3	Oct 15	32.3	49.5
4	Nov 4	178.6	43.3
5	Nov 15	491.8	41.8
6	Dec 2	728.4	39.4
7	Dec 6	817.6	32.3
8	All of the above	-	-
9	All of the above	-	-
10	All of the above	-	-
11	All of the above	-	-

<sup>z</sup>Heating Degree Days was calculated by taking the mean temperature for each day beginning on July 1<sup>st</sup> and subtracting that number from 50°F. Negative numbers (ie means temperatures above 50°F) were removed and the summation is presented here.

**Table 3. Mean snow mold severity and turf quality were assessed on April 2, 2020 at Wausau Country Club in Schofield, WI.**

	Treatment	Rate	Application Timinn <sup>a</sup>	Disease Severity <sup>b</sup>	Turf Quality <sup>c</sup>	Turf Color <sup>d</sup>
1	Non-treated control			88.8a	1.5b	113.5de
2	Instrata	9.3 fl oz/1000 ft2	A	88.8a	1.5b	123.0de
3	Instrata	9.3 fl oz/1000 ft2	B	82.5ab	2.2b	109.3e
4	Instrata	9.3 fl oz/1000 ft2	C	11.3c	5.7a	241.8a
5	Instrata	9.3 fl oz/1000 ft2	D	0.0c	7.0a	184.8c
6	Instrata	9.3 fl oz/1000 ft2	E	3.8c	6.7a	197.0bc
7	Instrata	9.3 fl oz/1000 ft2	F	2.5c	7.0a	228.0ab
8	Banner Maxx	2.0 fl oz/1000 ft2	ABCDEF	1.3c	7.0a	188.0c
9	Duraphite	6.0 fl oz/1000 ft2	ABCDEF	87.5a	1.4b	114.8de
10	Extreme Green 20	6.0 oz/1000 ft2	ABCDEF	90.0a	1.2b	119.8de
11	Duraphite	6.0 fl oz/1000 ft2				
	Extreme Green 20 Ambient Plus	6.0 oz/1000 ft2 0.37 fl oz/1000 ft2	ABCDEF	72.5b	2.0b	145.0d
LSD P=.05				14.31	1.69	31.51

<sup>a</sup>Application codes: A=9/17/19, B=9/30/19, C=10/14/19, D=10/26/19, E=11/7/19, F=11/20/19

<sup>b</sup>Mean percent diseased area assessed on March 23, 2020. Means followed by the same letter are not statistically different.

<sup>c</sup>Quality was visually assessed where 1 = dead, 6 = acceptable, 9 = dark green.

<sup>d</sup>Color was assessed using a FieldScout CM1000 Chlorophyll Meter from Spectrum Technologies, Inc.

**Table 4: Heating Degree Days and 2-inch soil temperature at Wausau Country Club in Wausau, WI in 2019-2020.**

Trt #	Application Date(s)	HDD <sup>z</sup>	2" Soil Temp (F)
1	Non-treated	NA	NA
2	Sep 17	0	69.1
3	Sep 30	0.9	61.9
4	Oct 14	79.8	43.5
5	Oct 26	296	41.0
6	Nov 7	433	30.2
7	Nov 20	758.6	31.2
8	All of the above	-	-
9	All of the above	-	-
10	All of the above	-	-
11	All of the above	-	-

<sup>z</sup>Heating Degree Days was calculated by taking the mean temperature for each day beginning on July 1<sup>st</sup> and subtracting that number from 50°F. Negative numbers (ie means temperatures above 50°F) were removed and the summation is presented here.

**Table 5. Mean snow mold severity and turf quality were assessed on April 9, 2020 at Timber Ridge Golf Club in Minocqua, WI.**

Treatment	Rate	Application Timinng <sup>a</sup>	Disease Severity <sup>b</sup>	Turf Quality <sup>c</sup>	Turf Color <sup>d</sup>	
1	Non-treated control		98.0a	1.0c	76.5d	
2	Instrata	9.3 fl oz/1000 ft2	A	99.0a	1.0c	79.4cd
3	Instrata	9.3 fl oz/1000 ft2	B	99.0a	1.0c	78.4cd
4	Instrata	9.3 fl oz/1000 ft2	C	97.0a	1.0c	84.4cd
5	Instrata	9.3 fl oz/1000 ft2	D	93.8a	1.0c	86.2cd
6	Instrata	9.3 fl oz/1000 ft2	E	15.0c	5.3a	151.6ab
7	Instrata	9.3 fl oz/1000 ft2	F	12.5c	5.5a	166.1a
8	Banner Maxx	2.0 fl oz/1000 ft2	ABCDEF	35.0b	4.3b	128.6b
9	Duraphite	6.0 fl oz/1000 ft2	ABCDEF	99.0a	1.0c	83.7cd
10	Extreme Green 20	6.0 oz/1000 ft2	ABCDEF	99.0a	1.0c	87.1cd
11	Duraphite	6.0 fl oz/1000 ft2	ABCDEF	99.0a	1.0c	95.3c
	Extreme Green 20 Ambient Plus	6.0 oz/1000 ft2 0.37 fl oz/1000 ft2				
LSD P=.05			7.02	0.51	17.62	

<sup>a</sup>Application codes: A=8/30/19, B=9/17/19, C=9/30/19, D=10/14/19, E=10/26/19, F=11/7/19

<sup>b</sup>Mean percent diseased area assessed on March 23, 2020. Means followed by the same letter are not statistically different.

<sup>c</sup>Quality was visually assessed where 1 = dead, 6 = acceptable, 9 = dark green.

<sup>d</sup>Color was assessed using a FieldScout CM1000 Chlorophyll Meter from Spectrum Technologies, Inc.

**Table 6: Heating Degree Days and 2-inch soil temperature at Timber Ridge GC in Minocqua, WI in 2019-2020.**

Trt #	Application Date(s)	HDD <sup>z</sup>	2" Soil Temp (F)
1	Non-treated	NA	NA
2	Aug 30	0.6	54.6
3	Sep 17	0.6	62.8
4	Sep 30	0.6	56.4
5	Oct 14	86.7	40.9
6	Oct 26	307.2	37.9
7	Nov 7	705.7	30.6
8	All of the above	-	-
9	All of the above	-	-
10	All of the above	-	-
11	All of the above	-	-

<sup>z</sup>Heating Degree Days was calculated by taking the mean temperature for each day beginning on July 1<sup>st</sup> and subtracting that number from 50°F. Negative numbers (ie means temperatures above 50°F) were removed and the summation is presented here.