

Bayer Fungicides to Control Snow Mold on Putting Greens in Montana, Idaho, and Washington 2013-2014 (Final Report)

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Snow mold control trials were conducted at 3 locations in the Intermountain Region of the PNW, on a research green at the WSU Turfgrass and Agronomy Research Facility in Pullman, WA, a green at Meadow Lake Resort Golf Course in Columbia Falls, MT, and a practice green at Osprey Meadows Golf Course in Donnelly, ID. The research green at Pullman, WA is a pure stand of 'T-1' creeping bentgrass grown on an USGA specification constructed putting green, the green at Columbia Falls is a mixed stand of 'Penncross' creeping bentgrass and annual bluegrass, and the practice green at Donnelly, ID is a mixed stand of creeping bentgrass and low percentage of annual bluegrass. Individual treatment plots were 6' x 7' with four replications in a randomized complete-block design. Treatments were applied 24 Oct 13, 30 Oct 13, and 14 Nov 13 at Donnelly, Columbia Falls, and Pullman, respectively. Fungicides were applied at 80 GPA with a bicycle-wheeled CO₂ pressurized (40 psi) sprayer with 11008 flat fan TeeJet nozzles. At Pullman, snow cover was intermittent, totaling approximately 44 days. Columbia Falls had snow cover totaling approximately 125 days from December 2013 to the third week of March 2013. Continuous snow cover lasted from the beginning of December 2012 through the first week of April 2014 (approx. 135 days) at Donnelly. Individual plots were evaluated for pink (*Microdochium nivale*) and/or gray (*Typhula spp.*) snow mold disease severity (% area infected). In addition, at the Pullman site an unidentified patch-like disease was included in the overall snow mold disease rating. Even though samples were taken and cultured in the lab, no disease was identified. The patches appeared to be a type of superficial fairy ring. At Columbia Falls, another unidentified disease, which looked like spots the size of a quarter, was rated separately from snow mold disease. Cultures of samples taken from the green did not reveal any type of disease. The spots are possibly environmental in nature, since there was a large amount of variation among individual treatments and the observed patterns on the green itself. Turfgrass quality was rated on a scale from 1 to 9; 9 = excellent and 6 = acceptable, and color was rated on a scale from 1 to 9; 9 = dark green on 2 Apr 14 at Pullman, 11 Apr 14 at Columbia Falls, and 16 Apr 14 at Donnelly.

At Pullman, along with rating for pink snow mold, an unidentified disease (possibly superficial fairy ring) was also included in the rating (Table 2). All fungicide treatments resulted in better disease control compared to the check. For the most part, Tartan or Interface + Mirage SC treatments, SP102000028297 at 4, 6, or 8 fl oz/M, and Interface 6 fl oz/M resulted in the best overall control and the best overall turfgrass quality. Figures 1 - 7 show the various treatments.

At Columbia Falls, disease pressure was quite low, the check had <9% area infected with snow mold (Table 3). All treatments provided very good disease control. However, unidentified disease spots

were also present. Unfortunately, they were lowest, at least numerically in most cases, in the check compared to the other treatments. However, they appeared to be greatest in the Interface + Mirage SC treatments and Instrata 9.3 fl oz/M compared to other fungicide treatments, which is puzzling. There was not a lot of difference in turfgrass quality except that the Instrata 9.3 fl oz/M had lower turfgrass quality compared to the check. Figures 8 - 14 show the various treatments. Figure 14 shows the unidentified spots in the Interface 4 fl oz/M + Mirage 2 fl oz/M treatment.

At Donnelly, disease pressure was extremely low the check had 2% of the area infected with snow mold (Table 4). All treatments provided excellent disease control. All treatments except Tartan + Mirage + 26 GT and Instrata resulted in turfgrass quality >6. Turfgrass quality of Instrata was not different compared to the check. Figure 15 - 20 show the various treatments.

Overall, at Pullman, even though there was possibly an additional unidentified disease present that made rating difficult there appeared to be some control and improved turfgrass quality with the Tartan or Interface + Mirage SC treatments, SP102000028297 at 4, 6, or 8 fl oz/M, and Interface 6 fl oz/M. At Columbia Falls and at Donnelly, with the low snow mold disease pressure one finds it hard to determine the effectiveness of any of the treatments, all performed very well. The only real difference was that the turfgrass quality of the Instrata treatment was not as good as any of the Bayer fungicide treatments.

Table 1. The GPS coordinates and climatic data at application at each site.

GPS coordinates

Location	Golf Course	Latitude	Longitude	Elevation
Pullman, WA	WSU Turf Research Facility	N 46° 44' 22.7"	W 117° 8' 55.35"	2597'
Columbia Falls, MT	Meadow Lake Resort GC	N 48° 23' 19"	W 114° 12' 12.7"	3183'
Donnelly, ID	Osprey Meadows GC	N 44° 40' 3.31"	W 116° 7' 18.99"	4961'

Climate data at application

Location	Golf Course	Date	Air temp (°F)	Soil temp 2" (°F)	RH (%)	Wind (Direction/Speed)	Weather conditions
Pullman, WA	WSU Turf Research Facility	11/14/2013	44	43	8%	SW / 2-4 mph	Cloudy
Columbia Falls, MT	Meadow Lake Resort GC	10/31/2013	43	34	51%	W / 0-3 mph	Sunny
Donnelly, ID	Osprey Meadows GC	10/24/2013	59	53	41%	W / 1-3 mph	Sunny

Table 2. The effect of fungicides on a 'T-1' creeping bentgrass green to control pink snow mold at the WSU Turfgrass and Agronomy Research Facility in Pullman, WA. Rated on 2 Apr 2014

Treatment	Rate (fl oz/M)	Pink snow mold + *unidentified patch-like disease (% area infected)	**Turfgrass quality
SP102000028297	4	10.0 e***	5.5 a
Tartan (trifloxystrobin + triadimefon) + Mirage SC (tebuconazole)	1 3	10.8 de	5.5 a
SP102000028297	8	12.5 cde	5.3 ab
Interface (iprodione + trifloxystrobin) + Mirage SC (tebuconazole)	4 1.5	13.3 cde	4.9 ab
SP102000028297	5	14.0 bcde	4.8 ab
Interface (iprodione + trifloxystrobin)	6	15.5 bcde	5.0 ab
Interface (iprodione + trifloxystrobin)	4	16.8 bcde	5.0 ab
SP102000028297	6	18.0 bcde	5.0 ab
Interface (iprodione + trifloxystrobin) + Mirage SC (tebuconazole)	3 1.5	21.3 bcde	4.3 bcd
Tartan (trifloxystrobin + triadimefon)	2	24.3 bcd	4.6 abc
SP102000028297	3	26.3 bc	4.4 bcd
Instrata (propiconazole + fludioxonil + chlorothalonil)	7	27.5 b	3.8 cd
Check	0	48.3 a	3.5 d

*Unidentified patch-like disease present. Was not able to culture any disease from samples taken.
Possibly superficial fairy ring.

**Turfgrass quality rated 1 to 9; 9 = excellent.

***Means within columns followed by the same letter are not significantly different. LSD (P = 0.05).

Fig. 1. Snow mold fungicide treatments on a creeping bentgrass green at the WSU Turfgrass and Agronomy Research Facility in Pullman, WA. Rated on 2 Apr 2014.



Fig. 2. Snow mold fungicide treatments on a creeping bentgrass green at the WSU Turfgrass and Agronomy Research Facility in Pullman, WA. Rated on 2 Apr 2014.



Fig. 3. Snow mold fungicide treatments on a creeping bentgrass green at the WSU Turfgrass and Agronomy Research Center in Pullman, WA. Rated on 2 Apr 2014.

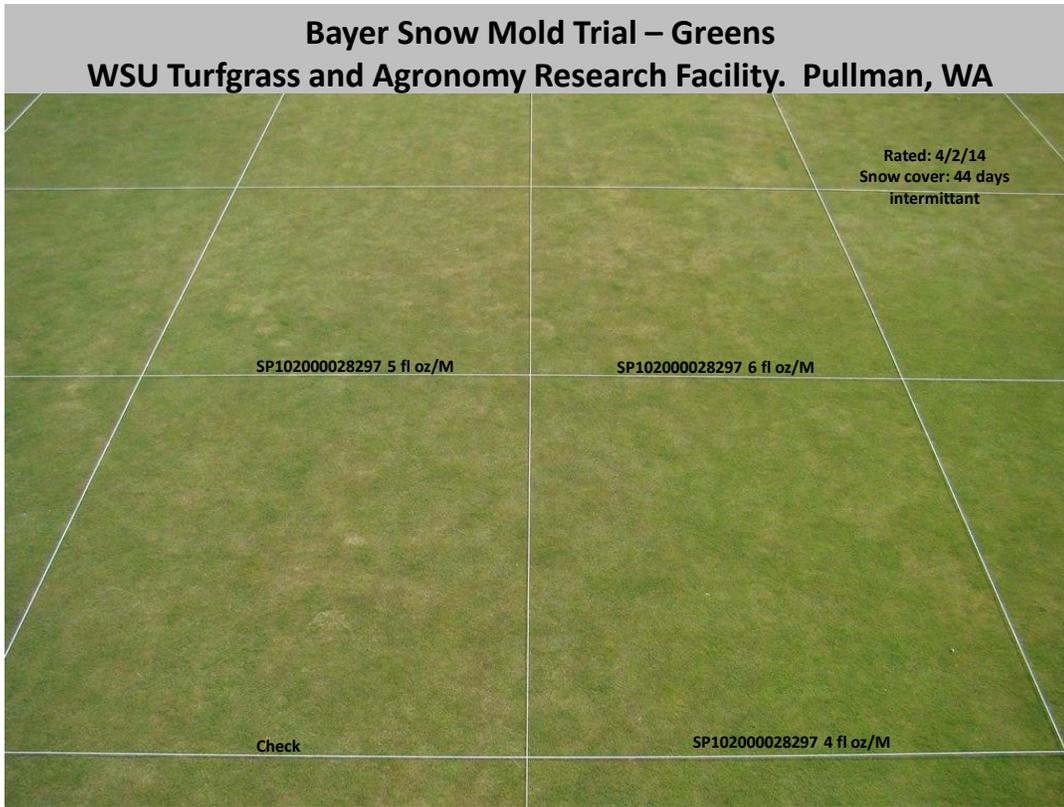


Fig. 4. Snow mold fungicide treatments on a creeping bentgrass green at the WSU Turfgrass and Agronomy Research Center in Pullman, WA. Rated on 2 Apr 2014.



Fig. 5. Snow mold fungicide treatments on a creeping bentgrass green at the WSU Turfgrass and Agronomy Research Center in Pullman, WA. Rated on 2 Apr 2014.

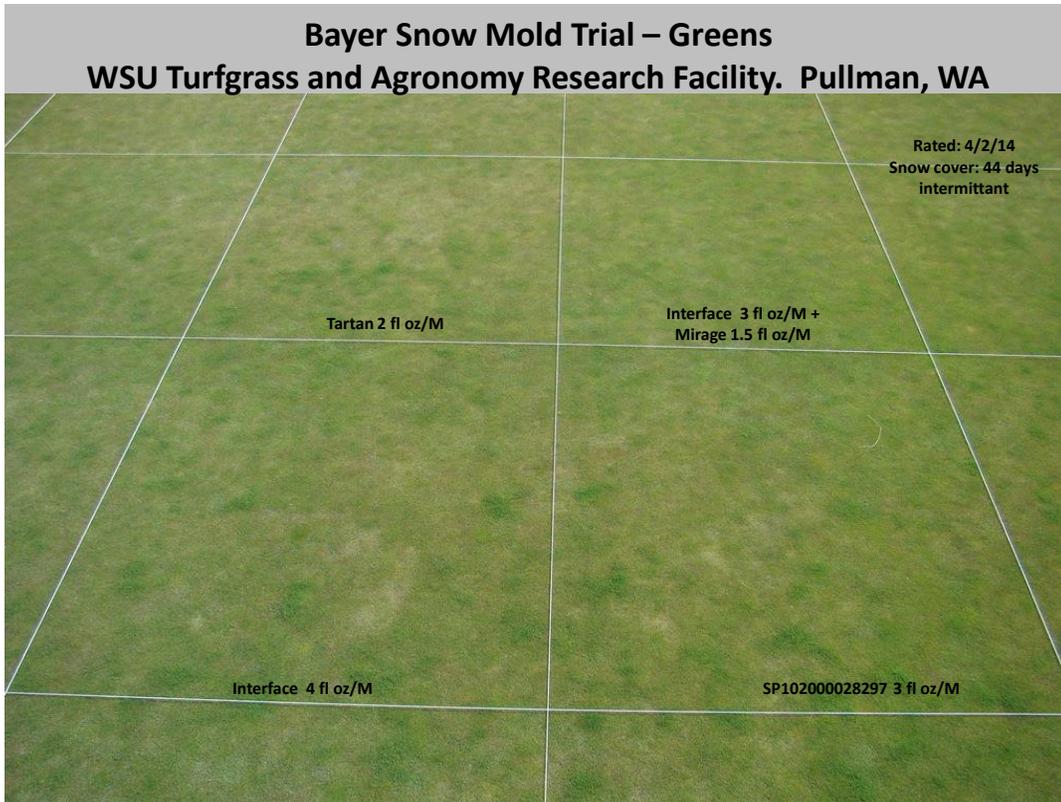


Fig. 6. Snow mold fungicide treatments on a creeping bentgrass green at the WSU Turfgrass and Agronomy Research Center in Pullman, WA. Rated on 2 Apr 2014.

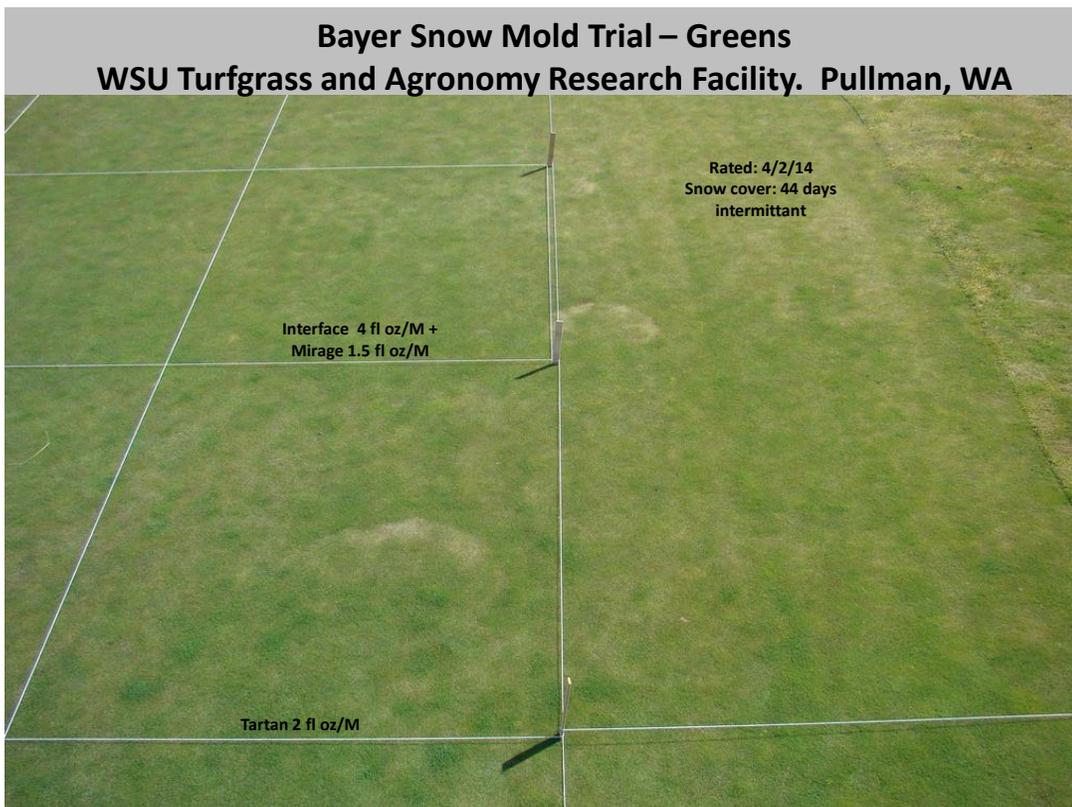


Fig. 7. Snow mold fungicide treatments on a creeping bentgrass green at the WSU Turfgrass and Agronomy Research Center in Pullman, WA. Rated on 2 Apr 2014.

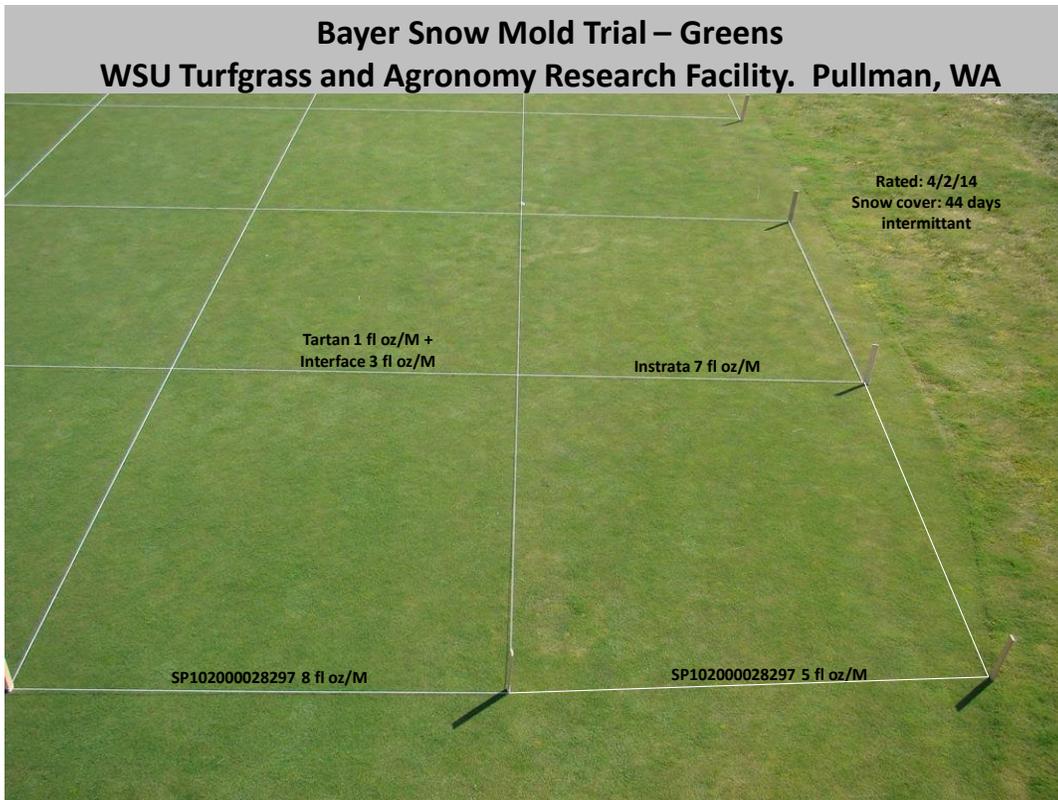


Table 3. The effect of fungicides on a 'Penncross' creeping bentgrass/annual bluegrass green to control pink and gray snow mold at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 11 Apr 2014.

Treatment	Rate (fl oz/M)	Snow mold (% area infected)	*Turfgrass quality	**Unidentified disease-like spots (% area infected)
SP102000028297 + Mirage SC (tebuconazole)	5 1.5	0.3 b***	6.0 a	6.5 ab
Interface (iprodione + trifloxystrobin) + Triton FLO (triticonazole)	5 0.85	0.3 b	6.0 a	5.0 ab
SP102000028297 + Mirage SC (tebuconazole)	4 1.5	1.0 b	5.9 a	6.0 ab
Tartan (trifloxystrobin + triadimefon) + Mirage SC (tebuconazole) + 26 GT (iprodione)	1 2 3	1.0 b	5.8 ab	9.5 ab
Interface (iprodione + trifloxystrobin) + Mirage SC (tebuconazole)	5 2	0.0 b	5.6 ab	19.5 a
Interface (iprodione + trifloxystrobin) + Mirage SC (tebuconazole)	4 2	0.0 b	5.5 ab	16.3 ab
Interface (iprodione + trifloxystrobin) + Mirage SC (tebuconazole)	5 1.5	0.3 b	5.5 ab	11.8 ab
SP102000028297 + Mirage SC (tebuconazole)	6 1.5	0.0 b	5.4 ab	3.8 b
Tartan (trifloxystrobin + triadimefon) + Mirage SC (tebuconazole)	2 2	1.0 b	5.4 ab	10.0 ab
Tartan (trifloxystrobin + triadimefon) + Mirage SC (tebuconazole) + 26 GT (iprodione)	1 1 3	0.5 b	5.0 ab	10.3 ab
Untreated Check	0	8.8 a	4.6 bc	3.3 b
Instrata (propiconazole + fludioxonil + chlorothalonil)	9.3	0.8 b	3.8 c	15.0 ab

*Turfgrass quality rated 1 to 9; 9 = excellent.

**Unidentified disease-like spots approximately the size of a quarter. Was not able to culture any disease from samples taken.

***Means within columns followed by the same letter are not significantly different. LSD (P = 0.05).

Fig. 8. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 11 Apr 2014.

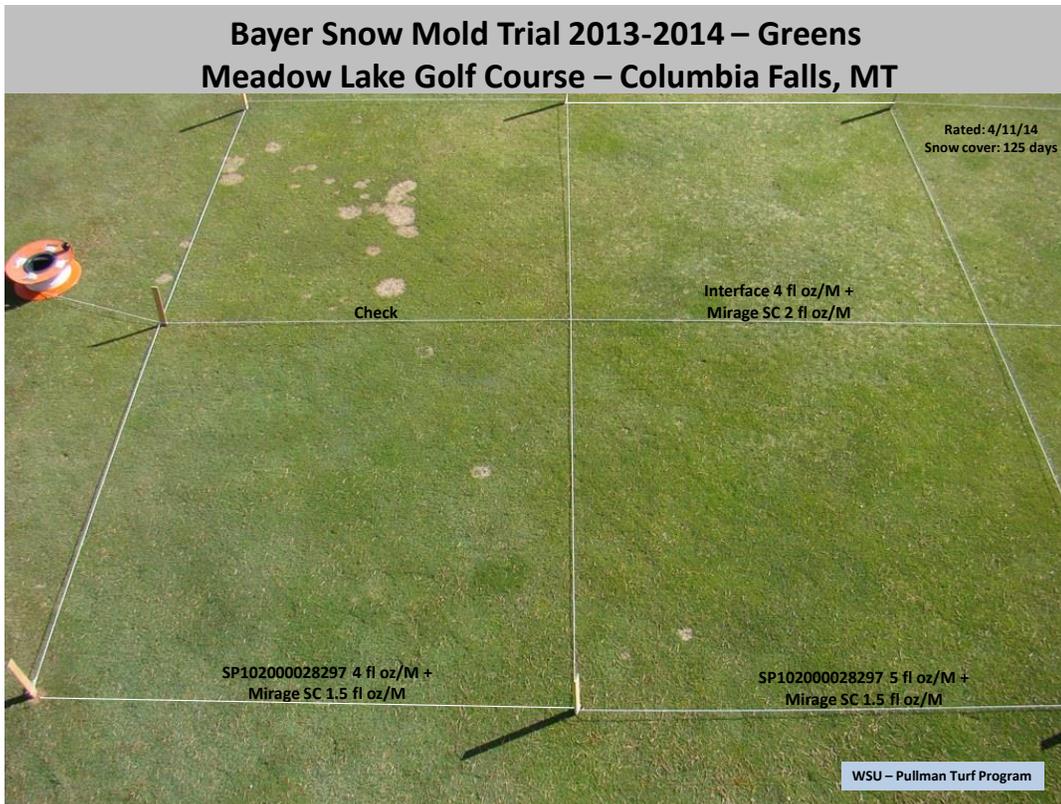


Fig. 9. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 11 Apr 2014.



Fig. 10. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 11 Apr 2014.



Fig. 11. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 11 Apr 2014.

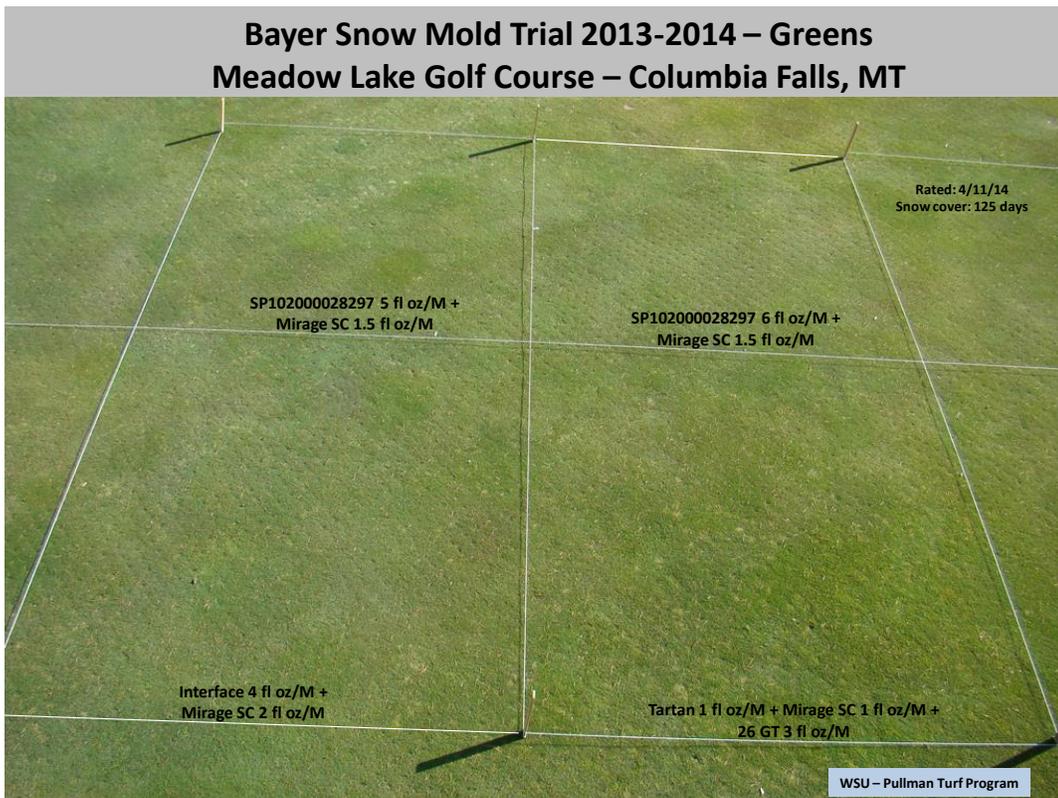


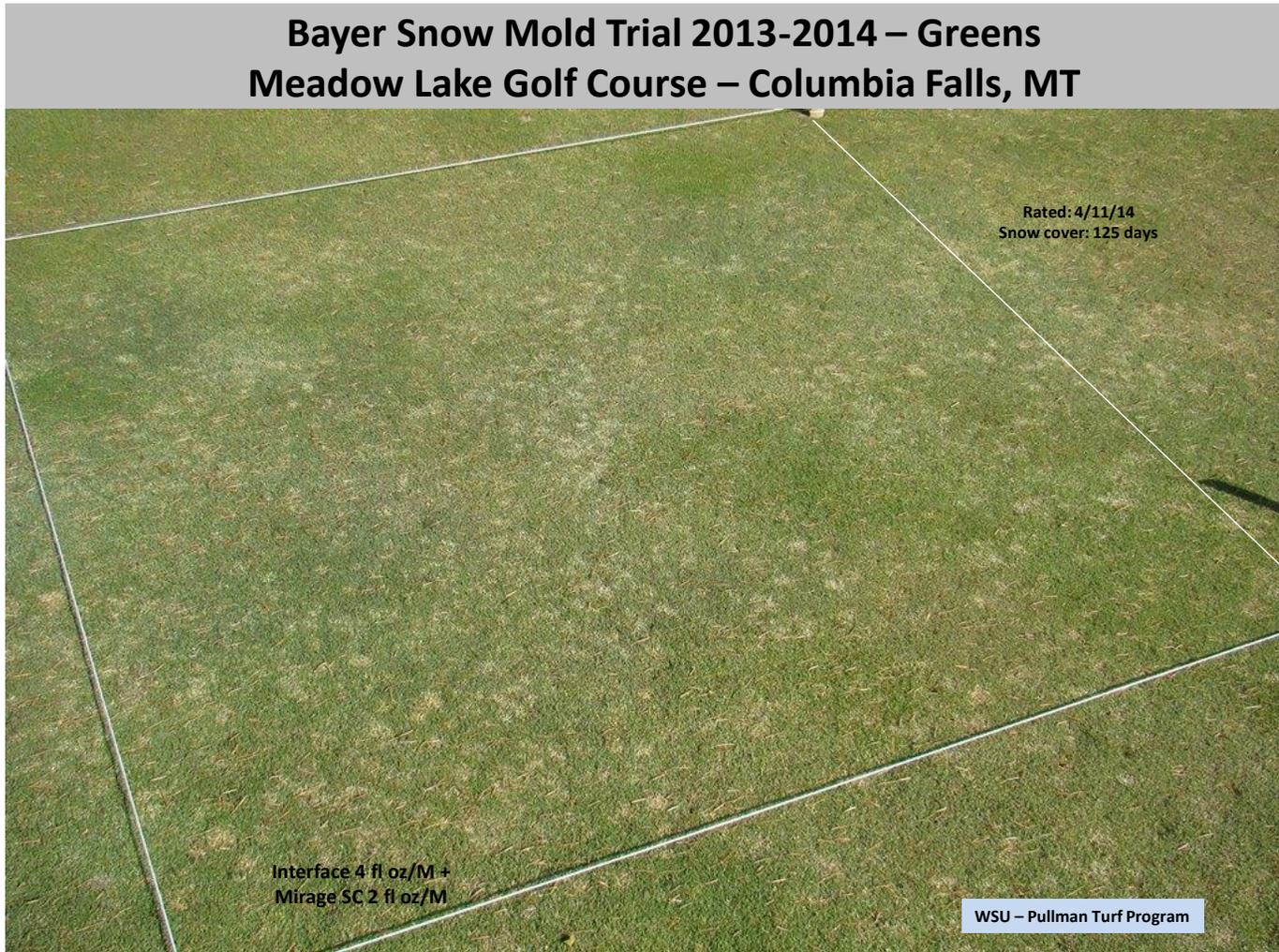
Fig. 12. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 11 Apr 2014.



Fig. 13. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 11 Apr 2014.



Fig. 14. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Meadow Lake Resort Golf Course in Columbia Falls, MT. Shows disease-like spots present on parts of the green. Rated on 11 Apr 2014.



**Bayer Snow Mold Trial 2013-2014 – Greens
Meadow Lake Golf Course – Columbia Falls, MT**

Rated: 4/11/14
Snow cover: 125 days

Interface 4 fl oz/M +
Mirage SC 2 fl oz/M

WSU – Pullman Turf Program

Table 4. The effect of fungicides on a creeping bentgrass/annual bluegrass green to control pink and gray snow mold at Osprey Meadows Golf Course in Donnelly, ID. Rated on 16 Apr 2014.

Treatment	Form. Type	Rate (fl oz/M)	Snow mold	
			(% area infected)	*Turfgrass quality
SP102000028297 + Mirage SC (tebuconazole)	SC SC	5 2	0.0 b**	7.0 a
SP102000028297 + Mirage SC (tebuconazole)	SC SC	6 2	0.3 b	6.9 ab
Interface (iprodione + trifloxystrobin) + Mirage SC (tebuconazole)	SC SC	6 2	0.0 b	6.8 ab
SP102000028297 + Mirage SC (tebuconazole)	SC SC	4 2	0.0 b	6.6 abc
Interface (iprodione + trifloxystrobin) + Mirage SC (tebuconazole)	SC SC	6 1.5	0.0 b	6.5 abc
Interface (iprodione + trifloxystrobin) + Mirage SC (tebuconazole)	SC SC	6 2	0.0 b	6.4 bc
Tartan (trifloxystrobin + triadimefon) + Mirage SC (tebuconazole)	SC SC	2 2	0.0 b	6.3 cd
Tartan (trifloxystrobin + triadimefon) + Mirage SC (tebuconazole) 26 GT (iprodione)	SC SC SC	1 2 3	0.0 b	5.8 d
Tartan (trifloxystrobin + triadimefon) + Mirage SC (tebuconazole) 26 GT (iprodione)	SC SC SC	1 1 3	0.0 b	5.1 e
Instrata (propiconazole + fludioxonil + chlorothalonil)	XL	11	0.0 b	3.5 f
Untreated		0	2.0 a	3.3 f

*Turfgrass quality rated 1 to 9; 9 = excellent.

**Means within columns followed by the same letter are not significantly different. LSD (P = 0.05).

Fig. 15. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Osprey Meadows Golf Course, Donnelly, ID. Rated on 16 Apr 2014.



Fig. 16. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Osprey Meadows Golf Course, Donnelly, ID. Rated on 16 Apr 2014.



Fig. 17. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Osprey Meadows Golf Course, Donnelly, ID. Rated on 16 Apr 2014.



Fig. 18. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Osprey Meadows Golf Course, Donnelly, ID. Rated on 16 Apr 2014.



Fig. 19. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Osprey Meadows Golf Course, Donnelly, ID. Rated on 16 Apr 2014.

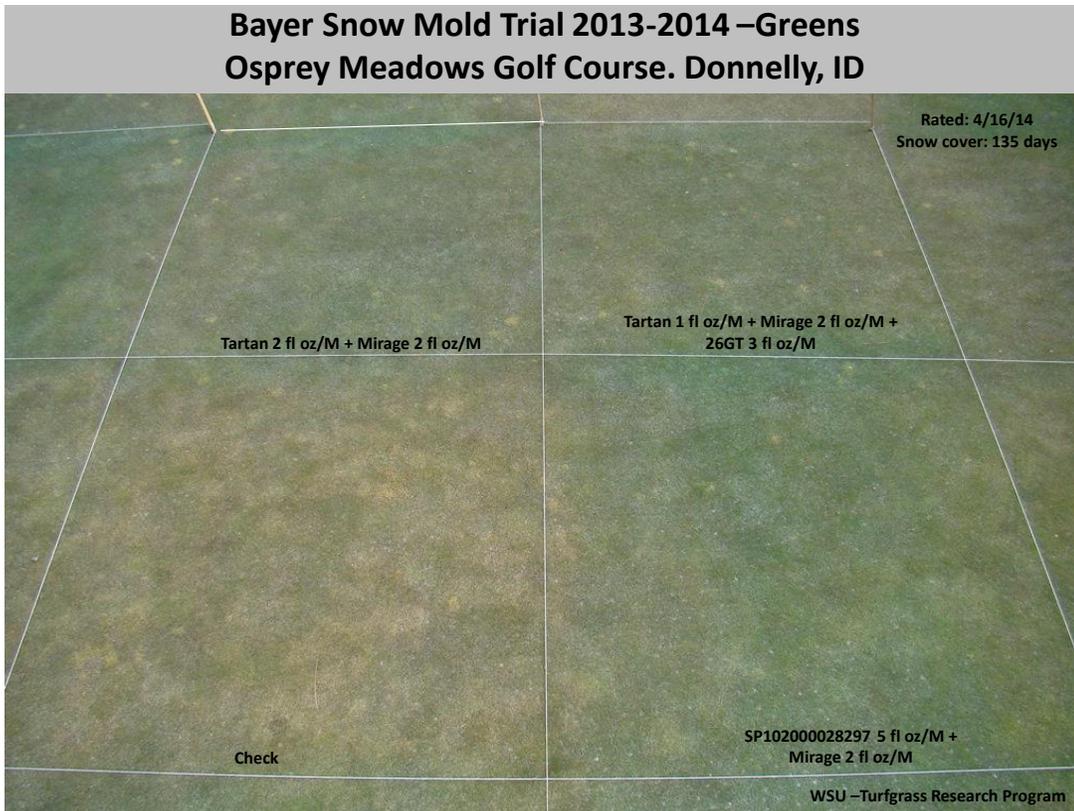


Fig. 20. Snow mold fungicide treatments on a creeping bentgrass/annual bluegrass green at Osprey Meadows Golf Course, Donnelly, ID. Rated on 16 Apr 2014.

