AMVAC-Turfcide 400 or AMV4820 alone, combined with other fungicides, or compared to other fungicides to control pink and gray snow mold on a green 2013-2014

AMVAC protocol #:PR13-32-1205 13C02F050XID740

Charles T. Golob and William J. Johnston
Dept. Crop and Soil Sciences
Washington State University
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A snow mold control trial was conducted on a nursery green at Chewelah Golf and Country Club in Chewelah, WA. The green is a mixed stand of 'Penncross' creeping bentgrass 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 2013 to April 2014. On 12 Apr 2014, individual plots were evaluated for pink (*Microdochium nivale*) and/or gray (T*yphula spp.*) snow mold disease severity (% area infected), turfgrass quality rated on a scale from 1 to 9; 9 = excellent and 6 = acceptable.

Disease pressure was very good with approximately 40% of the Check plot area infected with snow mold (Table 2). The percentage of pink and gray snow mold in the Check was estimated to be 50% and 50%, respectively (Fig. 11). All fungicide treatments resulted in better control compared to the fungicide treatments Banner MAXX 2 fl oz/M, Torque 0.9 fl oz/M, Triton 0.85 fl oz/M, and Trinity 1 fl oz/M. These four treatments did however result in significantly better control compared to the Check.

Turfgrass quality among the fungicide treatments varied from 6.9 (Turfcide 12 fl oz/M) to 2.9 (Trinity 1 fl oz/M) (Table 2). All treatments, except Interface 4 fl oz/M + Triton 0.85 fl oz/M, in which a pigment, either Foursome at 0.5 fl oz/M or Harrell's Par at 0.37 fl oz/M, was added resulted in a turfgrass quality rating >5. All other treatments in which a pigment was not added resulted in turfgrass quality <5. However, several treatments stood out, with high turfgrass quality ratings (>6), compared to the other treatments: Turfcide 8, 12, or 16fl oz/M + Foursome 0.5 fl oz/M, Interface 4 fl oz/M, Banner MAXX 2 fl oz/M, or Torque 0.9 fl oz/M + Turfcide 8 fl oz/M + Foursome 0.5 fl oz/M, and Banner MAXX 2 fl oz/M + Turfcide 12 or 16 fl oz/M + Foursome 0.5 fl oz/M.

Comparing only Turfcide 400 to AMV4820 with or without Foursome 0.5 fl oz/M or Harrell's Par 0.37 fl oz/M resulted in excellent to very good snow mold control (Table 3). However, adding either Foursome 0.5 fl oz/M or Harrell's Par 0.37 fl oz/M resulted in significantly better turfgrass quality compared to the same treatments of Turfcide or AMV4840 without a pigment added. Surprizingly,

for the most part, Turfcide + a pigment added resulted in higher turfgrass quality compared toAMV4840 + a pigment added. There was virtually no difference between any of the Turfcide rates compared to the AMV4840 rates without a pigment added. Figures 1 to 11 show the various fungicide treatments in Rep 2. Figure 11 shows the Check plot in Rep 2.

Overall, all treatments with Turfcide or AMV4840 resulted in excellent to very good snow mold control. However, for the most part, adding Foursome 0.5 fl oz/M or Harrell's Par 0.37 fl oz/M resulted in higher turfgrass quality. The addition of Interface, Banner MAXX, or Torque with Turfcide + a pigment resulted in some of the best control and highest turfgrass quality.

Table 1. Climatic data and GPS coordinates at application.

LOCATION: Chewelah Golf and Country Club. Chewelah, WA.

GPS coordinates: Lat.: N 48° 19' 0.48"

Long.: W 117° 44' 44.8"

Elev.: 2175'

Application date: 10/26/13

Air temperature	7.2°C
Soil temp (2")	5.5°C
RH	83%
Wind (W)	0-1 mph
Weather conditions	Foggy

Table 2. The effect of fungicides to control pink and gray snow mold and turfgrass quality on a nursery green at Chewelah Golf and Country Club in Chewelah, WA. 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 +	PCNB	400 (4F)	16.34	4.08 gal	12	0.0 d**	6.9 a
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Interface +	iprodione +	2.27SC	2.91	1.36 gal	4	0.0 d	6.6 ab
	trifloxystrobin		0.177				
Turfcide +	PCNB	4F	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	0.0 d	6.5 abc
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Banner Maxx +	propiconazole	1.3ME	0.88	87.12 fl.oz.	2	0.0 d	6.4 abcd
Turfcide +	PCNB	4F	21.78	5.45 gal	16		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Torque +	tebuconazole	3.6EC	1.1	39.2 fl.oz.	0.9	0.0 d	6.3 abcde
Turfcide +	PCNB	400 (4F)	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	0.0 d	6.1 bcdef
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
AMV4820 +	PCNB	4A	10.89	2.72 gal	8	0.0 d	5.9 cdefg
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
AMV4820 +	PCNB	4A	16.34	4.08 gal	12	0.0 d	5.6 efgh
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
AMV4820 +	PCNB	4A	21.78	5.45 gal	16	0.0 d	5.5 fghi
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Banner Maxx +	propiconazole	1.3ME	0.88	87.12 fl.oz.	2	0.3 d	6.4 abcd
Turfcide +	PCNB	4F	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Insignia +	pyraclostrobin	2.08SC	0.495	30.5 fl.oz.	0.7	0.3 d	5.6 efgh
AMV4820 +	PCNB	4A	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	0.3 d	4.3 klmn
AMV4820	PCNB	4A	10.89	2.72 gal	8	0.3 d	3.9 mno
Banner Maxx +	propiconazole	1.3ME	0.88	87.12 fl.oz.	2	0.5 d	6.4 abcd
Turfcide +	PCNB	4F	16.34	4.08 gal	12		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Torque +	tebuconazole	3.6EC	1.1	39.2 fl.oz.	0.9	0.5 d	6.0 bcdefg
AMV4820 +	PCNB	4A	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Interface +	iprodione +	2.27SC	2.91	1.36 gal	4	0.5 d	5.8 defgh
	trifloxystrobin		0.177				
AMV4820 +	PCNB	4A	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Insignia +	pyraclostrobin	2.08SC	0.495	30.5 fl.oz.	0.7	0.5 d	5.8 defgh
Turfcide +	PCNB	400 (4F)	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Instrata +	chlorothalonil +	3.591L	5.11	1.7 gal	5	0.5 d	5.6 efgh
	propiconazole +		0.8				
	fludioxonil		0.206				
AMV4820 +	PCNB	4A	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Interface	iprodione +	2.27SC	4.37	2.042 gal	6	0.5 d	4.9 ijk
	trifloxystrobin		0.265				
Turfcide	PCNB	400 (4F)	16.34	4.08 gal	12	0.5 d	4.5 jklm
Instrata	chlorothalonil +	3.591L	5.11	1.7 gal	5	0.5 d	4.4 klmn
	propiconazole +		0.8				
	fludioxonil		0.206				
AMV4820	PCNB	4A	21.78	5.45 gal	16	0.6 d	4.3 klmn
AMV4820 +	PCNB	4A	21.78	5.45 gal	16	0.8 d	5.4 ghi
Harrell's Par	pigment	100%	NA	16 fl.oz.	0.37		
Instrata	chlorothalonil +	3.591L	7.15	2.38 gal	7	1.0 d	4.0 lmn
	propiconazole +		1.12				
	fludioxonil		0.288				
Torque +	tebuconazole	3.6EC	1.1	39.2 fl.oz.	0.9	1.3 d	4.5 jklm
26/36	iprodione +	3.8EC	2.59	1.36 gal	4		
	thiophanate-methyl		2.59				
AMV4820	PCNB	4A	16.34	4.08 gal	12	1.3 d	4.1 lmn
Turfcide +	PCNB	400 (4SC)	21.78	5.45 gal	16	1.5 d	5.9 cdefg
Harrell's Par	pigment	100%	NA	16 fl.oz.	0.37		
Instrata +	chlorothalonil +	3.591L	5.11	1.7 gal	5	1.8 d	5.9 cdefg
	propiconazole +		0.8				
	fludioxonil		0.206				
Turfcide +	PCNB	4F	10.89	2.72 gal	8		
Foursome	pigment	100%	NA	21.78 fl.oz.	0.5		
Interface +	iprodione +	2.27SC	2.91	1.36 gal	4	2.0 d	5.1 hij
	trifloxystrobin		0.177				
Triton	triticonazole	3F	0.867	37 fl.oz.	0.85		
Insignia	pyraclostrobin	2.08SC	0.5	30.5 fl.oz.	0.7	2.5 d	3.9 mno
Interface	iprodione +	2.27SC	2.91	1.36 gal	4	2.8 d	4.6 jkl
	trifloxystrobin		0.177				
Turfcide	PCNB	400 (4F)	10.89	2.72 gal	8	2.8 d	4.0 lmn
26/36	iprodione +	3.8EC	2.59	1.36 gal	4	3.5 d	4.6 jkl
	thiophanate-methyl		2.59				
Insignia +	pyraclostrobin	2.08SC	0.495	30.5 fl.oz.	0.7	4.3 d	4.1 lmn
Trinity	triticonazole	1.69L	0.575	43.56 fl.oz.	1		
Banner Maxx	propiconazole	1.3ME	0.88	87.12 fl.oz.	2	12.3 c	3.3 opq
Torque	tebuconazole	3.6EC	1.1	39.2 fl.oz.	0.9	18.5 b	3.1 opq
Triton	triticonazole	3F	0.867	37 fl.oz.	0.85	18.8 b	3.8 nop
Trinity	triticonazole	1.69L	0.575	43.56 fl.oz.	1	21.3 b	2.9 qr
Untreated	---	---	---	---	0	40.0 a	2.4 r

*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. The effect of Turfcide or AMV4840 with or without pigments to control pink and gray snow mold and turfgrass quality on a nursery green at Chewelah Golf and Country Club in Chewelah, WA. 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 + Foursome	PCNB pigment	400 (4F) 100%	16.34 NA	4.08 gal 21.78 fl.oz.	12 0.5	0.0 b**	6.9 a
Turfcide + Foursome	PCNB pigment	400 (4SC) 100%	21.78 NA	5.45 gal 21.78 fl.oz.	16 0.5	0.0 b	6.5 ab
Turfcide + Foursome	PCNB pigment	400 (4F) 100%	10.89 NA	2.72 gal 21.78 fl.oz.	8 0.5	0.0 b	6.1 bc
AMV4820 + Foursome	PCNB pigment	4A 100%	10.89 NA	2.72 gal 21.78 fl.oz.	8 0.5	0.0 b	5.9 cd
Turfcide + Harrell's Par	PCNB pigment	400 (4SC) 100%	21.78 NA	5.45 gal 16 fl.oz.	16 0.37	1.5 b	5.9 cd
AMV4820 + Foursome	PCNB pigment	4A 100%	16.34 NA	4.08 gal 21.78 fl.oz.	12 0.5	0.0 b	5.6 cd
AMV4820 + Foursome	PCNB pigment	4A 100%	21.78 NA	5.45 gal 21.78 fl.oz.	16 0.5	0.0 b	5.5 d
AMV4820 + Harrell's Par	PCNB pigment	4A 100%	21.78 NA	5.45 gal 16 fl.oz.	16 0.37	0.8 b	5.4 d
Turfcide	PCNB	400 (4F)	16.34	4.08 gal	12	0.5 b	4.5 e
Turfcide	PCNB	400 (4F)	21.78	5.45 gal	16	0.3 b	4.3 ef
AMV4820	PCNB	4A	21.78	5.45 gal	16	0.6 b	4.3 ef
AMV4820	PCNB	4A	16.34	4.08 gal	12	1.3 b	4.1 ef
Turfcide	PCNB	400 (4F)	10.89	2.72 gal	8	2.8 b	4.0 ef
AMV4820	PCNB	4A	10.89	2.72 gal	8	0.3 b	3.9 f
Untreated	---	---	---	---	0	40.0 a	2.4 g

*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 nursery green at Chewelah Golf and Country Club. Chewelah, WA. Rated on 12 Apr 2014.

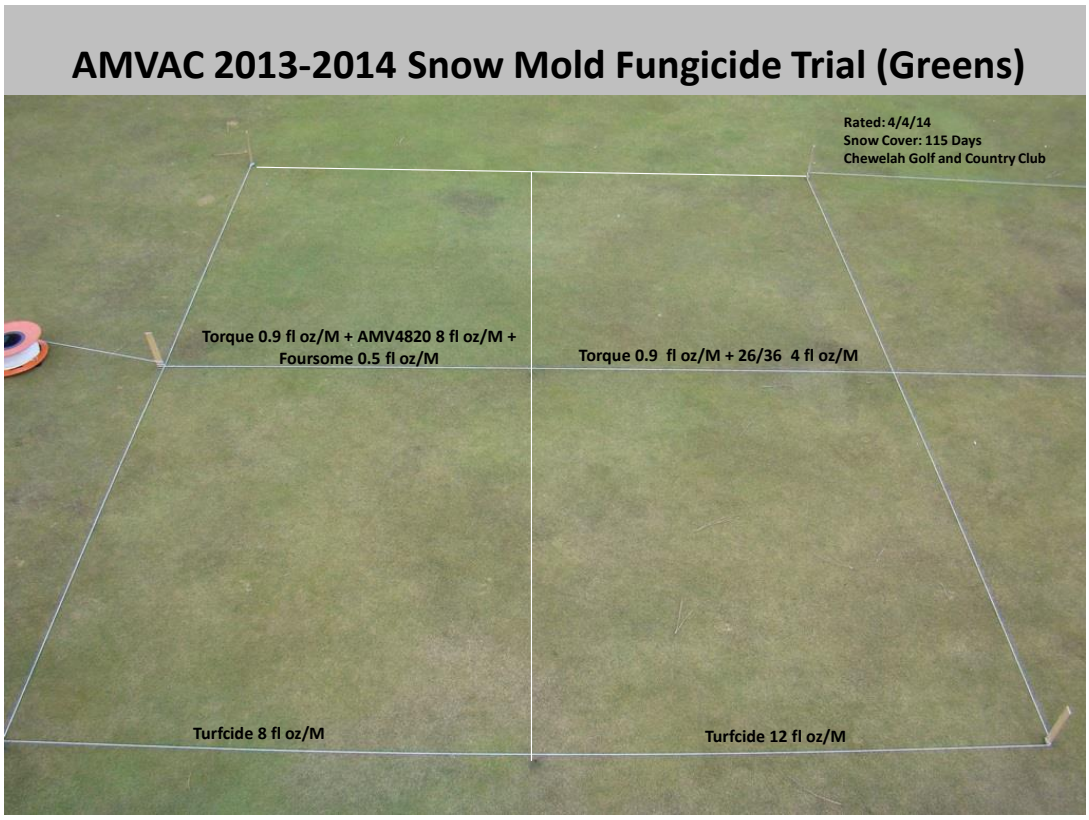

Fig. 2. The effect of fungicides to control pink and gray snow mold on a nursery green at Chewelah Golf and Country Club. Chewelah, WA. Rated on 12 Apr 2014.

Fig. 3. The effect of fungicides to control pink and gray snow mold on a nursery green at Chewelah Golf and Country Club. Chewelah, WA. Rated on 12 Apr 2014.

Fig. 4. The effect of fungicides to control pink and gray snow mold on a nursery green at Chewelah Golf and Country Club. Chewelah, WA. Rated on 12 Apr 2014.

Fig. 5. The effect of fungicides to control pink and gray snow mold on a nursery green at Chewelah Golf and Country Club. Chewelah, WA. Rated on 12 Apr 2014.

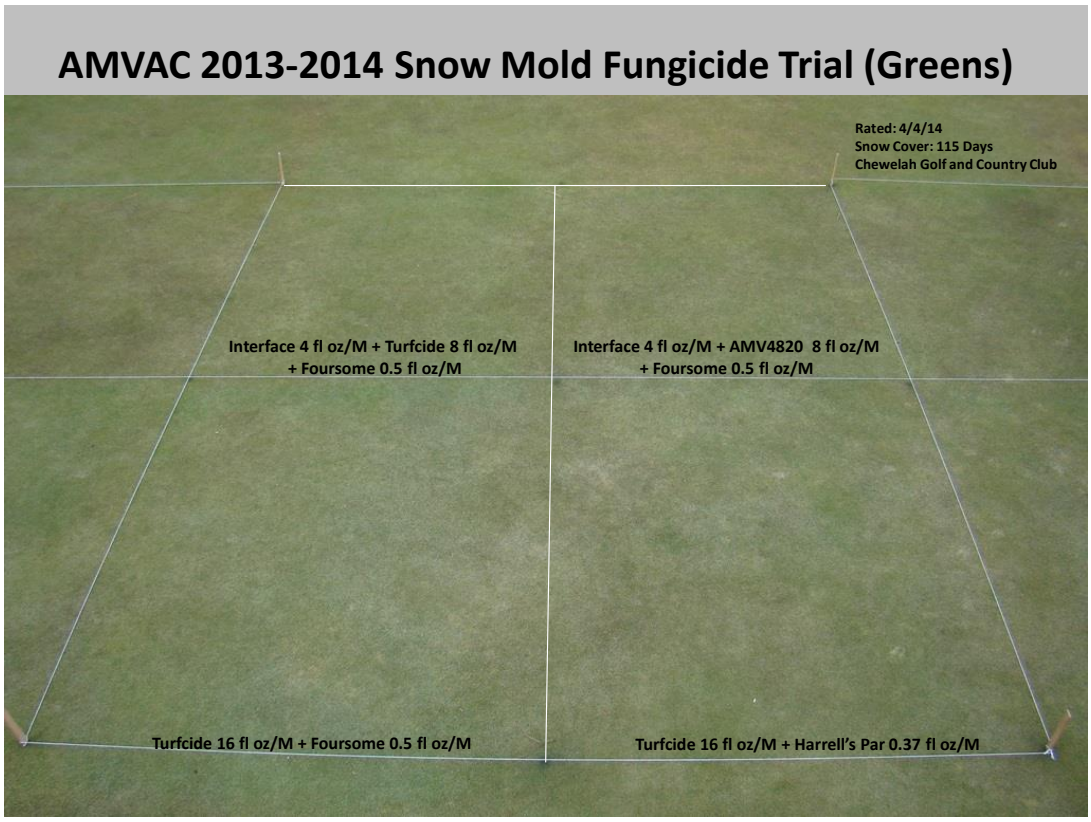

Fig. 6. The effect of fungicides to control pink and gray snow mold on a nursery green at Chewelah Golf and Country Club. Chewelah, WA. Rated on 12 Apr 2014.

Fig. 7. The effect of fungicides to control pink and gray snow mold on a nursery green at Chewelah Golf and Country Club. Chewelah, WA. Rated on 12 Apr 2014.

Fig. 8. The effect of fungicides to control pink and gray snow mold on a nursery green at Chewelah Golf and Country Club. Chewelah, WA. Rated on 12 Apr 2014.

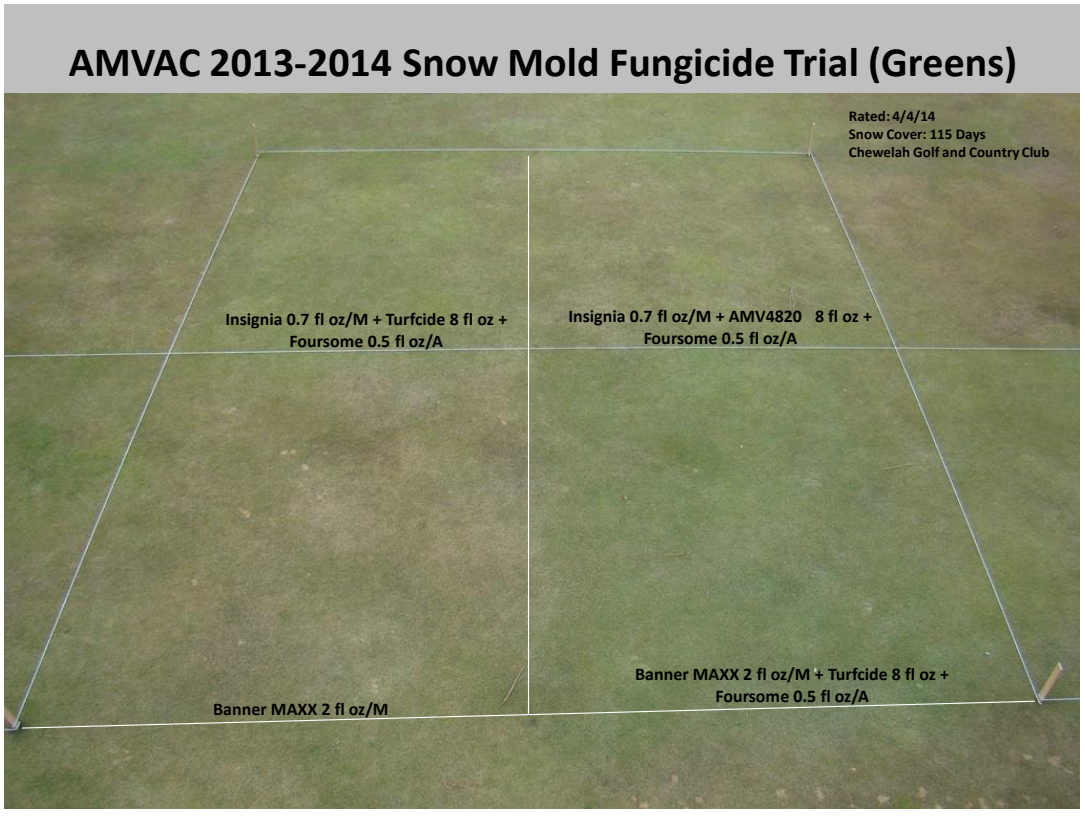

Fig. 9. The effect of fungicides to control pink and gray snow mold on a nursery green at Chewelah Golf and Country Club. Chewelah, WA. Rated on 12 Apr 2014.

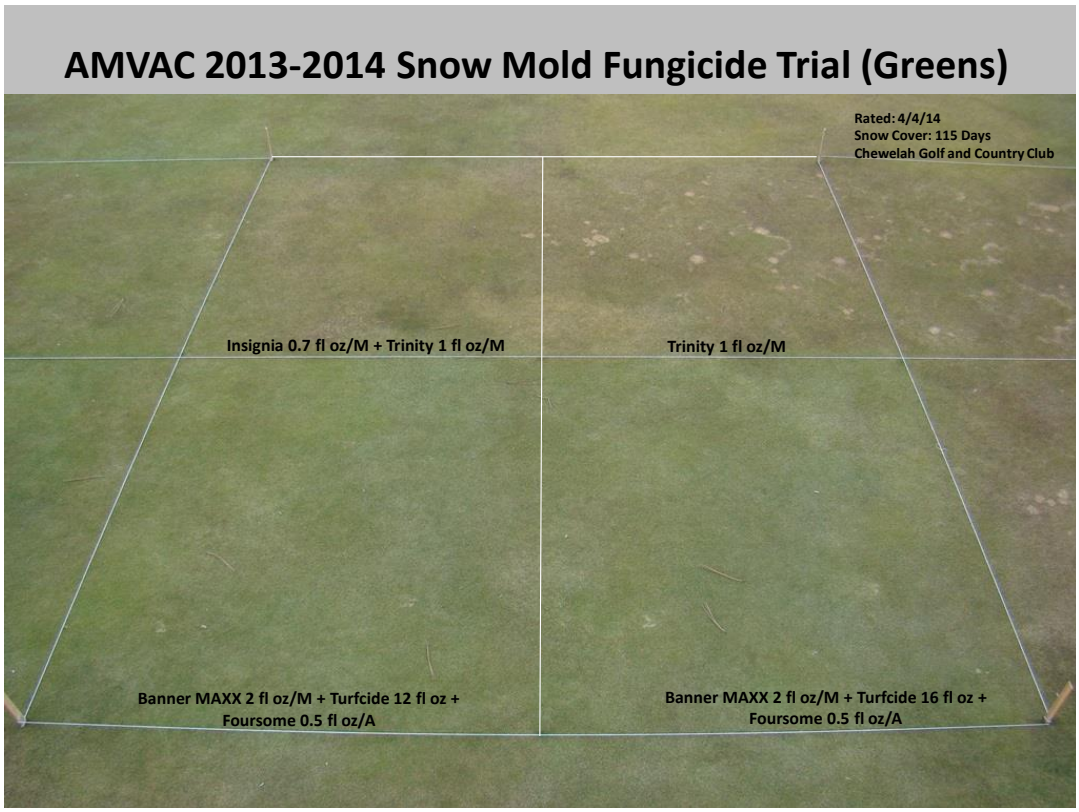

Fig. 10. The effect of fungicides to control pink and gray snow mold on a nursery green at Chewelah Golf and Country Club. Chewelah, WA. Rated on 12 Apr 2014.

Fig. 11. Typical Check plot with both pink and gray snow mold on a nursery green at Chewelah Golf and Country Club. Chewelah, WA. Rated on 12 Apr 2014.