AMVAC-Turfcide 400 or AMV4820 alone, combined with other fungicides, or compared to other fungicides to control pink and gray snow mold on fairways 2013-14 (Final Report)

AMVAC Protocol #: PR13-32-1204 13C02F050XID739
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A snow mold control trial was conducted on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. The fairway is a mixed stand of creeping bentgrass, Kentucky bluegrass, perennial ryegrass, and annual bluegrass. Individual treatment plots were 6' x 7' with four replications in a randomized complete-block design. Treatments were applied 31 Oct 2013. Fungicides were applied at 80 GPA with a bicycle-wheeled CO_2 pressurized (40 psi) sprayer with 11008 flat fan TeeJet nozzles. GPS coordinates and climatic data at time of application are in Table 1. Snow cover totaled approximately 125 days from December 2012 to April 2013. On 12 Apr 14, individual plots were evaluated for pink (*Microdochium nivale*) and/or gray (*Typhula spp.*) snow mold disease severity (% area infected) and turfgrass quality rated on a scale from 1 to 9; 9 = excellent and 6 = acceptable.

At Columbia Falls, disease pressure was good, the untreated Check had over 35% of the plot area infected with both pink and gray snow mold (Table 2). It was estimated that there was 65% pink and 35% gray snow mold present in the Check. All treatments resulted in significantly better control compared to the Check. However, there were 5 treatments (AMV4840 12 fl oz/M, Interface 3 fl oz/M, 26/36 4 fl oz/M, Torque 0.9 fl oz/M, or Triton 0.75 fl oz/M that resulted in ≥10% of the plot area infected with snow mold. Insignia 0.7 fl oz/M + Turfcide or AMV4840 at 8 fl oz/M + Foursome 0.5 fl oz/M at least numerically were basically the top treatments in terms of disease control and turfgrass quality. Also, Torque 0.9 fl oz/M + Turfcide 8 fl oz/M + Foursome 0.5 fl oz/M performed just as well. Interface, Banner MAXX, or Concert II + Turfcide 8 floz/M + Foursome 0.5 fl oz/M also were good treatments.

All Turfcide or AMV4840 treatments with or without Foursome or Harrell's Par resulted in significantly less snow mold (Table 3). In terms of turfgrass quality most treatments were not significantly different. Although Turfcide 16 fl oz/M + Harrell's Par 0.37 fl oz/M and AMV4840 8 fl oz/M + Foursome 0.5 fl oz/M resulted, at least numerically, with the highest turfgrass quality. For the most part, the addition of a pigment either Foursome at 0.5 fl oz/M or Harrell's Par 0.37 fl oz/M does not appear to be necessary when used on fairways. Figures 1 – 12 show the various treatments. Figure 12 show what a typical check plot looked like.

Overall, Insignia + Turfcide or AMV4840 + Foursome and Torque + Turfcide + Foursome resulted in the best turfgrass quality and very good disease control. Interface, Banner MAXX, or Concert II also resulted in very good disease control although not significant lower turfgrass quality. Comparing

all treatments the addition of a pigment such as Foursome or Harrell's Par appears to result in some increase in turfgrass quality (Table 2), but when comparing Turfcide to AMV4840 there appears to be little advantage to adding a pigment to improve turfgrass quality on fairways(Table 3).

Table 1. Climatic data and GPS coordinates at time of application.

LOCATION: Columbia Falls, MT. Meadow Lake Resort Golf Course.

GPS coordinates: Lat.: N 48° 23' 21.6"

Long.: W 114° 12' 8.5"

Elev.: 3100'

Application date: 10/31/13

Air temperature	3.3°C
Soil temp (2")	3.6°C
RH	88%
Wind (N)	0-2 mph
Weather conditions	Overcast and misty rain

Table 2. The effect of fungicides on turfgrass quality and control of pink and gray snow mold and turfgrass quality on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

Product	Active Ingredient	Formulation	lb AI/A	Product/A	Rate (fl oz/M)	Snow mold (% area infected)	*Turfgrass quality
Banner Maxx +	propiconazole	1.3ME	0.88	87.12 fl.oz.	2	0.3 f**	5.8 abcde
Turfcide +	PCNB	4F	21.78	5.45 gal	16		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Banner Maxx +	propiconazole	1.3ME	0.88	87.12 fl.oz.	2	0.5 f	5.4 bcdefgh
Turfcide +	PCNB	4F	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Torque +	tebuconazole	3.6EC	1.1	39.2 fl.oz.	0.9	0.8 f	6.4 ab
Turfcide +	PCNB	400 (4F)	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Banner Maxx +	propiconazole	1.3ME	0.88	87.12 fl.oz.	2	0.8 f	6.0 abc
Turfcide +	PCNB	4F	16.34	4.08 gal	12		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Insignia +	pyraclostrobin	2.08SC	0.495	30.5 fl.oz.	0.7	1.0 f	6.8 a
AMV4820 +	PCNB	4A	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Concert II +	chlorothalonil	4.3L	11.57	2.89 gal	8.5	1.0 f	5.5 bcdefg
	propiconazole		0.87				
Turfcide +	PCNB	400 (4F)	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Torque +	tebuconazole	3.6EC	1.1	39.2 fl.oz.	0.9	1.0 f	5.1 cdefgh
26/36	iprodione +	3.8EC	2.59	1.36 gal	4		
	thiophanate-methyl		2.59				
Insignia +	pyraclostrobin	2.08SC	0.495	30.5 fl.oz.	0.7	1.5 f	6.4 ab
Turfcide +	PCNB	400 (4F)	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Turfcide	PCNB	400 (4F)	21.78	5.45 gal	16	1.5 f	5.6 abcdef
Turfcide +	PCNB	400 (4SC)	21.78	5.45 gal	16	1.5 f	5.3 bcdefgh
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
AMV4820	PCNB	4A	21.78	5.45 gal	16	1.5 f	5.0 cdefgh
Interface +	iprodione +	2.27SC	2.18	1.02 gal	3	1.8 f	6.1 abc
	trifloxystrobin		0.133				
Turfcide +	PCNB	4F	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
AMV4820 +	PCNB	4A	10.89	2.72 gal	8	1.8 f	5.8 abcde
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Concert II +	chlorothalonil +	4.3L	11.57	2.89 gal	8.5	1.8 f	5.6 abcdef
	propiconazole		0.87				
AMV4820	PCNB	4A	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Turfcide +	PCNB	400 (4SC)	21.78	5.45 gal	16	2.0 ef	5.9 abcd
Harrell's Par	pigment	100%	NA	16 fl.oz.	0.37		
AMV4820	PCNB	4A	10.89	2.72 gal	8	2.0 ef	5.4 bcdefgh
AMV4820 +	PCNB	4A	21.78	5.45 gal	16	2.3 def	5.6 abcdef
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Turfcide +	PCNB	400 (4F)	16.34	4.08 gal	12	2.3 def	5.3 bcdefgh
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
AMV4820	PCNB	4A	16.3	4.08 gal	12.0	3.0 def	5.1 cdefgh
Torque +	tebuconazole	3.6EC	1.1	39.2 fl.oz.	0.9	3.5 def	5.3 bcdefgh
AMV4820 +	PCNB	4A	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Turfcide	PCNB	400 (4F)	10.89	2.72 gal	8	4.0 def	5.5 bcdefg
Concert II +	chlorothalonil +	4.3L	11.57	2.89 gal	8.5	5.0 def	4.5 fghij
	propiconazole		0.87				
Banner Maxx	propiconazole	1.3ME	0.44	43.56 fl.oz.	1		
Turfcide +	PCNB	400 (4F)	10.89	2.72 gal	8	5.0 def	5.4 bcdefgh
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Interface	iprodione +	2.27SC	4.37	2.042 gal	6	6.0 def	5.8 abcde
	trifloxystrobin		0.265				
AMV4820 +	PCNB	4A	21.78	5.45 gal	16	6.0 def	5.3 bcdefgh
Harrell's Par	pigment	100%	NA	16 fl.oz.	0.37		
Insignia +	pyraclostrobin	2.08SC	0.495	30.5 fl.oz.	0.7	6.0 def	5.0 cdefgh
Trinity	triticonazole	1.69L	0.575	43.56 fl.oz.	1		
Interface +	iprodione +	2.27SC	2.18	1.02 gal	3	6.5 cdef	5.9 abcd
	trifloxystrobin		0.133				
AMV4820 +	PCNB	4A	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Banner Maxx	propiconazole	1.3ME	0.88	87.12 fl.oz.	2	6.5 cdef	5.0 cdefgh
Interface +	iprodione +	2.27SC	2.18	1.02 gal	3	6.8 cdef	5.3 bcdefgh
	trifloxystrobin		0.133				
Triton	triticonazole	3F	0.77	32.67 fl.oz.	0.75		
Insignia	pyraclostrobin	2.08SC	0.5	30.5 fl.oz.	0.7	7.0 cdef	5.5 bcdefg
Turfcide	PCNB	400 (4F)	16.34	4.08 gal	12	7.5 cdef	4.6 efghij
Trinity	triticonazole	1.69L	0.575	43.56 fl.oz.	1	7.5 cdef	4.5 fghij
AMV4820 +	PCNB	4A	16.34	4.08 gal	12	9.8 cdef	4.8 defghi
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Interface	iprodione +	2.27SC	2.18	1.02 gal	3	11.8 cde	4.4 ghij
	trifloxystrobin		0.133				
26/36	iprodione +	3.8EC	2.59	1.36 gal	4	12.0 cd	4.3 hij
	thiophanate-methyl		2.59				
Torque	tebuconazole	3.6EC	1.1	39.2 fl.oz.	0.9	16.3 bc	3.8 ij
Triton	triticonazole	3F	0.77	32.67 fl.oz.	0.75	23.8 b	3.5 jk
Untreated	---	---	---	---	0	35.5 a	2.5 k

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

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

Table 3. Comparison of AMV4820 to Turfcide 400 with or without pigments for pink and gray snow mold control and turfgrass quality on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

Product	Active Ingredient	Formulation	lb AI/A	Product/A	Rate (fl oz/M)	Snow mold (% area infected)	*Turfgrass quality
Turfcide + Harrell's Par	PCNB pigment	400 (4SC) 100%	21.78 NA	5.45 gal 16 fl.oz.	16 0.37	2.0 b	5.9 a
AMV4820 + Foursome	PCNB pigment	4A 100%	10.89 NA	2.72 gal 21.78 fl.oz.	8 0.5	1.8 b	5.8 ab
Turfcide	PCNB	400 (4F)	21.78	5.45 gal	16	1.5 b	5.6 ab
AMV4820 + Foursome	PCNB pigment	4A 100%	21.78 NA	5.45 gal 21.78 fl.oz.	16 0.5	2.3 b	5.6 ab
Turfcide	PCNB	400 (4F)	10.89	2.72 gal	8	4.0 b	5.5 ab
AMV4820	PCNB	4A	10.89	2.72 gal	8	2.0 b	5.4 ab
Turfcide + Foursome	PCNB pigment	400 (4F) 100%	10.89 NA	2.72 gal 21.78 fl.oz.	8 0.5	5.0 b	5.4 ab
Turfcide + Foursome	PCNB pigment	400 (4SC) 100%	21.78 NA	5.45 gal 21.78 fl.oz.	16 0.5	1.5 b	5.3 ab
Turfcide + Foursome	PCNB pigment	400 (4F) 100%	16.34 NA	4.08 gal 21.78 fl.oz.	12 0.5	2.3 b	5.3 ab
AMV4820 + Harrell's Par	PCNB pigment	4A 100%	21.78 NA	5.45 gal 16 fl.oz.	16 0.37	6.0 b	5.3 ab
AMV4820	PCNB	4A	16.3	4.08 gal	12.0	3.0 b	5.1 ab
AMV4820	PCNB	4A	21.78	5.45 gal	16	1.5 b	5.0 ab
AMV4820 + Foursome	PCNB pigment	4A 100%	16.34 NA	4.08 gal 21.78 fl.oz.	12 0.5	9.8 b	4.8 ab
Turfcide	PCNB	400 (4F)	16.34	4.08 gal	12	7.5 b	4.6 b
Untreated	---	---	---	---	0	35.5 a	2.5 c

*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. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

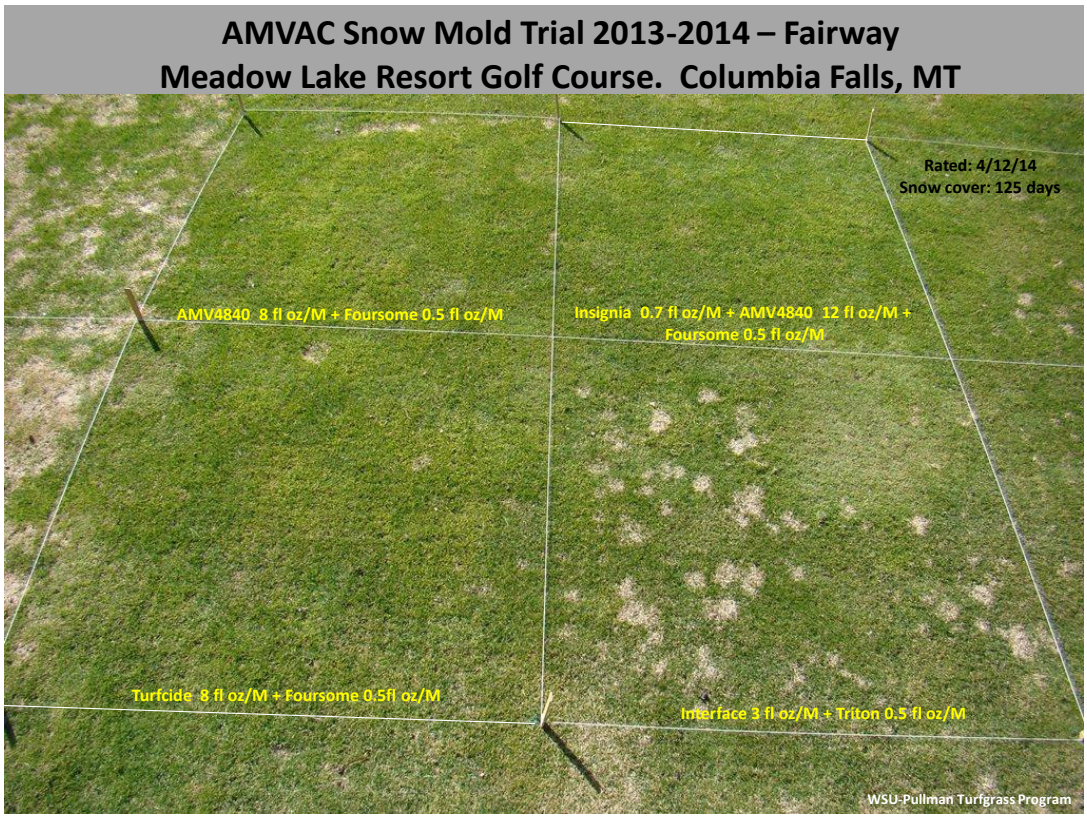

Fig. 2. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

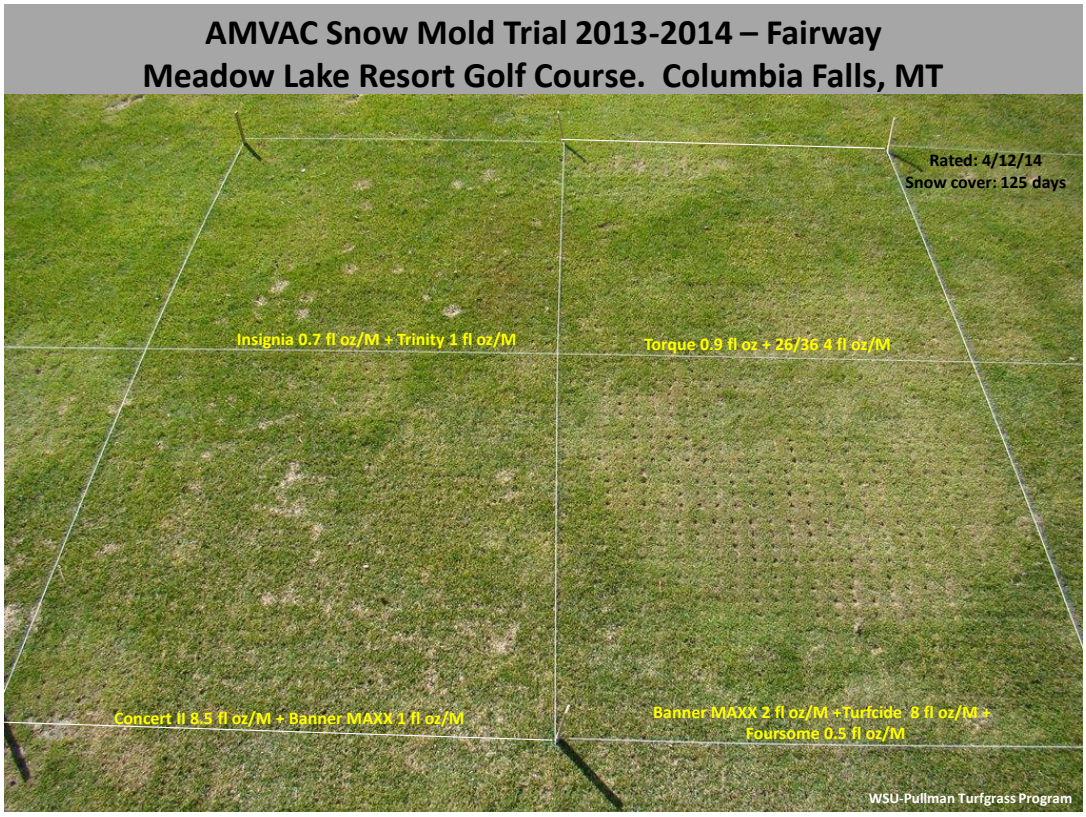

Fig. 3. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

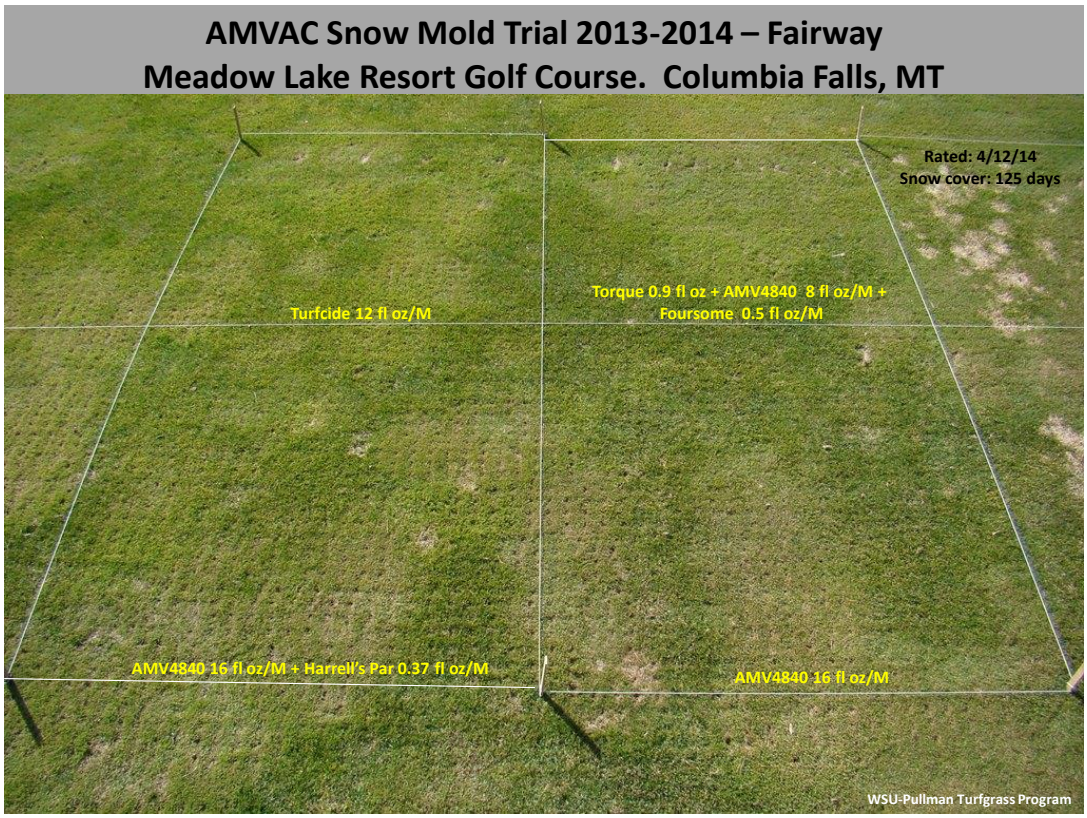

Fig. 4. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

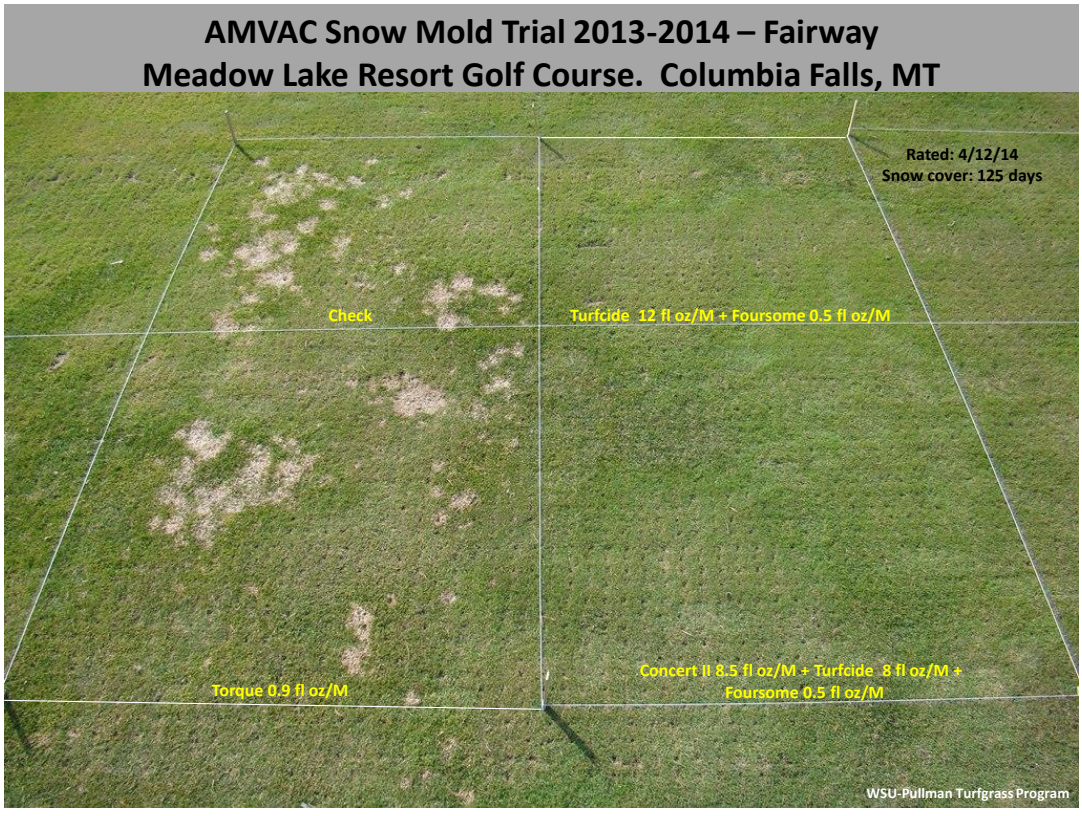

Fig. 5. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

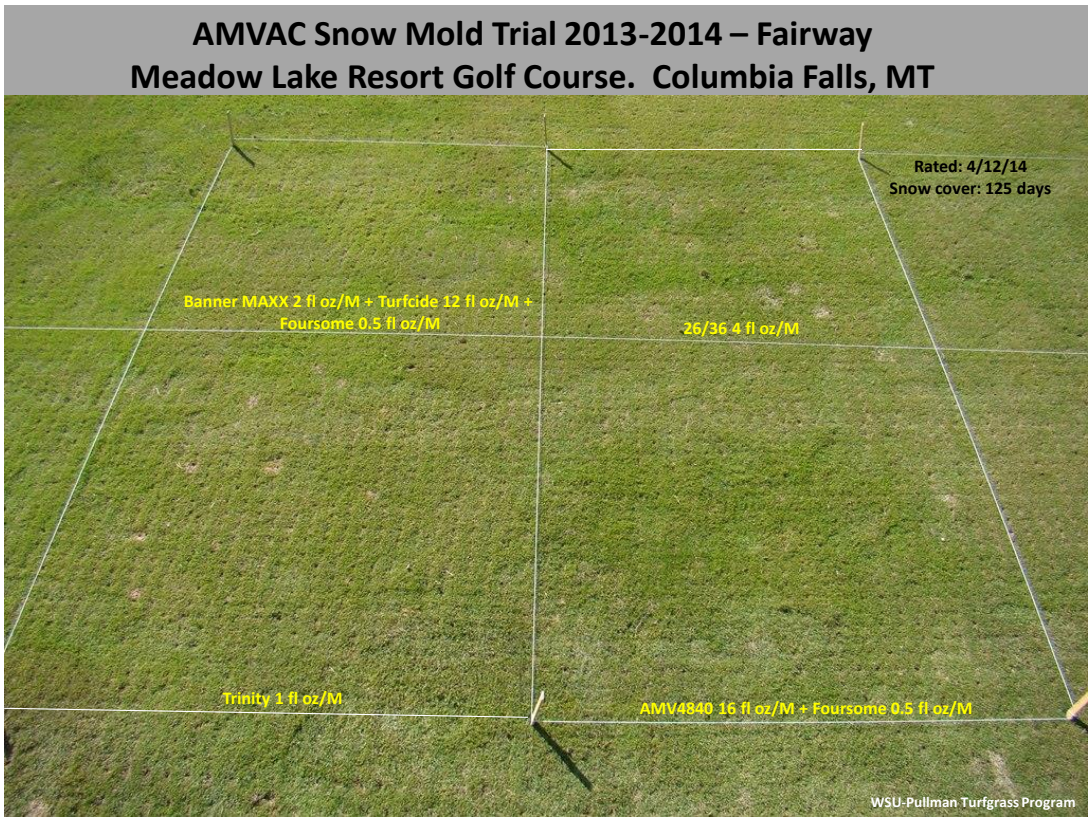

Fig. 6. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

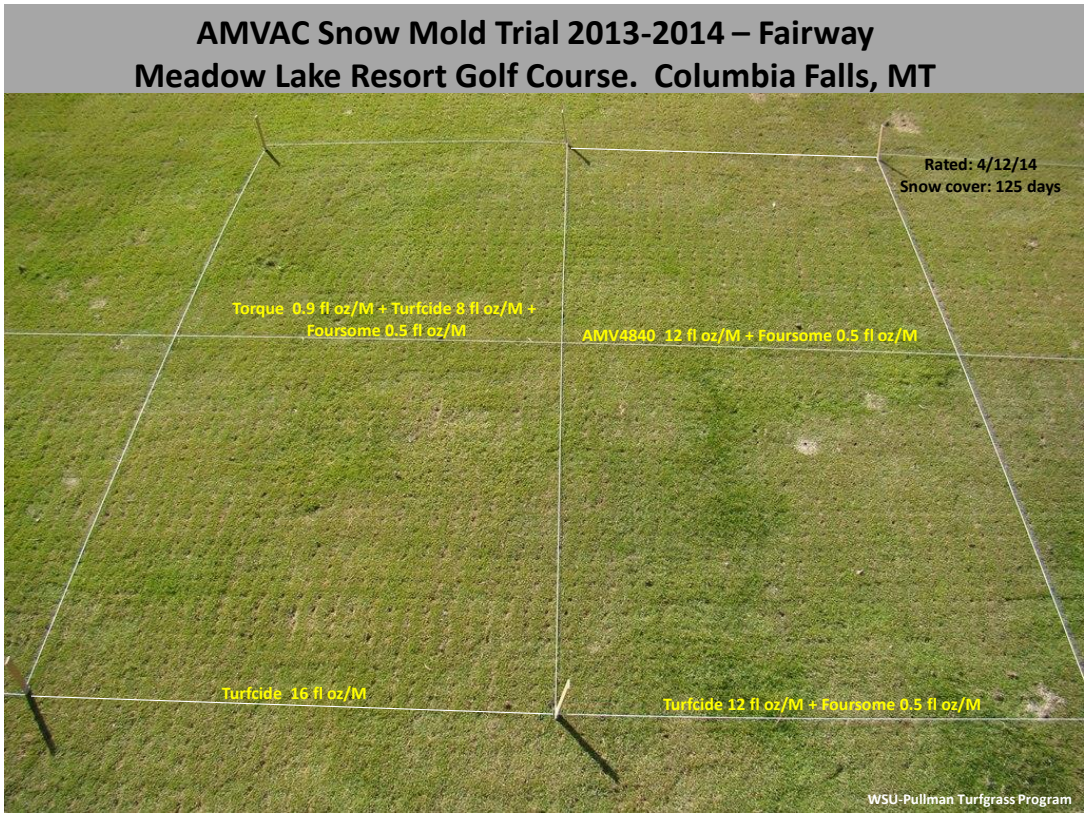

Fig.7. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

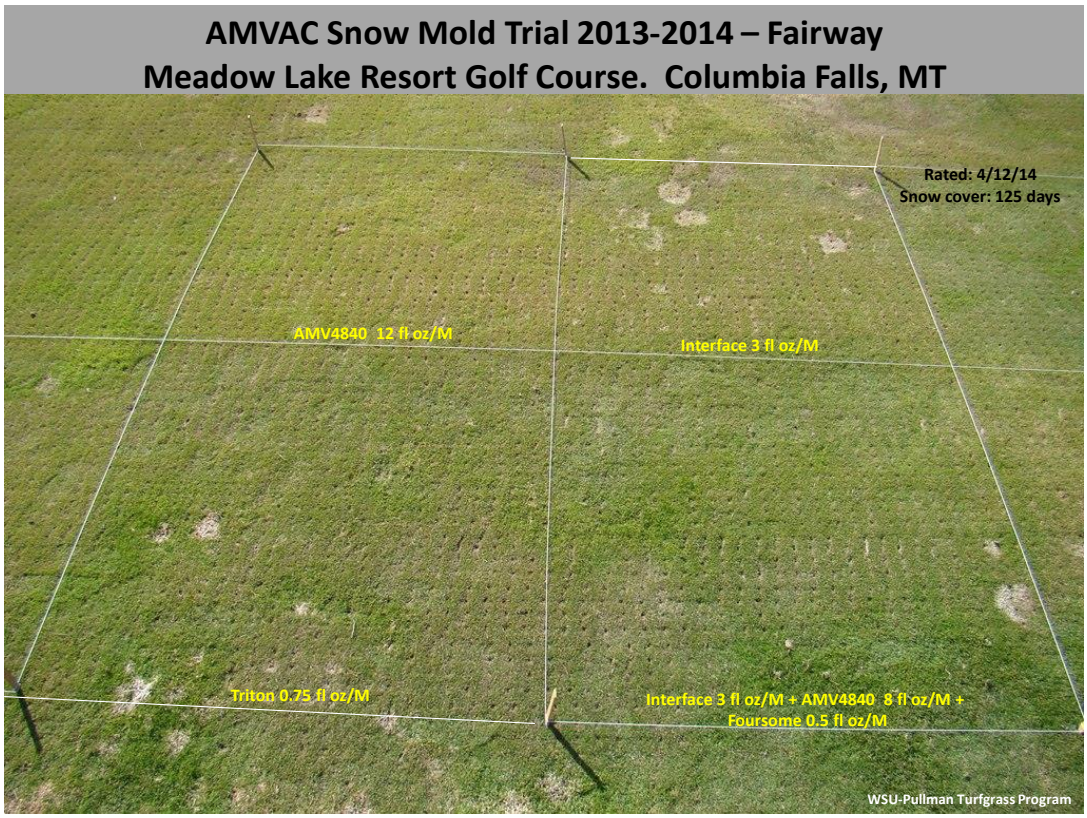

Fig.8. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

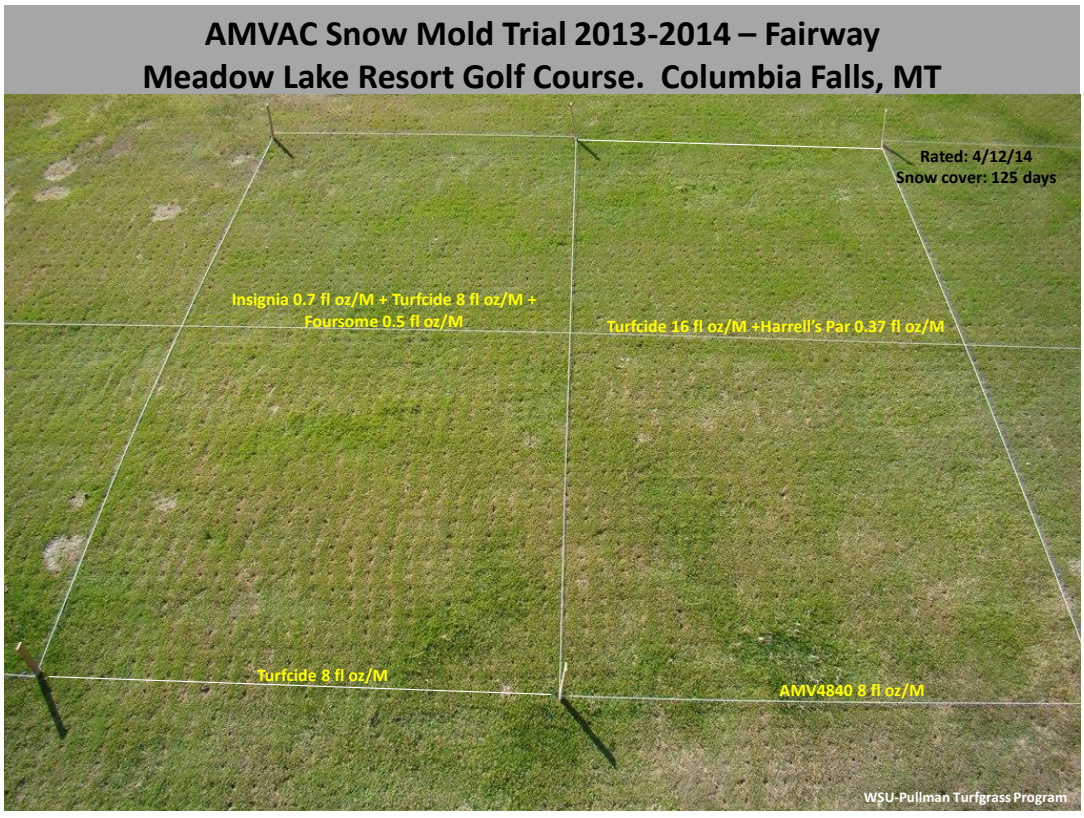

Fig.9. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

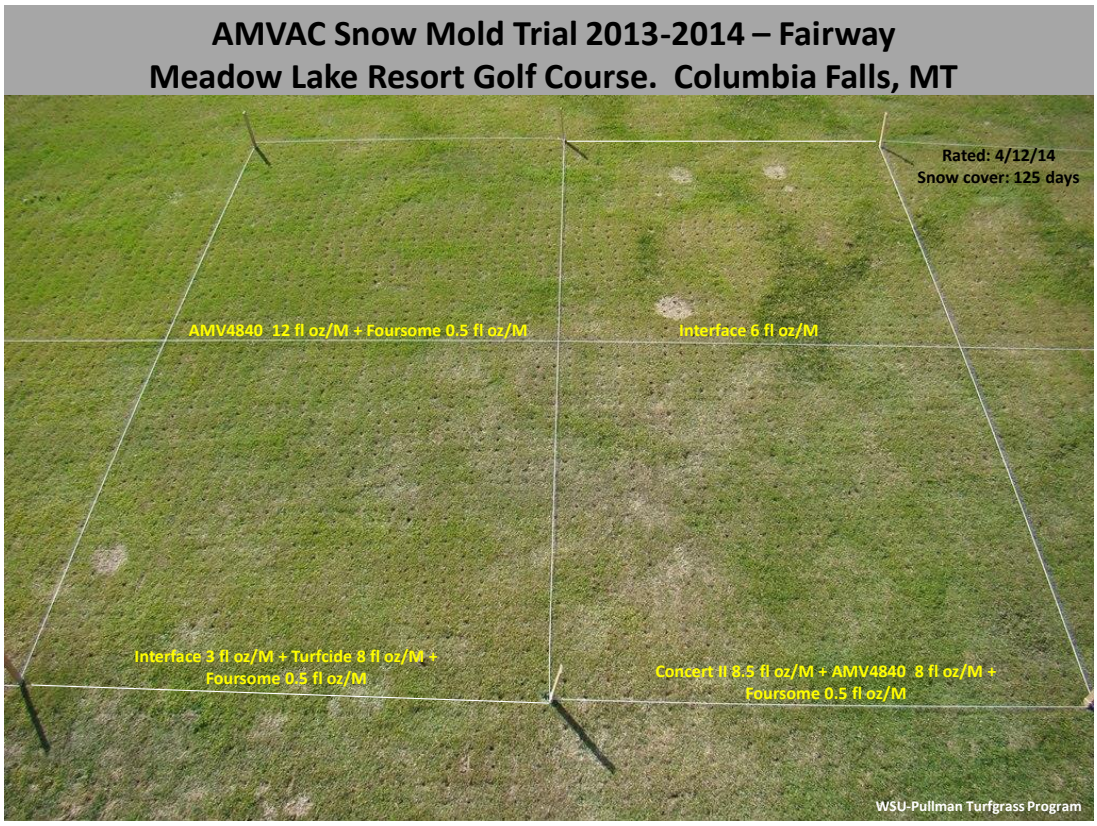

Fig.10. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

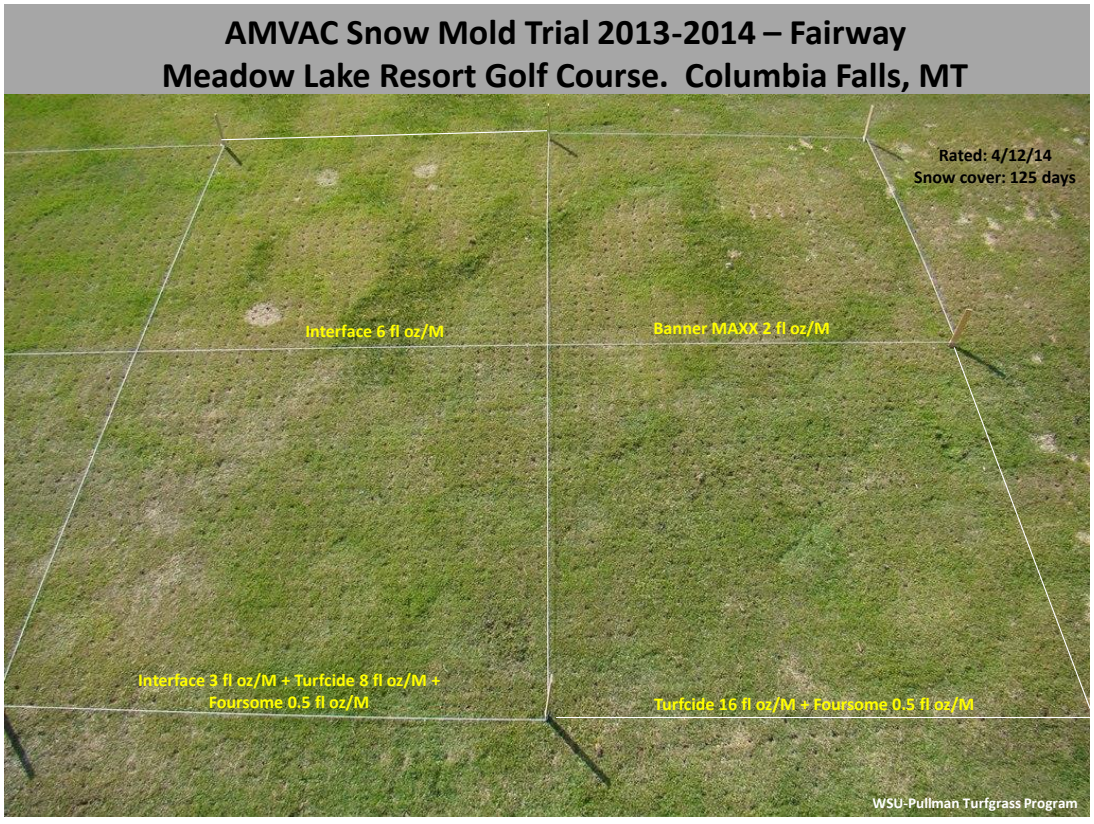

Fig.11. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Rated on 12 Apr 2014.

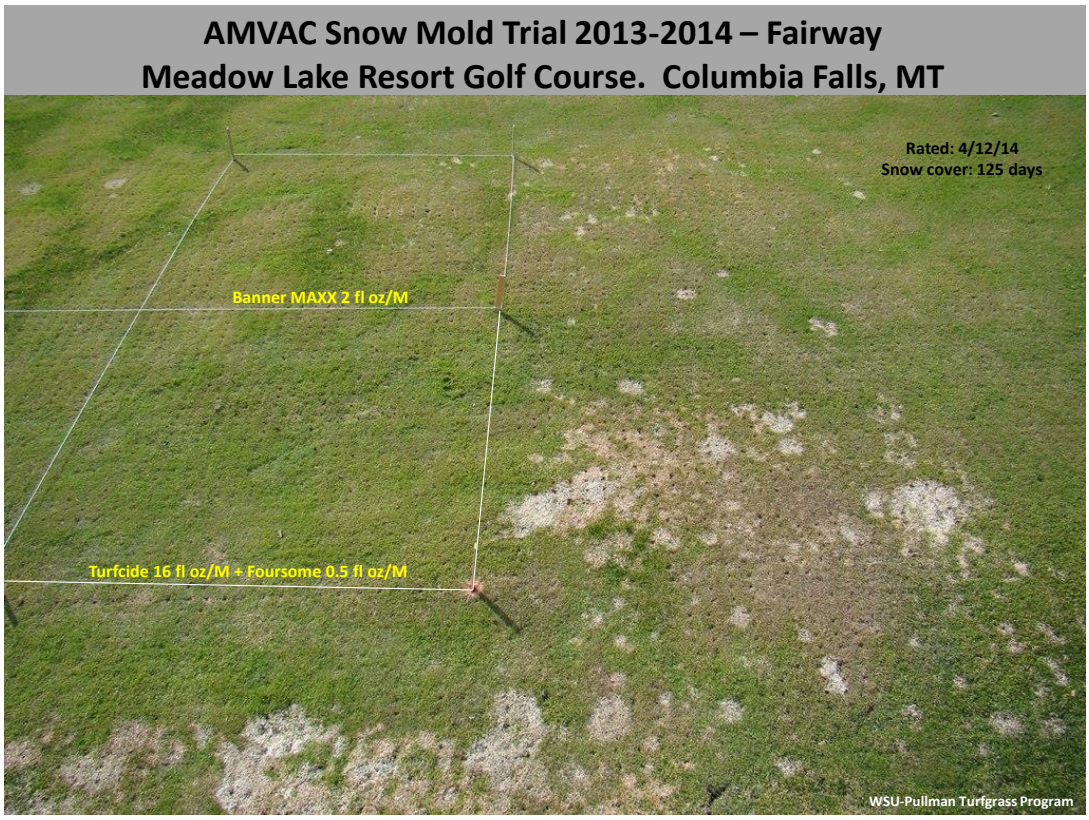

Fig.12. The effect of fungicides to control pink and gray snow mold on a fairway at Meadow Lake Resort Golf Course in Columbia Falls, MT. Typical check plot with 35% gray and 65% pinksnow mold. Rated on 12 Apr 2014.