



## 2013-2014 Snow Mold Control Evaluation Silver Bay CC – Silver Bay, MN



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### OBJECTIVES

To evaluate fungicides for the control of Typhula blight (caused by *Typhula ishikariensis* and *T. incarnata*), Microdochium patch (caused by *Microdochium nivale*), and snow scald (*Myriosclerotinia borealis*).

### MATERIALS AND METHODS

This evaluation was conducted at Silver Bay CC in Silver Bay, MN on a creeping bentgrass (*Agrostis stolonifera*) and annual bluegrass (*Poa annua*) golf course fairway maintained at a height of 0.5 inch. Individual plots measured 3 ft x 10 ft (30 ft<sup>2</sup>), and were arranged in a randomized complete block design with four replications. Individual treatments were applied at a nozzle pressure of 40 p.s.i using a CO<sub>2</sub> pressurized boom sprayer equipped with two XR Teejet 8004 VS nozzles. All fungicides were agitated by hand and applied in the equivalent of 2 gallons of water per 1000 ft<sup>2</sup>. All fungicides were agitated by hand and applied in the equivalent of 2 gallons of water per 1000 ft<sup>2</sup>. All applications were made on October 25<sup>th</sup>, 2013. The experimental plot area was not inoculated. There was consistent snow cover on the experimental area from late November until mid-April, a total of over 120 days. Disease severity, turf quality, and color were recorded on May 6<sup>th</sup>, 2014. Disease severity was visually rated as percent area affected, turfgrass quality was visually rated on a 1-9 scale with 6 being acceptable, Normalized Difference Vegetative Index (turfgrass color) was rated using a GreenSeeker NDVI Turf Color Meter® from NTech Industries (Ukiah, CA). Treatment means were analyzed using the Waller Duncan method and are presented in Table 1.

### RESULTS AND DISCUSSION

Disease pressure was moderate at Silver Bay CC in 2013-2014, with non-treated controls averaging 32.5% disease. Extremely cold temperatures throughout the winter likely resulted in less snow mold than is typically observed at this location. Both snow scald and speckled snow mold (*T. ishikariensis*) were observed in the experimental area. All treatments with the exception of treatment 24 provided suppression of snow mold relative to the non-treated control. The low disease pressure resulted in relatively little separation of products, with 21 of the 24 treatments providing excellent suppression (<6.3%). Most of the effective treatments contained at least three active ingredients, with some treatments containing four or even five active ingredients.

**Table 1: Mean snow mold severity, turf quality, and turf color assessed on May 6<sup>th</sup>, 2014 at Silver Bay CC in Silver Bay, MN.**

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		32.5a	4.3e	0.355c	
2	Instrata	11.0 fl oz/1000 ft2	Late	0.0d	7.0bc	0.450abc
3	Interface	6.0 fl oz/1000 ft2	Late	0.0d	7.3abc	0.510ab
	Mirage	1.5 fl oz/1000 ft2	Late			
4	Interface	6.0 fl oz/1000 ft2	Late	0.0d	7.5ab	0.527a
	Mirage	2.0 fl oz/1000 ft2	Late			
5	SP28296	5.0 fl oz/1000 ft2	Late	0.0d	7.0bc	0.457abc
	Mirage	2.0 fl oz/1000 ft2	Late			
6	SP28296	6.0 fl oz/1000 ft2	Late	0.0d	7.0bc	0.462ab
	Mirage	2.0 fl oz/1000 ft2	Late			
7	SP28296	8.0 fl oz/1000 ft2	Late	0.0d	7.3abc	0.435abc
	Mirage	2.0 fl oz/1000 ft2	Late			
8	SP28297	3.816 fl oz/1000 ft2	Late	0.5d	6.8bc	0.460ab
	Mirage	2.0 fl oz/1000 ft2	Late			
9	SP28297	4.77 fl oz/1000 ft2	Late	0.0d	7.3abc	0.467ab
	Mirage	2.0 fl oz/1000 ft2	Late			
10	SP28297	5.724 fl oz/1000 ft2	Late	0.0d	7.3abc	0.455abc
	Mirage	2.0 fl oz/1000 ft2	Late			
11	Tartan	2.0 fl oz/1000 ft2	Late	0.0d	7.3abc	0.417bc
	Mirage	2.0 fl oz/1000 ft2	Late			
12	Tartan	1.0 fl oz/1000 ft2	Late	0.5d	7.0bc	0.490ab
	Mirage	1.0 fl oz/1000 ft2	Late			
	Chipco 26GT	3.0 fl oz/1000 ft2	Late			
	Tartan	1.0 fl oz/1000 ft2	Late			
13	Mirage	2.0 fl oz/1000 ft2	Late	0.0d	7.3abc	0.517ab
	Chipco 26GT	3.0 fl oz/1000 ft2	Late			
	Interface	3.0 fl oz/1000 ft2	Late			
14	Triton FLO	0.55 fl oz/1000 ft2	Late	6.3cd	6.5c	0.480ab
	Droplex	10.0 fl oz/a	Late			
15	Instrata	5.5 fl oz/1000 ft2	Late	1.3cd	6.5c	0.450abc
	Droplex	10.0 fl oz/a	Late			
16	Banner MAXX II	1.0 fl oz/1000 ft2	Late	13.8bc	5.0de	0.472ab
	Civitas	8.0 fl oz/1000 ft2	Late			
	Harmonizer	0.5 fl oz/1000 ft2	Late			
	Droplex	10.0 fl oz/a	Late			
17	QP TM/C	6.0 oz/1000 ft2	Late	2.5cd	7.3abc	0.512ab
	QP Iprodione	4.0 fl oz/1000 ft2	Late			
	QP Propiconazole	2.0 fl oz/1000 ft2	Late			
	Foursome	0.5 fl oz/1000 ft2	Late			
18	QP TM/C	6.0 oz/1000 ft2	Late	0.0d	8.0a	0.502ab
	QP Iprodione	4.0 fl oz/1000 ft2	Late			
	QP Tebuconazole	0.6 fl oz/1000 ft2	Late			
	Foursome	0.5 fl oz/1000 ft2	Late			

<sup>a</sup>Fungicide treatments were applied on Oct. 25<sup>th</sup>, 2013.

<sup>b</sup>Mean percent diseased area assessed on May 6<sup>th</sup>, 2014.

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

<sup>d</sup>Color was assessed using a Greenseeker NDVI Turf Color Meter from NTech Industries®.

**Table 1 (cont): Mean snow mold severity, turf quality, and turf color assessed on May 6<sup>th</sup>, 2014 at Silver Bay CC in Silver Bay, MN.**

Treatment	Rate	Application Timing <sup>a</sup>	Disease Severity <sup>b</sup>	Turf Quality <sup>c</sup>	Turf Color <sup>d</sup>	
19	QP Iprodione QP Tebuconazole Foursome	4.0 fl oz/1000 ft <sup>2</sup> 1.1 fl oz/1000 ft <sup>2</sup> 0.5 fl oz/1000 ft <sup>2</sup>	Late Late Late	0.0d	8.0a	0.487ab
20	QP Enclave Foursome	8.0 fl oz/1000 ft <sup>2</sup> 0.5 fl oz/1000 ft <sup>2</sup>	Late Late	0.0d	8.0a	0.517ab
21	Torque 26/36	0.75 fl oz/1000 ft <sup>2</sup> 4.0 fl oz/1000 ft <sup>2</sup>	Late Late	0.0d	7.0bc	0.495ab
22	Torque 26/36 Legend	0.75 fl oz/1000 ft <sup>2</sup> 4.0 fl oz/1000 ft <sup>2</sup> 5.0 fl oz/1000 ft <sup>2</sup>	Late Late Late	0.0d	7.0bc	0.477ab
23	Torque 26/36 Heritage TL	0.6 fl oz/1000 ft <sup>2</sup> 4.0 fl oz/1000 ft <sup>2</sup> 1.0 fl oz/1000 ft <sup>2</sup>	Late Late Late	0.0d	7.0bc	0.522a
24	Chipco 26GT Daconil Weatherstik	4.0 fl oz/1000 ft <sup>2</sup> 5.5 fl oz/1000 ft <sup>2</sup>	Late Late	20.0ab	5.3d	0.447abc

<sup>a</sup>Fungicide treatments were applied on Oct. 25<sup>th</sup>, 2013.

<sup>b</sup>Mean percent diseased area assessed on May 6<sup>th</sup>, 2014.

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

<sup>d</sup>Color was assessed using a Greenseeker NDVI Turf Color Meter from NTech Industries®.



*Snow mold pressure at Silver Bay Country Club was moderate.*





**2013-2014 Auxiliary Snow Mold Control Evaluation**  
**Tumbledown Trails Golf Course – Madison, WI**  
**Wausau Country Club – Wausau, WI**  
**Marquette Country Club – Marquette, MI**

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## **OBJECTIVES**

To evaluate fungicide treatments containing PCNB for the control of *Microdochium* patch (*Microdochium nivale*) and Typhula blight (*Typhula incarnata*, *T. ishikariensis*) on golf course turfgrass.

## **MATERIALS AND METHODS**

This evaluation was conducted at three locations; Tumbledown Trails GC in Madison, WI, Wausau Country Club in Schofield, WI and Marquette GC in Marquette, MI. All plots were on a creeping bentgrass (*Agrostis stolonifera*) and annual bluegrass (*Poa annua*) fairway maintained at 0.5. Individual plots measured 3 ft x 10 ft (30 ft<sup>2</sup>), and were arranged in a randomized complete block design with four replications. Individual treatments were applied at a nozzle pressure of 40 p.s.i using a CO<sub>2</sub> pressurized boom sprayer equipped with two XR Teejet 8004 VS nozzles. All fungicides were agitated by hand and applied in the equivalent of 2 gallons of water per 1000 ft<sup>2</sup>, except for 1786-G (2.5 gallons water). Applications were made on November 5<sup>th</sup> at Marquette GC, November 14<sup>th</sup> at Wausau CC, and November 21<sup>st</sup> at Tumbledown Trails. The experimental plot area was not inoculated. Disease severity and turf quality were recorded following snow melt in April of 2014 at all three courses. Disease severity was visually rated as percent area affected, turfgrass quality was visually rated on a 1-9 scale with 6 being acceptable, and Normalized Difference Vegetative Index (turfgrass color) was rated using a HCS 100 GreenSeeker® from Trimble Navigation Ltd (Sunnyvale, CA). Treatment means were analyzed using the Waller Duncan method and are presented in Tables 1, 2, and 3.

## **RESULTS AND DISCUSSION**

Disease pressure absent at Madison and very high and both Wausau and Marquette with non-treated controls averaging 87.5% and 92.5% disease, respectively. The primary disease present in Wausau was pink snow mold and in Marquette was speckled snow mold. At both Wausau and Marquette all treatments except 1786-G reduced snow mold compared to the non-treated control. Interface and Turfcide 400 reduced snow mold significantly though not to the same degree as Instrata. It should be noted that Instrata includes three active ingredients while Interface contains two and the remaining contain only one.

**Table 1: Mean snow mold severity, turf quality, and turf color assessed on April 2<sup>nd</sup>, 2014 at Tumbledown Trails GC 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	Nontreated Control		0.0a	7.0a	0.478a	
2	1786-G	12.0 fl oz/1000 ft <sup>2</sup>	Late	0.5a	7.5a	0.495a
3	Instrata	9.3 fl oz/1000 ft <sup>2</sup>	Late	0.0a	7.0a	0.545a
4	Interface	6.0 fl oz/1000 ft <sup>2</sup>	Late	0.0a	7.8a	0.525a
5	Turfcide 400	12.0 fl oz/1000 ft <sup>2</sup>	Late	0.0a	7.5a	0.535a

<sup>a</sup>Fungicide treatments were applied on November 21<sup>st</sup>, 2013.

<sup>b</sup>Mean percent diseased area assessed on April 2<sup>nd</sup>, 2014.

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

<sup>d</sup>Color was assessed using an HCS 100 NDVI GreenSeeker from Trimble Navigation Ltd@.

**Table 2: Mean snow mold severity, turf quality, and turf color assessed on April 21<sup>st</sup>, 2014 at Wausau CC in Wausau, WI.**

Treatment	Rate	Application Timing <sup>a</sup>	Disease Severity <sup>b</sup>	Turf Quality <sup>c</sup>	Turf Color <sup>d</sup>	
1	Nontreated Control		87.5a	1.5c	0.277d	
2	1786-G	12.0 fl oz/1000 ft <sup>2</sup>	Late	91.3a	1.3c	0.310d
3	Instrata	9.3 fl oz/1000 ft <sup>2</sup>	Late	2.5d	6.5a	0.687a
4	Interface	6.0 fl oz/1000 ft <sup>2</sup>	Late	35.0c	4.3b	0.607b
5	Turfcide 400	12.0 fl oz/1000 ft <sup>2</sup>	Late	55.0b	3.5b	0.527c

<sup>a</sup>Fungicide treatments were applied on November 14<sup>th</sup>, 2013.

<sup>b</sup>Mean percent diseased area assessed on April 21<sup>st</sup>, 2014.

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

<sup>d</sup>Color was assessed using an HCS 100 NDVI GreenSeeker from Trimble Navigation Ltd@.

**Table 3: Mean snow mold severity, turf quality, and turf color assessed on April 23<sup>rd</sup>, 2014 at Marquette GC in Marquette, MI.**

Treatment	Rate	Application Timing <sup>a</sup>	Disease Severity <sup>b</sup>	Turf Quality <sup>c</sup>	Turf Color <sup>d</sup>	
1	Nontreated Control		92.5a	1.5c	0.243b	
2	1786-G	12.0 fl oz/1000 ft <sup>2</sup>	Late	98.3a	1.0c	0.243b
3	Instrata	9.3 fl oz/1000 ft <sup>2</sup>	Late	21.3c	4.8a	0.470a
4	Interface	6.0 fl oz/1000 ft <sup>2</sup>	Late	62.5b	3.0b	0.378a
5	Turfcide 400	12.0 fl oz/1000 ft <sup>2</sup>	Late	63.8b	2.8b	0.378a

<sup>a</sup>Fungicide treatments were applied on November 5<sup>th</sup>, 2013.

<sup>b</sup>Mean percent diseased area assessed on April 23<sup>rd</sup>, 2014.



## 2013-2014 Pink Snow Mold Control Evaluation OJ Noer Center – Verona, WI

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### OBJECTIVES

To evaluate fungicides for the control of *Microdochium* patch caused by the fungus *Microdochium nivale*.

### MATERIALS AND METHODS

This evaluation was conducted at the OJ Noer Turfgrass Research and Educational Facility in Madison, WI on an ‘Alpha’ creeping bentgrass (*Agrostis stolonifera*) plot 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 p.s.i using a CO<sub>2</sub> pressurized boom sprayer equipped with two XR Teejet 8004 VS nozzles. All fungicides were agitated by hand and applied in the equivalent of 2 gallons of water per 1000 ft<sup>2</sup>. Early applications were made on November 7<sup>th</sup>, 2013 and late applications were made on December 2<sup>nd</sup>, 2013. The experimental plot area was inoculated with *M. nivale*-infested rye grain and covered with a GreenJacket® cover on December 3<sup>rd</sup>. Snow cover was consistent from mid-December until late March, a period of approximately 100 days. Disease severity, turf quality, and turf color were recorded on April 1<sup>st</sup>, 2014. Disease severity was visually rated as percent area affected, turfgrass quality was visually rated on a 1-9 scale with 6 being acceptable, and Normalized Difference Vegetative Index (turfgrass color) was rated using a HCS 100 GreenSeeker® from Trimble Navigation Ltd (Sunnyvale, CA). Treatment means were analyzed using the Waller Duncan method and are presented in Table 1. In addition, surface temperature on the research plot was recorded using a Spectrum Watchdog® datalogger and is presented in Figure 1.

### RESULTS AND DISCUSSION

Despite the prolonged snow cover in 2013-2014, *Microdochium* patch severity was very low on the experimental area with non-treated controls averaging just 3.8%. Disease was not observed on any other treatment with the exception of minor amounts on treatments 26 and 29. Other snow mold diseases such as gray (*Typhula incarnata*) and speckled (*T. ishkariensis*) were not observed. This decreased severity was likely due to the extremely cold temperatures observed in southern Wisconsin and a lack of snow depth required to properly insulate the turf surface, as evidenced by the cold surface temperatures observed in Figure 1. Differences in turf color were not observed using the NDVI meter, though products containing green pigments did appear slightly more green and resulted in a slight increase in turf quality.

**Table 1: Mean snow mold severity, turf quality, and turf color assessed on April 1<sup>st</sup>, 2014 at the OJ Noer Turfgrass Research 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		3.8a	7.0cd	0.555a
2	Chipco26GT	4.0 fl oz/1000 ft2 Late	0.0a	7.0cd	0.572a
3	Banner MAXX II	2.0 fl oz/1000 ft2 Late	0.0a	7.0cd	0.562a
4	Triton FLO	0.85 fl oz/1000 ft2 Late	0.0a	7.3c	0.582a
5	Heritage TL	2.0 fl oz/1000 ft2 Late	0.0a	7.3c	0.562a
6	1786-G	12.0 fl oz/1000 ft2 Early/Late	0.0a	8.8a	0.590a
7	Interface Triton FLO	6.0 fl oz/1000 ft2 0.85 fl oz/1000 ft2 Late Late	0.0a	7.8b	0.575a
8	Interface Triton FLO Droplex	3.0 fl oz/1000 ft2 0.55 fl oz/1000 ft2 10.0 fl oz/a Late Late Late	0.0a	8.0b	0.580a
9	Instrata Droplex	5.5 fl oz/1000 ft2 10.0 fl oz/a Late Late	0.0a	7.0cd	0.560a
10	Banner MAXX II Civitas Harmonizer Droplex	1.0 fl oz/1000 ft2 8.0 fl oz/1000 ft2 0.5 fl oz/1000 ft2 10.0 fl oz/a Late Late Late Late	0.0a	8.0b	0.575a
11	A13705W	2.6 fl oz/1000 ft2 Late	0.0a	7.0cd	0.592a
12	Secure	0.5 fl oz/1000 ft2 Late	0.0a	7.3c	0.582a
13	Secure Daconil Weatherstik	0.5 fl oz/1000 ft2 5.5 fl oz/1000 ft2 Late Late	0.0a	7.0cd	0.580a
14	Concert II	8.5 fl oz/1000 ft2 Late	0.0a	7.0cd	0.582a
15	A13705W Daconil Weatherstik	2.6 fl oz/1000 ft2 5.5 fl oz/1000 ft2 Late Late	0.0a	7.0cd	0.555a
16	A15457 A17856 A7087 PAR	0.236 fl oz/1000 ft2 1.09 fl oz/1000 ft2 0.5 fl oz/1000 ft2 0.36 fl oz/1000 ft2 Late Late Late Late	0.0a	8.0b	0.575a
17	A15457 A17856 Heritage TL PAR	0.236 fl oz/1000 ft2 1.09 fl oz/1000 ft2 1.01 fl oz/1000 ft2 0.36 fl oz/1000 ft2 Late Late Late Late	0.0a	8.0b	0.587a
18	A15457 A17856 Banner MAXX II PAR	0.236 fl oz/1000 ft2 1.09 fl oz/1000 ft2 2.0 fl oz/1000 ft2 0.36 fl oz/1000 ft2 Late Late Late Late	0.0a	7.8b	0.567a
19	A19188 A17856 PAR	1.0 fl oz/1000 ft2 1.09 fl oz/1000 ft2 0.36 fl oz/1000 ft2 Late Late Late	0.0a	8.0b	0.590a
20	Instrata PAR	9.4 fl oz/1000 ft2 0.36 fl oz/1000 ft2 Late Late	0.0a	8.0b	0.565a

<sup>a</sup>Early fungicide treatments were applied on Nov. 7<sup>th</sup>, 2013 and late treatments applied on Dec. 2<sup>nd</sup>, 2013.

<sup>b</sup>Mean percent diseased area assessed on April 1<sup>st</sup>, 2014.

**Table 1: Mean snow mold severity, turf quality, and turf color assessed on April 1<sup>st</sup>, 2014 at the OJ Noer Turfgrass Research Facility in Madison, WI.**

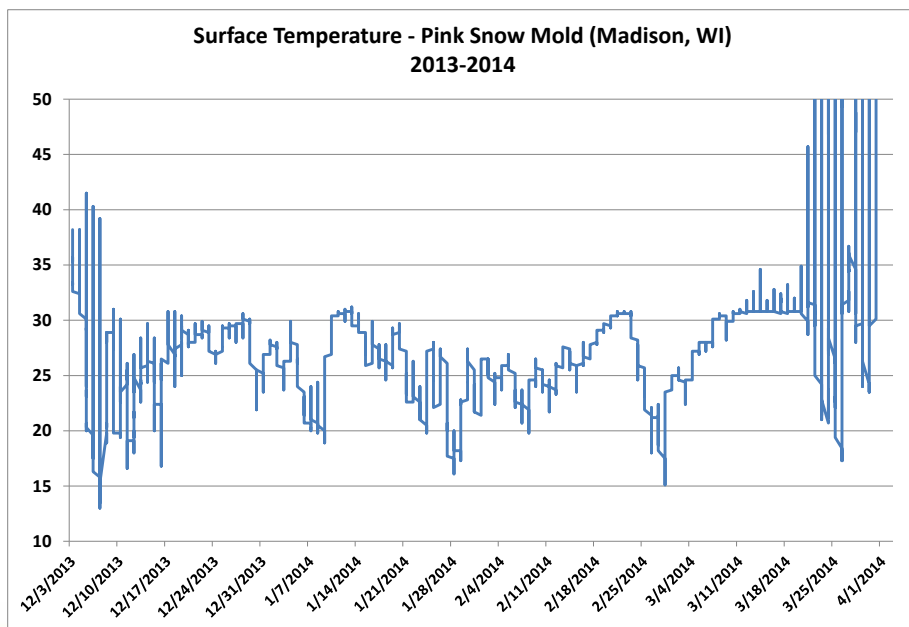
Treatment	Rate	Application Timing <sup>a</sup>	Disease Severity <sup>b</sup>	Turf Quality <sup>c</sup>	Turf Color <sup>d</sup>
21	A20744 A17856 A7087 PAR	0.5 oz/1000 ft2 1.09 fl oz/1000 ft2 0.5 fl oz/1000 ft2 0.36 fl oz/1000 ft2	Late Late Late Late	0.0a	8.0b 0.600a
22	A20744 A17856 Heritage TL PAR	0.5 oz/1000 ft2 1.09 fl oz/1000 ft2 1.01 fl oz/1000 ft2 0.36 fl oz/1000 ft2	Late Late Late Late	0.0a	8.0b 0.597a
23	A20744 A17856 Banner MAXX II PAR	0.5 oz/1000 ft2 1.09 fl oz/1000 ft2 2.0 fl oz/1000 ft2 0.36 fl oz/1000 ft2	Late Late Late Late	0.0a	8.0b 0.582a
24	A20581 PAR	0.47 fl oz/1000 ft2 0.36 fl oz/1000 ft2	Late Late	0.0a	8.0b 0.577a
25	1786-A	12.0 fl oz/1000 ft2	Early/Late	0.0a	9.0a 0.587a
26	1786-B	12.0 fl oz/1000 ft2	Early/Late	1.3a	8.8a 0.595a
27	1786-C	12.0 fl oz/1000 ft2	Early/Late	0.0a	7.3c 0.590a
28	1786-D	12.0 fl oz/1000 ft2	Early/Late	0.0a	7.3c 0.570a
29	1786-E	12.0 fl oz/1000 ft2	Early/Late	1.3a	7.0cd 0.585a
30	1786-F	12.0 fl oz/1000 ft2	Early/Late	0.0a	6.8d 0.555a

<sup>a</sup>Early fungicide treatments were applied on Nov. 7<sup>th</sup>, 2013 and late treatments applied on Dec. 2<sup>nd</sup>, 2013.

<sup>b</sup>Mean percent diseased area assessed on April 1<sup>st</sup>, 2014.

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

<sup>d</sup>Color was assessed using an HCS 100 NDVI GreenSeeker from Trimble Navigation Ltd®.



*Pink snow mold pressure was low at the Madison, Wisconsin test plots.*



*The Minnesota Golf Course Superintendents' Association acknowledges and gratefully appreciates the collaborative efforts between the Universities of Minnesota and Wisconsin. Thank you for your ongoing support of our industry. Without which, intense turf management would be much more difficult.*

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