

Bayer Fungicides Used to Control Snow Mold on Putting Greens in Idaho and Washington 2010-2011

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Snow mold control trials were conducted at 3 different locations in the Intermountain Region of the PNW, on a practice green at the City of McCall Golf Course in McCall, ID, on a nursery green at the Chewelah Golf and Country Club in Chewelah, WA, and on a research green at the WSU Turfgrass and Agronomy Research Center (TARC) in Pullman, WA. The practice green at McCall is a stand of creeping bentgrass/annual bluegrass, the nursery green at Chewelah is a push-up green covered with 3" to 4" of sand with a mixed stand of 'Pennncross' creeping bentgrass and annual bluegrass, and the research green at Pullman is a pure stand of 'T-1' creeping bentgrass grown on an USGA specification putting green. Individual treatment plots were 6' x 7' with three replications in a randomized complete-block design. Treatments were applied 27 Oct 10, 29 Oct 10, and 17 Nov 10 at McCall, Chewelah, 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 65 days. Continuous snow cover lasted from the end of November 2010 through the end of March 2011 (approx. 125 days) at Chewelah and from the middle of November 2010 to 2 May 2011 at McCall (approx. 160 days). At McCall, snow was not allowed to melt naturally compared to the other 2 sites. On May 2 approximately 1 foot of snow was mechanically removed from the green in the morning and rated that afternoon. 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 of 1-9; 9 = excellent and 6 = acceptable) on 24 Mar 11 at Pullman, 30 Mar 11 at Chewelah, and 2 May 11 at McCall. The snow mold trial at McCall was rated one additional time, 2 weeks after its first rating, on 17 May 2011.

At Pullman, the untreated Check had approximately 16% of the area infected with pink snow mold (Table 1. Figures 1 and 2). All treatments resulted in complete or nearly complete snow mold control. However, turf quality was better when comparing the Bayer fungicide treatments, all of which contain at least one product with StressGuard, to Instrata alone. The Instrata + PAR treatment, in terms of turfgrass color and quality, was comparable to

Interface 4 fl oz + Daconil 5 oz. Figures 1 through 5 show the snow mold treatments in reps 1 and 2.

At Chewelah, the untreated Check had approximately 86% of the plot area infected with both gray and pink snow mold when rated on 30 Mar 2011 (Table 2. Figures 6 and 7). It was estimated that the breakdown of snow mold present was approximately 60% gray and 40% pink snow mold. No fungicide treatment resulted in complete snow mold control, but all fungicide treatments reduced snow mold infection to under 9%. Turfgrass color was higher in all fungicide combinations (all of which contain at least one product with StressGuard) compared to Instrata alone. Although the Instrata 9.3 fl oz + PAR 0.37 fl oz treatment was among the highest in turfgrass color and quality. Among the treatments that performed the worst were Interface 6, 4, or 3 fl oz + Triton FLO 0.85 fl oz and Instrata alone at 9.3 fl oz. Figure 6 through 11 show the treatments in reps 1 and 2. Figure 12 is an overview of reps 1 and 2.

At McCall, when rated on 2 May 2011, the untreated Check had 22% of the plot area infected with pink snow mold, even though there was sufficient snow cover (more than 160 days) for gray snow mold to develop. The reason for the lack of gray snow mold development may be due to the fact that a treatment of Banner MAXX + Daconil was applied, by the superintendent, in early October 2010 to control for an outbreak of pink snow mold. Reserve 5.4 fl oz + Interface 6 fl oz had the highest overall turfgrass quality. Figure 19 is a close up of this treatment. Furthermore, this treatment was essentially the same as Instrata 9.3 fl oz + PAR 0.37 fl oz in terms of snow mold control and turfgrass quality. Figures 13 through 16 show treatments in reps 1 and 2. Figure 20 is an overview of reps 1 and 2 when rated on 2 May 2011. There were some confusing visual signs (brown necrotic leaf tissue) of what appeared to be snow mold disease in plots that were treated with Interface 3 or 6 fl oz + Triton FLO 0.85 fl oz (Figures 17 and 18). However, the study was rated again 2 weeks later with no sign of what appeared to be disease in those 2 treatments (Table 3). Note: immediately after the 2 May 2011 rating the superintendent applied Fungicide IX to the entire practice green which may have stopped disease development. In any event, when the Interface + Triton treatments were rated on 17 May 2011 they were outstanding and as good as any of the other fungicide treatments in the trial. Figures 21 through 24 show the treatments in reps 1 and 2 rated on 17 May 2011. Figure 25 is an overview of reps 1 and 2.

Overall, Interface 4, 5 or 6 fl oz/M + Daconil 5 oz at Pullman resulted in complete snow mold control, with turfgrass quality increasing slightly with increased rates. Tartan 2 fl oz or Reserve 4.5 fl oz also did well but had slightly less turfgrass quality compared to the higher Interface + Daconil treatments. All Bayer fungicide treatments had significantly higher turfgrass quality compared to Instrata 5 or 7 fl oz treatments. Tank mixing PAR with Instrata did significantly increase turfgrass quality.

Under longer snow cover at Chewelah and McCall, Interface + Triton treatments for the most part did not perform as well as Tartan 2 fl oz + Daconil 5 oz, Reserve 4.5 fl oz + Compass 0.25 oz, or Reserve 5.4 fl oz + Interface 6 fl oz. At Chewelah, Interface 3 or 4 fl oz + Triton FLO 0.85 fl oz were similar to Instrata 9.3 fl oz in terms of disease control and quality. As seen at Pullman, tank mixing PAR with Instrata did result in increased turfgrass quality and color to levels seen with many Bayer fungicide combinations at both Chewelah and McCall. At McCall, when rated on 2 May 2011 plots treated with Interface + Triton showed an underlying sign that disease may be present. However, 2 weeks later when the plots were rated again these signs were gone.

Table 1. The effect of increased rates of Interface on turfgrass quality and to control snow mold on a research green at the WSU Turfgrass and Agronomy Research Center (TARC) in Pullman, WA. Rated 24 Mar 2011.

Treatment	Form. Type	Rate (fl oz or oz/M)	Disease (% Area infected)	Turf quality*	Color**
INTERFACE (Iprodione + Trifloxystrobin) + DACONIL ULTREX (Chlorothalonil)	SC WG	6 fl oz 5 oz	0.0 c***	5.5 a	5.5 a
INTERFACE (Iprodione + Trifloxystrobin) + DACONIL ULTREX (Chlorothalonil)	SC WG	5 fl oz 5 oz	0.0 c	5.3 ab	5.3 ab
INTERFACE (Iprodione + Trifloxystrobin) + DACONIL ULTREX (Chlorothalonil)	SC WG	4 fl oz 5 oz	0.0 c	5.0 ab	4.8 bc
INSTRATA Propiconazole + Fludioxinil + Chlorothalonil) + PAR (Proprietary pigment concentrate)	XL	7 fl oz 0.37 fl oz	0.0 c	4.8 b	4.5 c
INSTRATA Propiconazole + Fludioxinil + Chlorothalonil)	XL	5 fl oz	0.0 c	4.0 c	3.5 d
INSTRATA Propiconazole + Fludioxinil + Chlorothalonil)	XL	7 fl oz	0.0 c	4.0 c	3.3 d
TARTAN (Triadimefon + Trifloxystrobin)	SC	2 fl oz	0.3 c	5.0 ab	5.0 abc
RESERVE 4.8 SC (Triticonazole + Chlorothalonil)	SC	4.5 fl oz	0.3 c	4.8 b	5.0 abc
PAR (Proprietary pigment concentrate)		0.37 fl oz	5.3 b	3.3 cd	5.0 abc
UNTREATED			14.8 a	2.3 d	3.8 d

*Turf quality was rated 1-9; with 9 = excellent.

**Color was rated 1-9; with 9 = dark green.

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

Figure 1. Snow mold fungicide treatments at TARC. Pullman, WA. Rated 24 Mar 2011.



Figure 2. Snow mold fungicide treatments at TARC. Pullman, WA. Rated 24 Mar 2011.



Figure 3. Snow mold fungicide treatments at TARC. Pullman, WA. Rated 24 Mar 2011.



Figure 4. Snow mold fungicide treatments at TARC. Pullman, WA. Rated 24 Mar 2011.

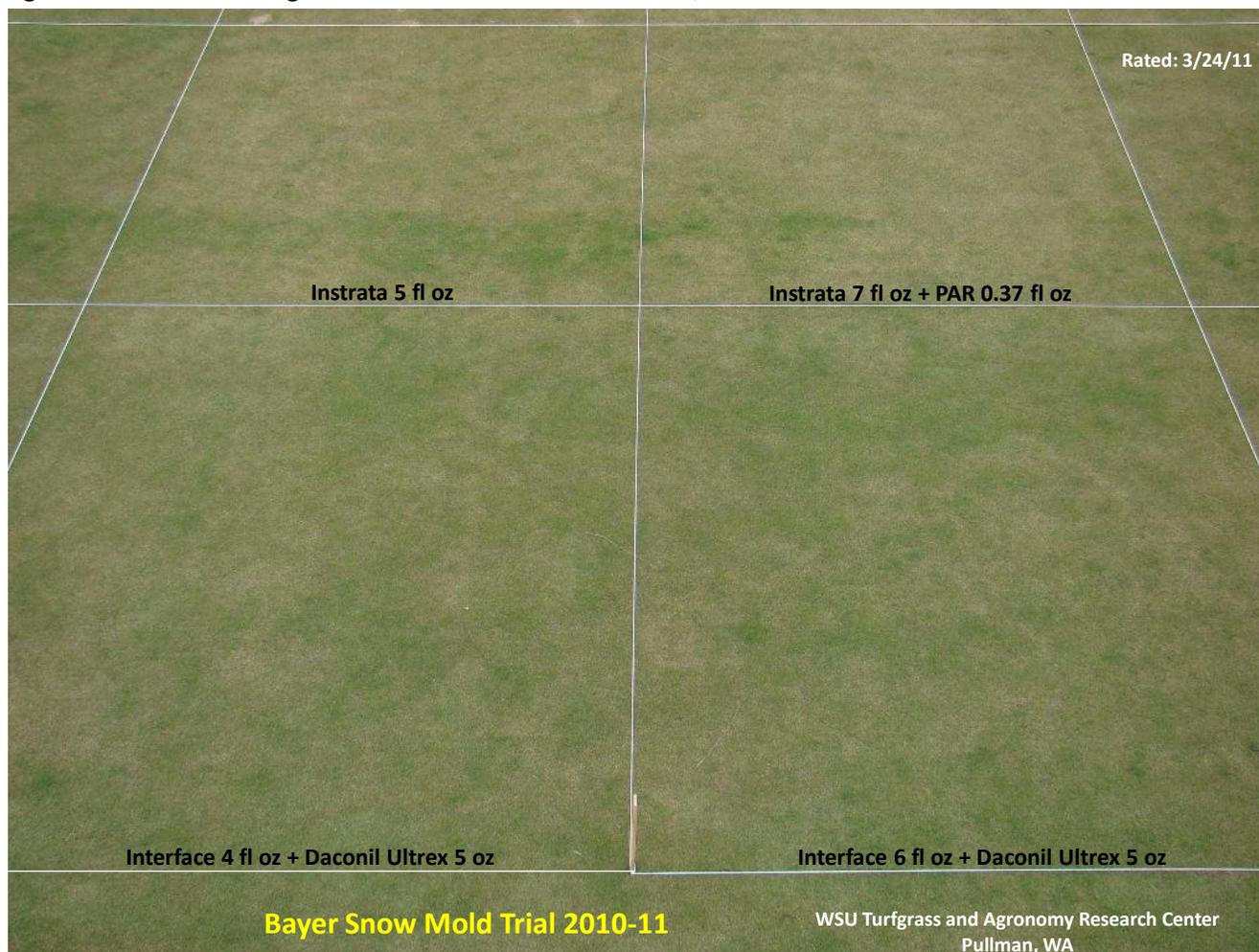


Figure 5. Snow mold fungicide treatments at TARC. Pullman, WA. Rated 24 Mar 2011.

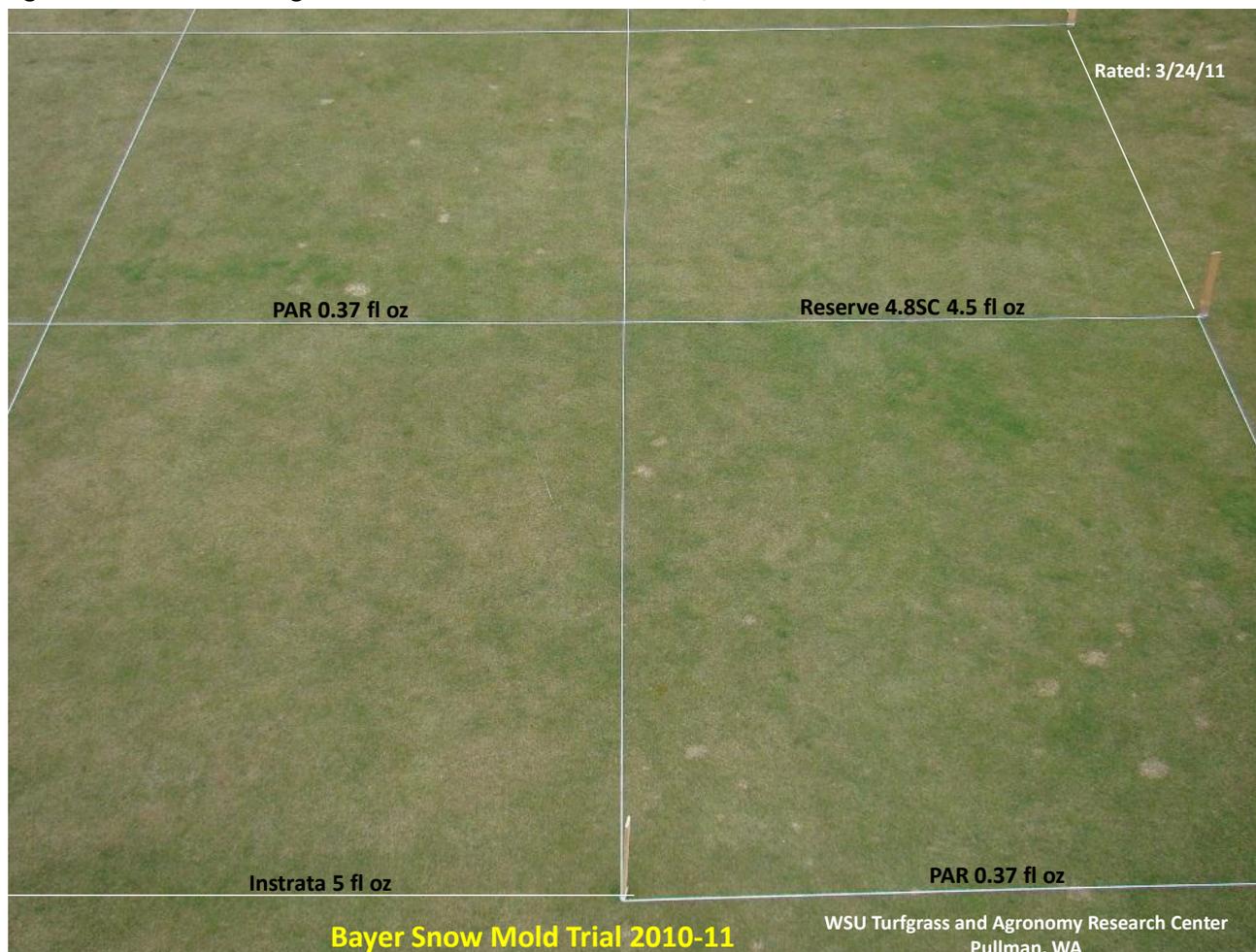


Table 2. The effect of various Bayer fungicide combinations on turfgrass quality and to control snow mold on a practice green at the Chewelah Golf and Country Club in Chewelah, WA. Rated 30 Mar 2011.

Treatment	Form. Type	Rate (fl oz or oz/M)	Disease (% area infected)	Turf quality*	Color**
TARTAN (Triadimefon + Trifloxystrobin) + DACONIL ULTREX (Chlorothalonil)	SC WG	2 fl oz 5 oz	1.0 d***	6.5 a	6.5 b
RESERVE 4.8 SC (Triticonazole + Chlorothalonil) + COMPASS (Trifloxystrobin)	SC WG	4.5 fl oz 0.25 oz	1.3 d	6.0 ab	6.0 c
INTERFACE (Iprodione + Trifloxystrobin) + TRITON FLO (Triticonazole)	SC SC	5 fl oz 0.85 fl oz	1.8 cd	6.3 ab	7.0 a
INSTRATA (Propiconazole + Fludioxinil + Chlorothalonil) + PAR (Proprietary pigment concentrate)		9.3 fl oz 0.37 fl oz	2.3 cd	6.5 a	7.0 a
INSTRATA (Propiconazole + Fludioxinil + Chlorothalonil)	XL	11 fl oz	3.8 cd	5.3 abc	5.3 d
INTERFACE (Iprodione + Trifloxystrobin) + TRITON FLO (Triticonazole)	SC SC	6 fl oz 0.85 fl oz	6.5 cd	6.0 ab	7.0 a
INTERFACE (Iprodione + Trifloxystrobin) + TRITON FLO (Triticonazole)	SC SC	3 fl oz 0.5 fl oz	7.3 cd	5.0 bc	6.0 c
INSTRATA (Propiconazole + Fludioxinil + Chlorothalonil)	XL	9.3 fl oz	7.3 cd	4.3 c	4.8 e
INTERFACE (Iprodione + Trifloxystrobin) + TRITON FLO (Triticonazole)	SC SC	4 fl oz 0.85 fl oz	8.8 c	4.0 c	6.3 bc
PAR (Proprietary pigment concentrate)		0.37 fl oz	78.8 b	1.0 d	1.0 f
UNTREATED		0	86.3 a	1.0 d	1.0 f

*Turf quality was rated 1-9; with 9 = excellent.

**Color was rated 1-9; with 9 = dark green.

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

Figure 6. Snow mold fungicide treatments at the Chewelah Golf and Country Club. Chewelah, WA.



Figure 7. Snow mold fungicide treatments at the Chewelah Golf and Country Club. Chewelah, WA.

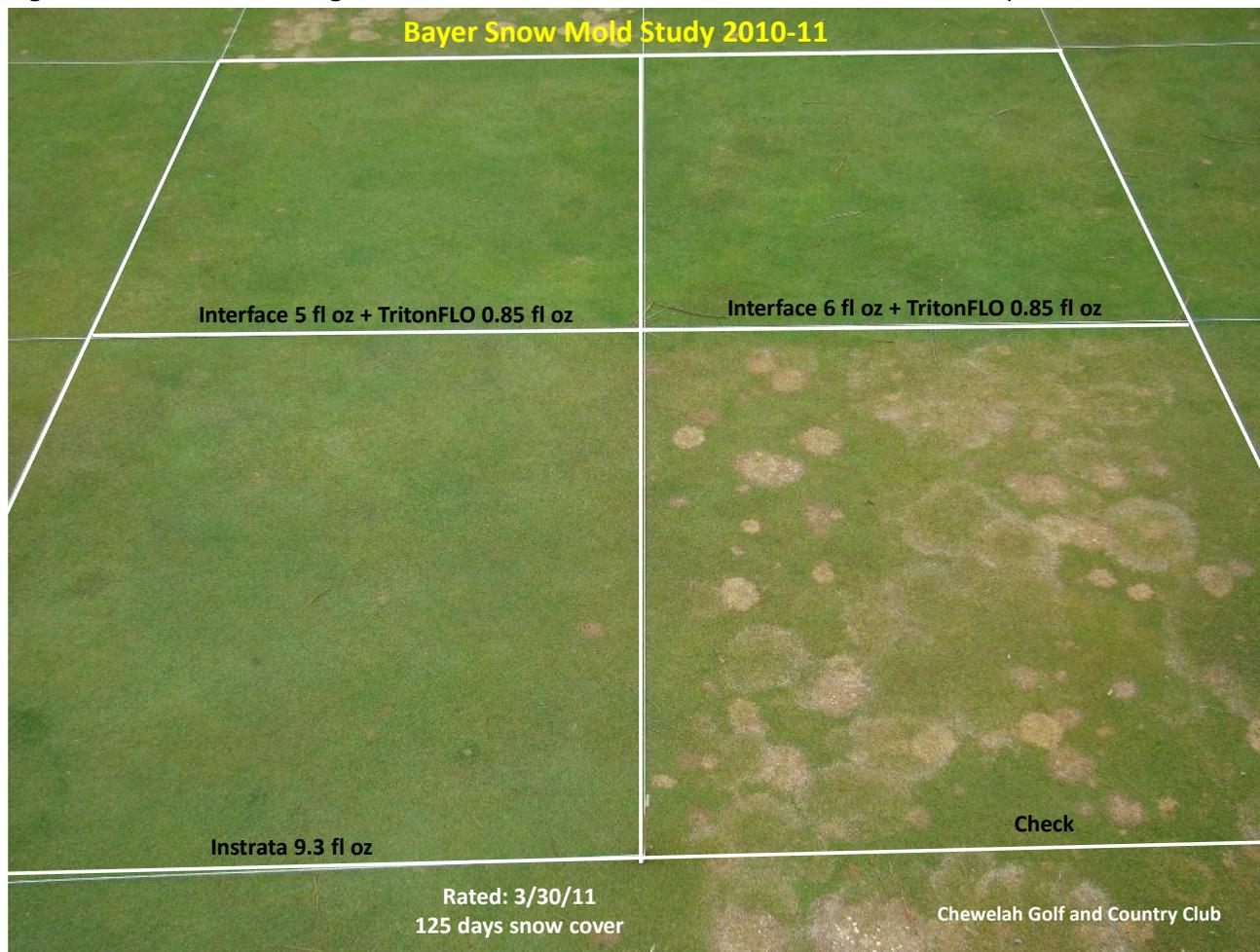


Figure 8. Snow mold fungicide treatments at the Chewelah Golf and Country Club. Chewelah, WA.



Figure 9. Snow mold fungicide treatments at the Chewelah Golf and Country Club. Chewelah, WA.

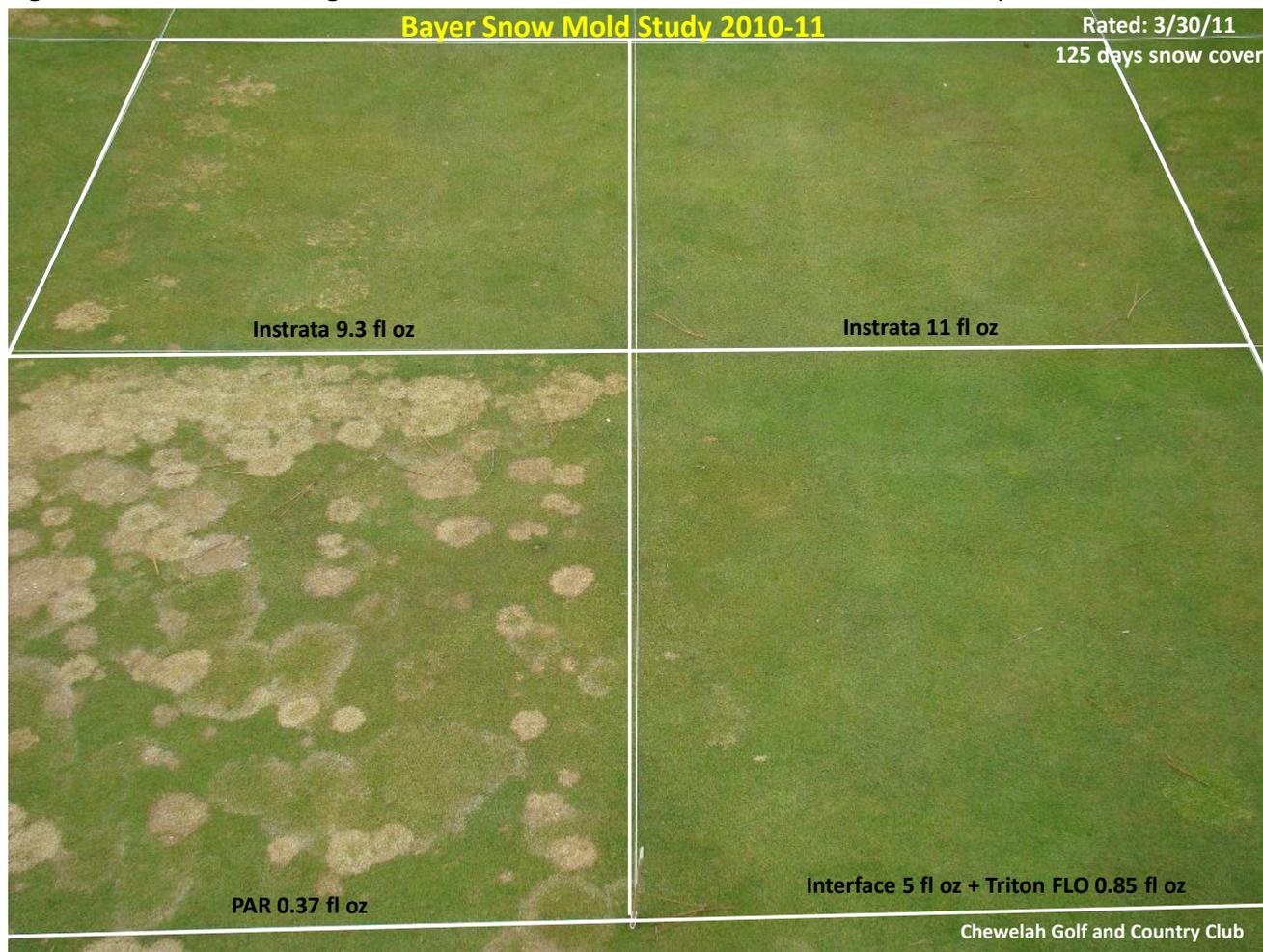


Figure 10. Snow mold fungicide treatments at the Chewelah Golf and Country Club. Chewelah, WA.



Figure 11. Snow mold fungicide treatments at the Chewelah Golf and Country Club. Chewelah, WA.

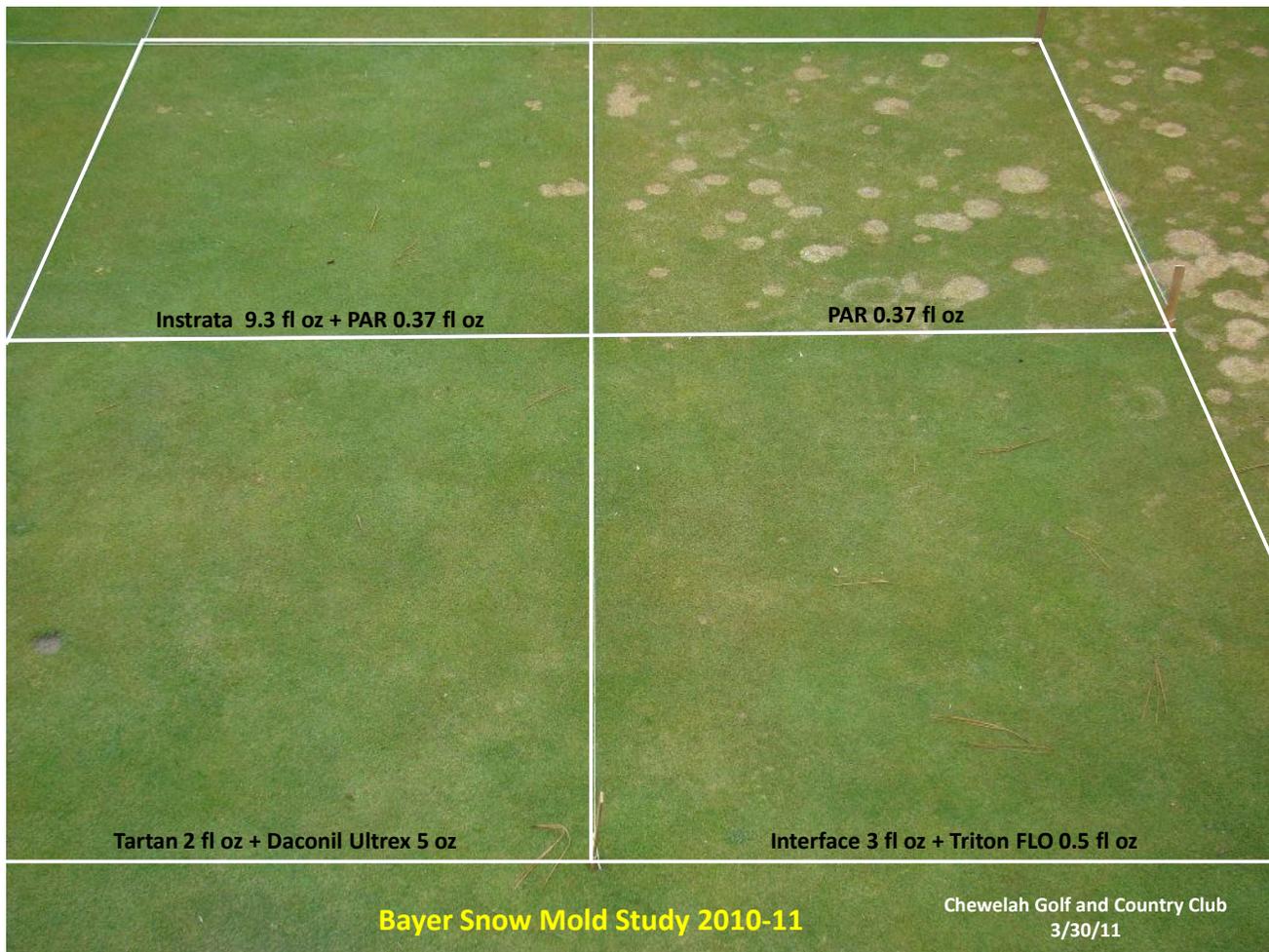


Figure 12. Snow mold fungicide treatments at the Chewelah Golf and Country Club. Chewelah, WA.

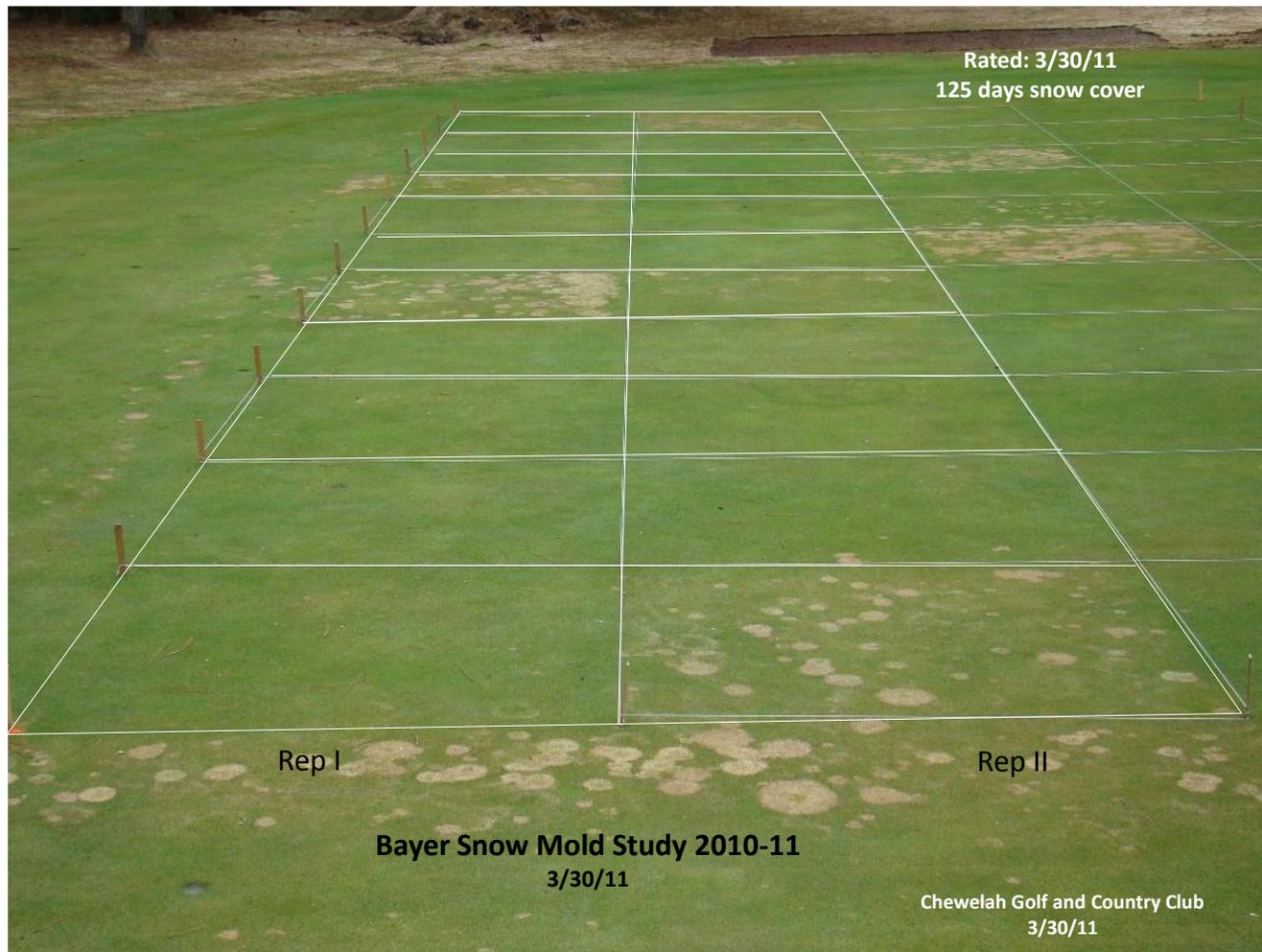


Table 3. The effect of various Bayer fungicide combinations on turfgrass quality and to control snow mold on a practice green at the City of McCall Golf Course in McCall, ID. Rated 2 May 2011.

Treatment*	Form. Type	Rate (fl oz or oz/M)	5/2/11	5/2/11	5/17/11***	5/17/11
			Disease (% area infected)	Turf quality**	Disease (% area infected)	Turf quality
INSTRATA (Propiconazole + Fludioxinil + Chlorothalonil) + PAR (Proprietary pigment concentrate)		9.3 fl oz 0.37 fl oz	0.0 b****	7.8 a	0.0 b	8.5 a
RESERVE 4.8 SC (Triticonazole + Chlorothalonil) + INTERFACE (Iprodione + Trifloxystrobin)	SC SC	5.4 fl oz 6 fl oz	0.3 b	7.7 ab	0.3 b	8.3 a
INSTRATA (Propiconazole + Fludioxinil + Chlorothalonil)	XL	11 fl oz	0.3 b	4.3 c	0.0 b	7.7 ab
RESERVE 4.8 SC (Triticonazole + Chlorothalonil) + COMPASS (Trifloxystrobin)	SC WG	5.4 fl oz 0.25 oz	1.0 b	6.3 b	0.3 b	8.3 a
INSTRATA (Propiconazole + Fludioxinil + Chlorothalonil)		9.3 fl oz	1.0 b	4.7 c	1.0 b	7.0 b
INTERFACE (Iprodione + Trifloxystrobin) + TRITON FLO (Triticonazole)	SC SC	3 fl oz 0.5 fl oz	18.7 a	4.0 c	1.0 b	7.7 ab
INTERFACE (Iprodione + Trifloxystrobin) + TRITON FLO (Triticonazole)	SC SC	6 fl oz 0.85 fl oz	21.7 a	3.8 c	0.7 b	8.2 a
UNTREATED		0	22.3 a	2.3 d	19.0 a	4.3 c

* Prior (early October 2010) to the study the entire practice green was treated with Banner MAXX and Daconil.

**Turf quality was rated 1-9; with 9 = excellent.

***Fungicide IX was applied on 5/3/11 the day after plots were initially rated.

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

Figure 13. Snow mold fungicide treatments at the City of McCall Golf Course. McCall, ID.



Figure 14. Snow mold fungicide treatments at the City of McCall Golf Course. McCall, ID.



Figure 15. Snow mold fungicide treatments at the City of McCall Golf Course. McCall, ID.

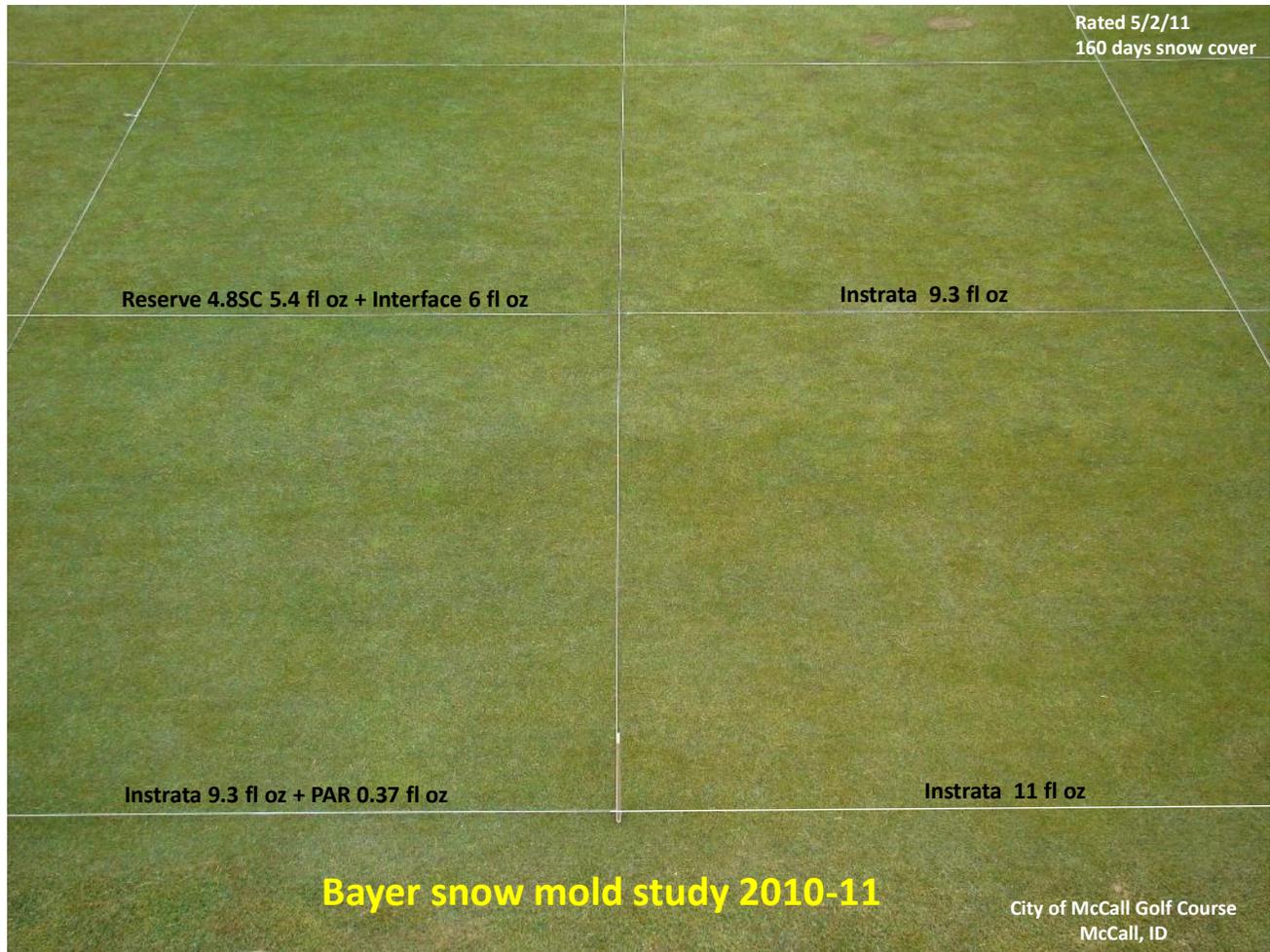


Figure 16. Snow mold fungicide treatments at the City of McCall Golf Course. McCall, ID.

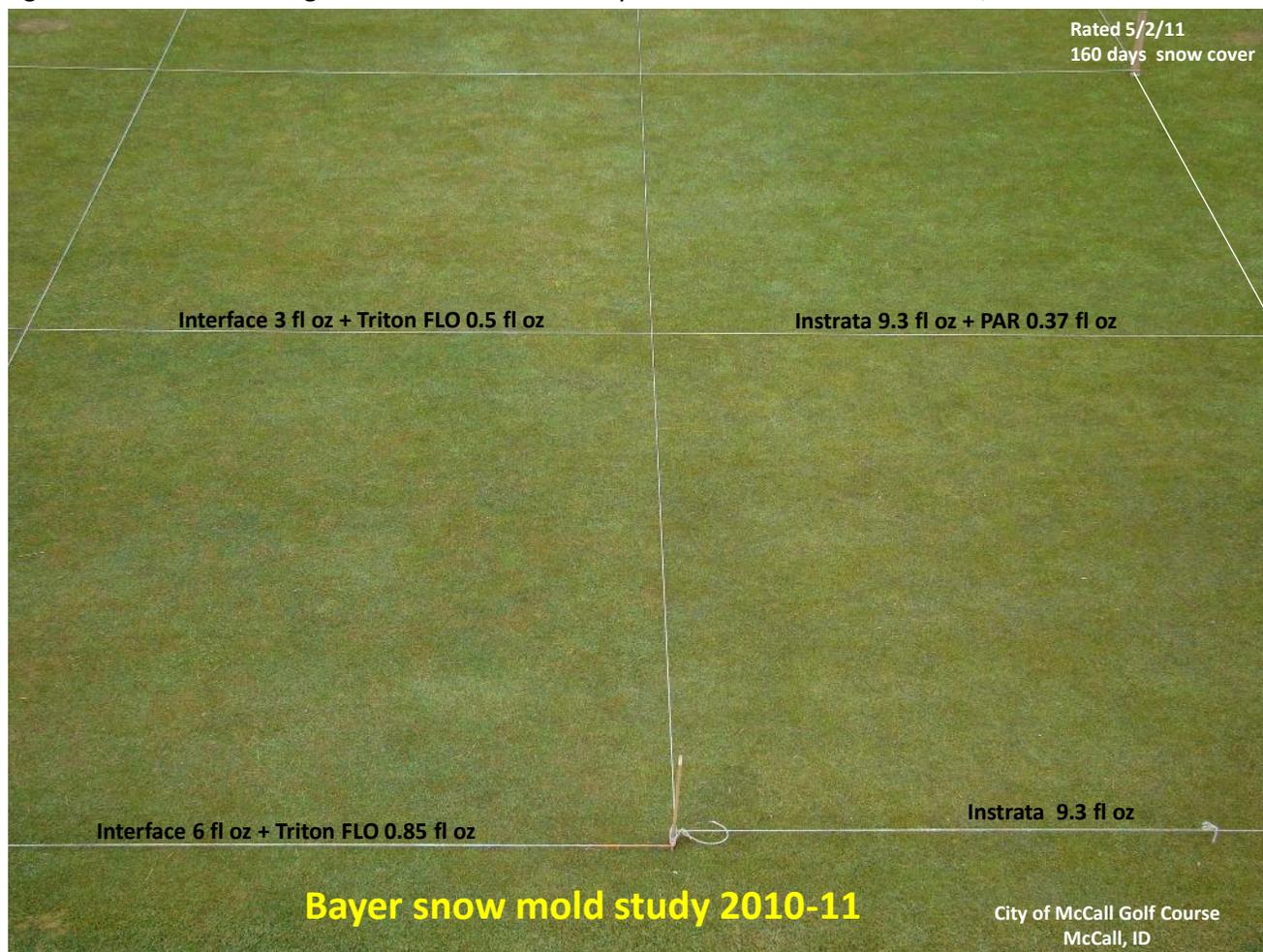


Figure 17. Snow mold fungicide treatments at the City of McCall Golf Course. McCall, ID.

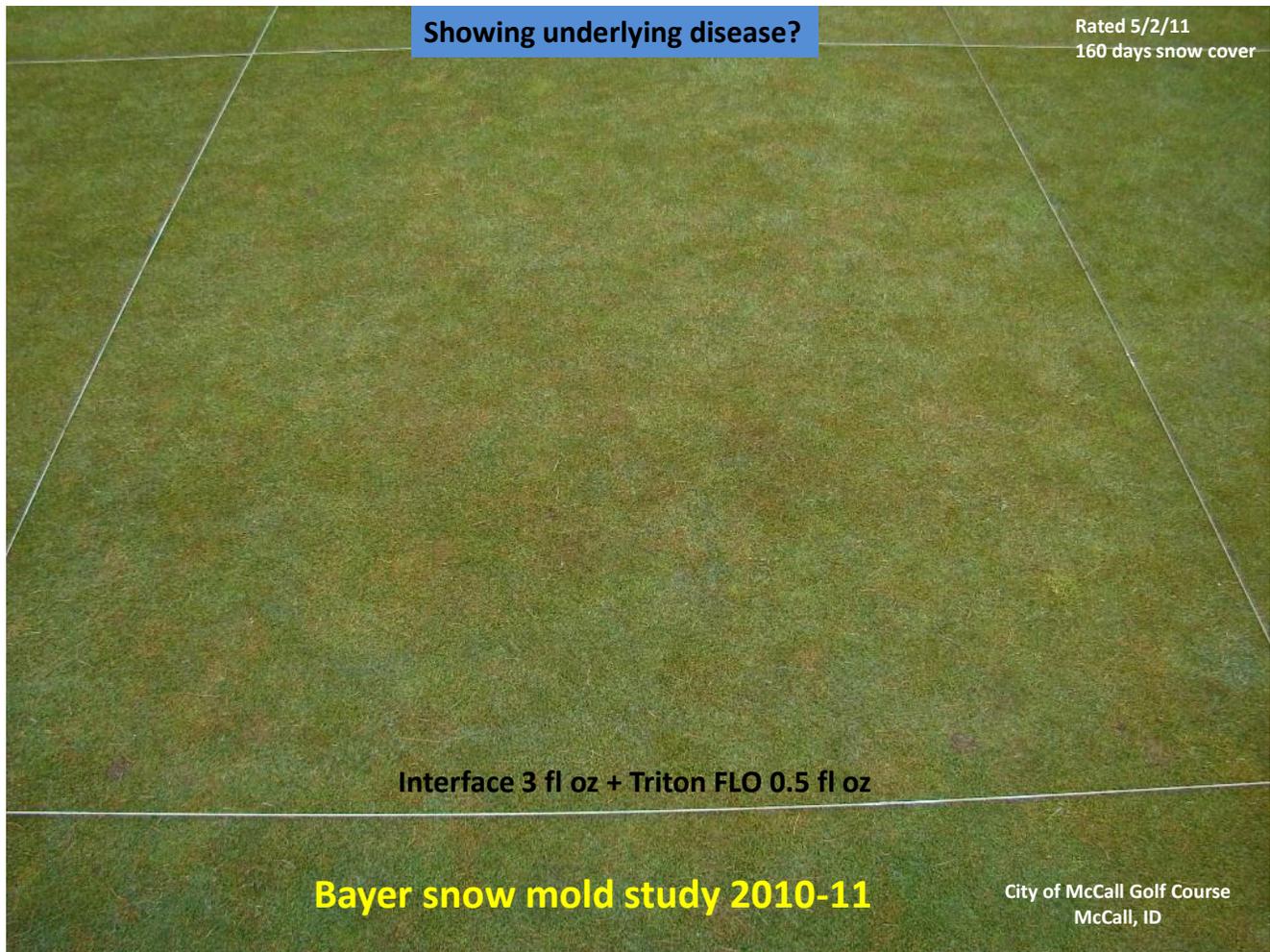


Figure 18. Snow mold fungicide treatments at the City of McCall Golf Course. McCall, ID.



Bayer snow mold study 2010-11

Rated 5/2/11
160 days snow cover

Interface 6 fl oz + Triton FLO 0.85 fl oz
Close up of suspicious brown areas

City of McCall Golf Course
McCall, ID

Figure 19. Snow mold fungicide treatments at the City of McCall Golf Course. McCall, ID.

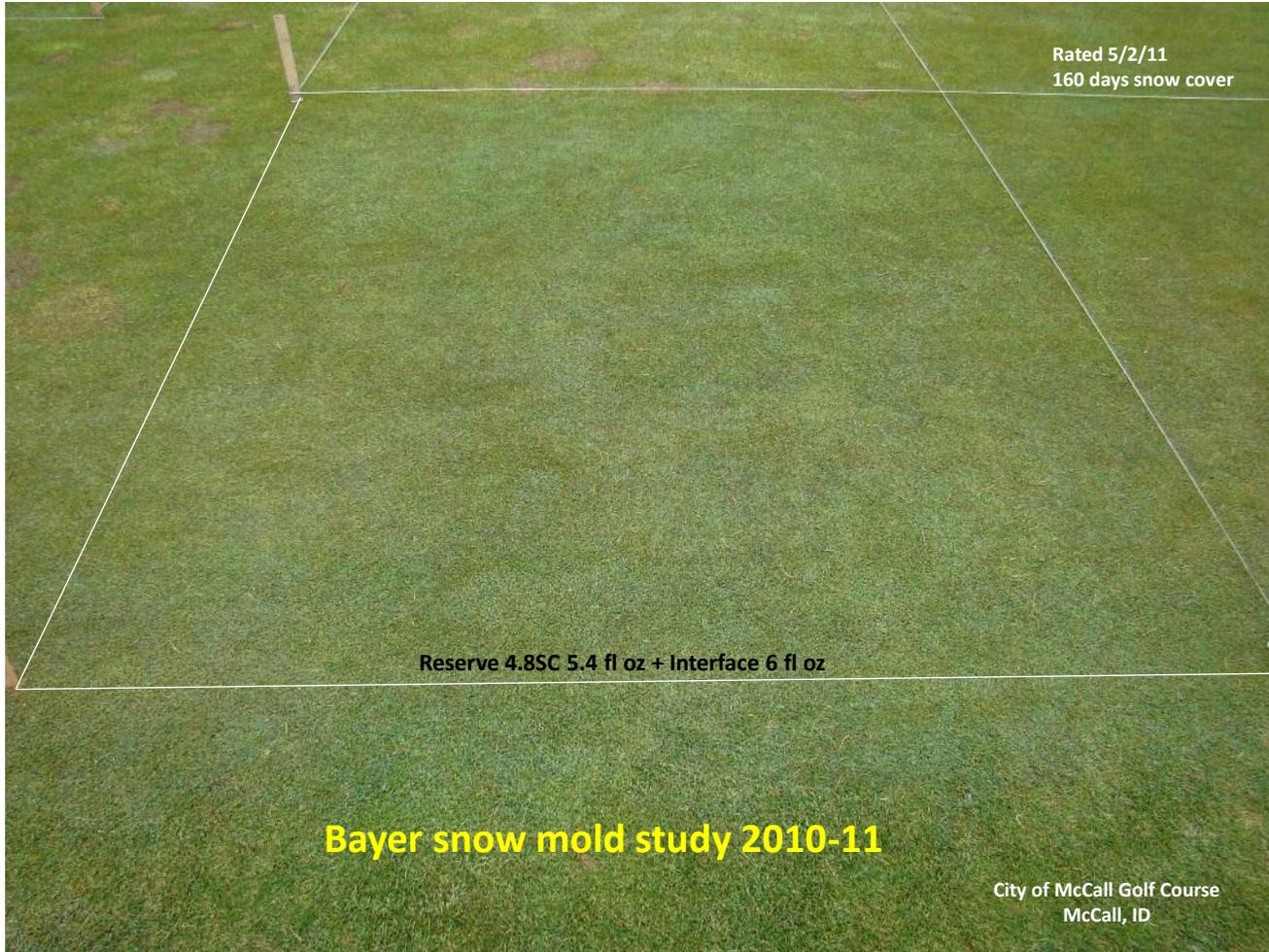


Figure 20. Snow mold fungicide treatments at the City of McCall Golf Course. McCall, ID.



Figure 21. Snow mold fungicide treatments at the City of McCall Golf Course rated 17 May 2011. McCall, ID.

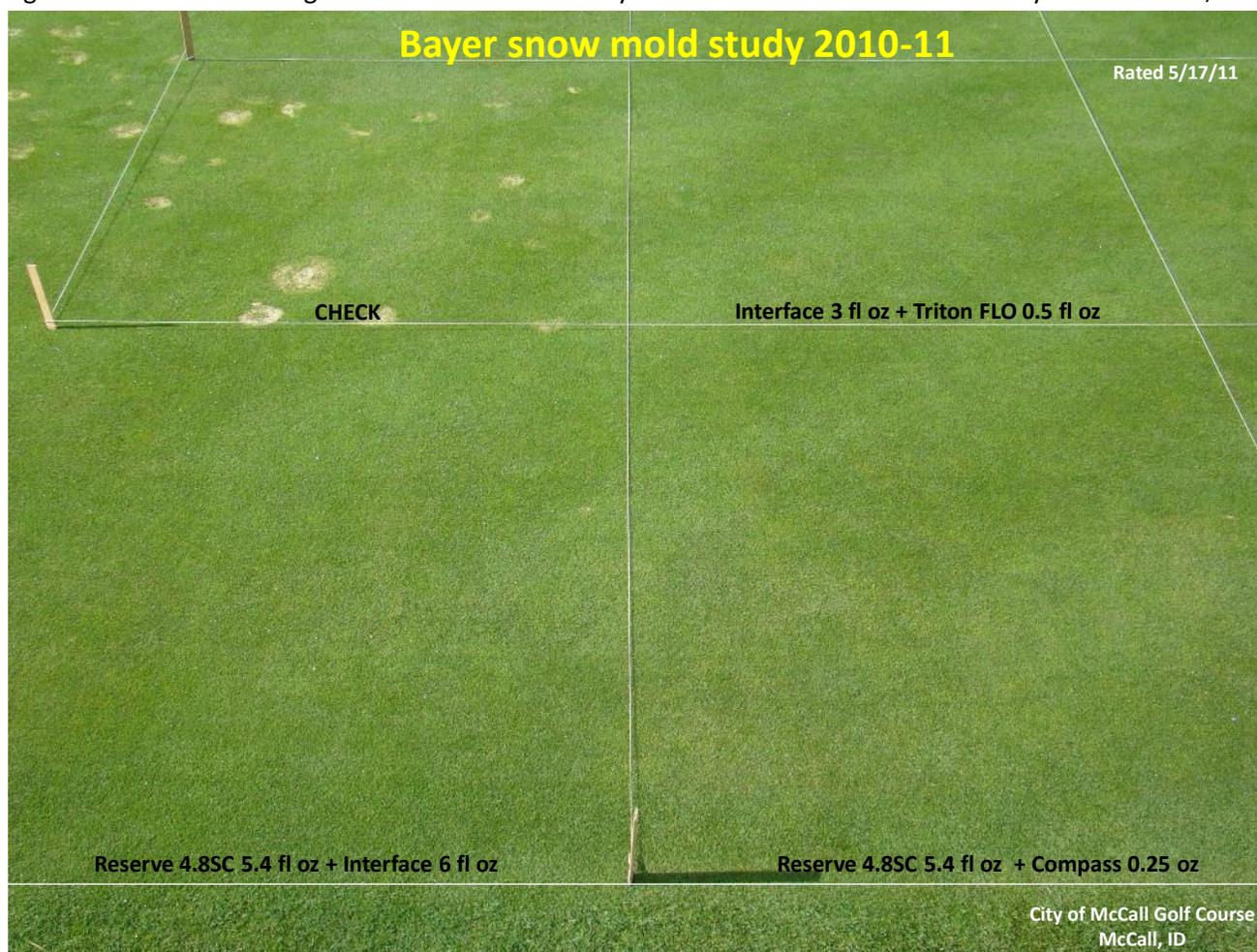


Figure 22. Snow mold fungicide treatments at the City of McCall Golf Course rated 17 May 2011. McCall, ID.

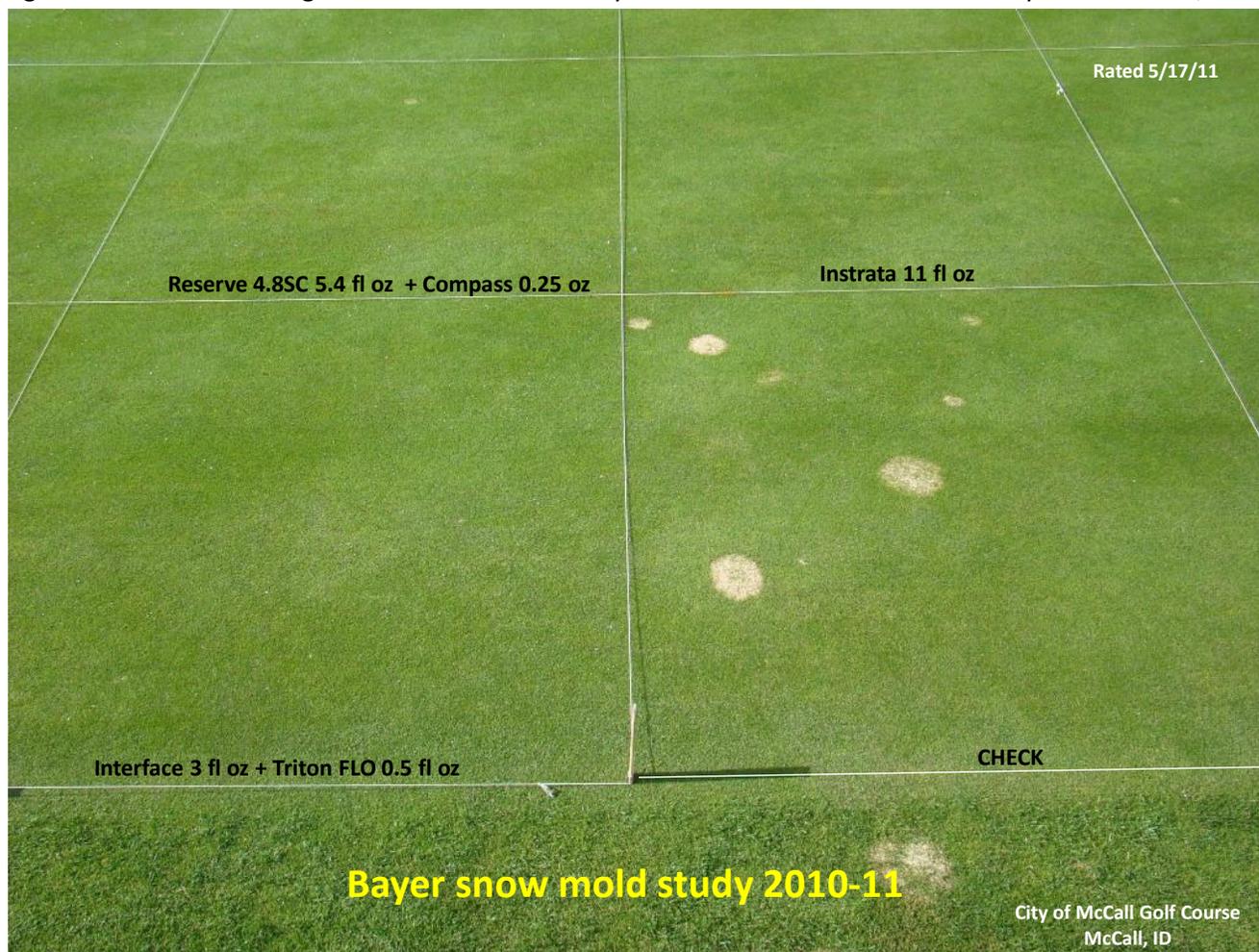


Figure 23. Snow mold fungicide treatments at the City of McCall Golf Course rated 17 May 2011. McCall, ID.

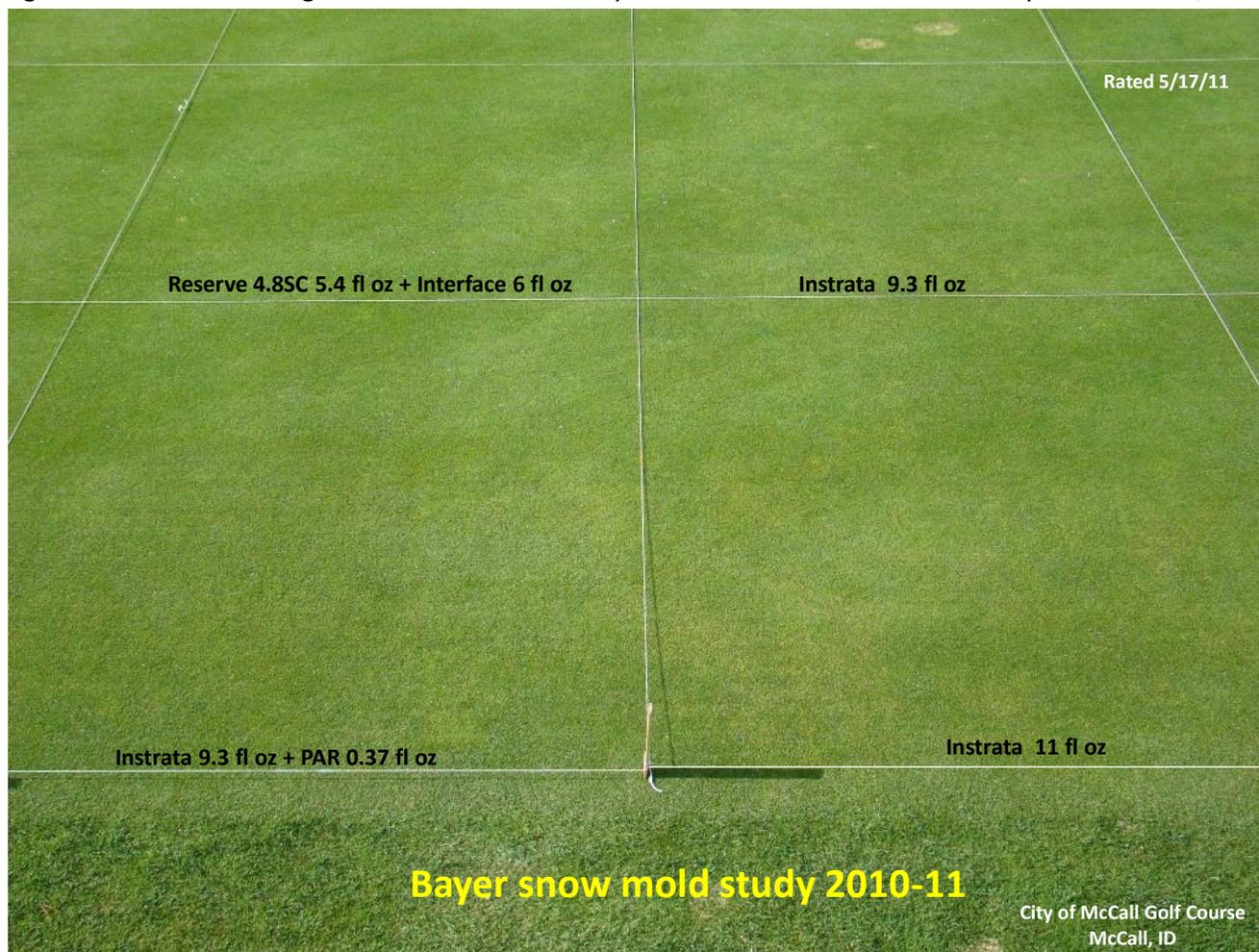


Figure 24. Snow mold fungicide treatments at the City of McCall Golf Course rated 17 May 2011. McCall, ID.

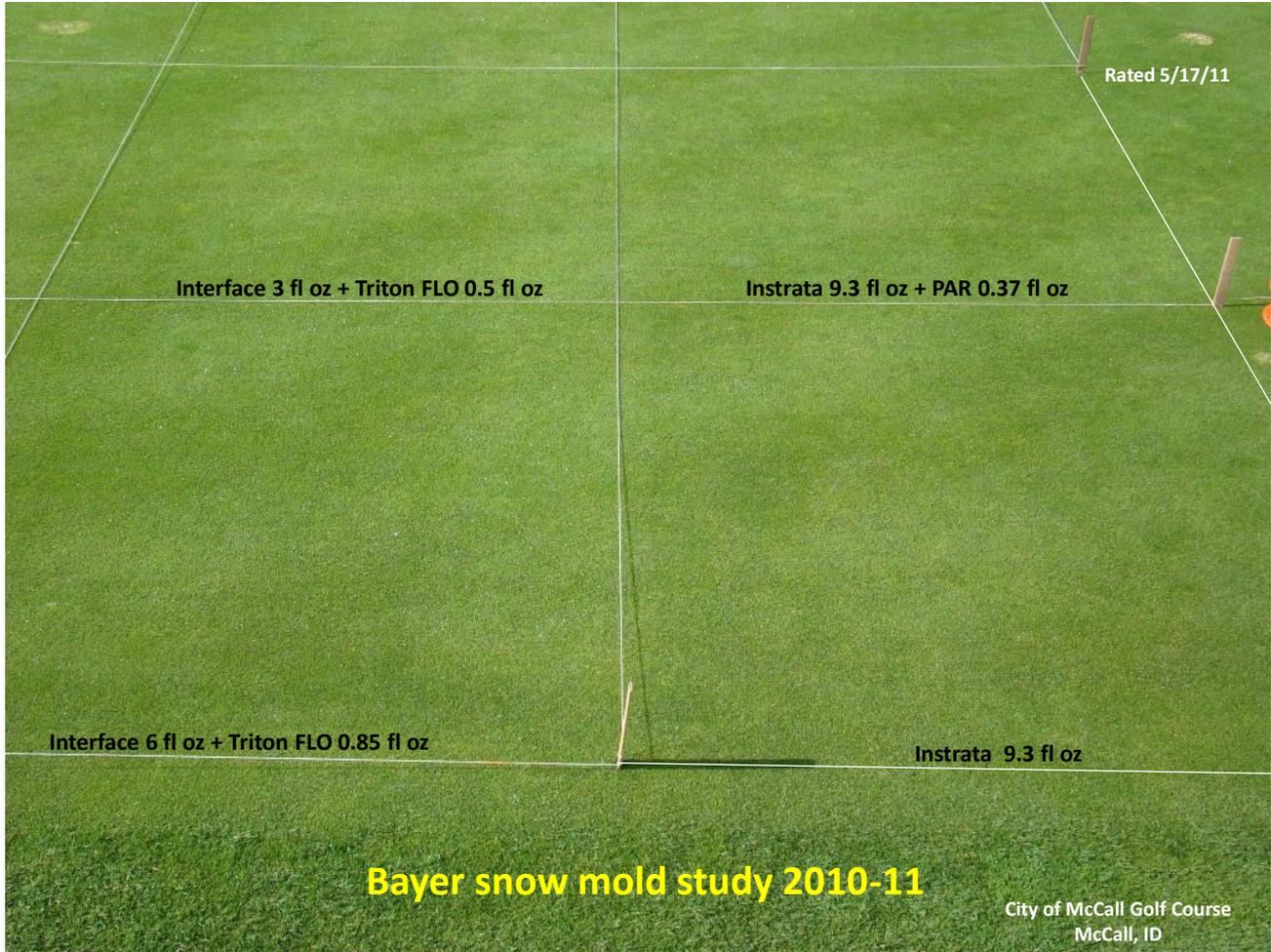


Figure 25. Snow mold fungicide treatments at the City of McCall Golf Course rated 17 May 2011. McCall, ID.

