

The Effects of Various Fungicides on the Control of Overwintering Diseases 2002-03

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Summary

This trial was developed in order to evaluate various fungicides for their control of overwintering diseases. The site at Greywolf Golf Resort was chosen due to consistently high disease on creeping bentgrass fairways. This site is considered a worst case scenario for snow moulds due to the susceptibility of the grasses to snow mould and the long winters with deep snow cover. As a result, plots were not inoculated as significant natural infections typically occur at this site. Plots were laid out and treatments were applied on October 16 and November 7, 2002. An evaluation to determine the effectiveness of the various treatments was conducted on April 16, 2003.

The winter of 2002-03 was considered to be one where snow pack was much below normal and disease pressure was low to moderate. The snow cover duration was about 110 days. Percent of area covered by disease was 34% on the untreated control plots, whereas, the previous three years had 85% or more snow mould.

The most effective control was obtained with the following treatments. All products were applied on both application dates unless otherwise stated.

- Triticonazole 70WG 9g and Compass 50WG 6g/100m²(final application date only)
- Triticonazole 70WG 9g and Compass 50WG 6g/100m²
- Eagle 40WP 30g/100m² and Rovral Green 250ml/100m²
- Eagle 40WP 30g/100m²
- Eagle 40WP 20g/100m² and Rovral Green 250ml/100m²
- Rovral Green 250 ml/100m²
- Eagle 40WP 30 g and Daconil 2787 250ml/100m²
- Quintozene 7-3-12 1154 g/100m²
- Daconil 2787 250 ml and Rovral Green 250 ml/100m²
- Eagle 40WP 20 g/100m² and Rovral Green 250 ml
- Compass 50WG 6g/100m²
- Senator 70WP 125g and Daconil 2787 250 ml/100m²
- Arrest 75W 375g/100m²

Introduction

Fine turfgrasses, which are not protected by fungicides, are predisposed to damage caused by snow molds. On golf greens, where creeping bentgrass (*Agrostis palustris*) is the predominant species disease damage is a frequent occurrence. Turfgrasses weakened or damaged by snow molds are extremely slow to recover and are often invaded by opportunistic weedy grass species. As the possibility of chemical resistance to snow moulds increases, new fungicides may be of benefit.

A typical snow mold prevention program consists of three or four fall applications and a single application in the spring. Usually fungicides with different modes of action are alternated from application to application. However, in this trial, the same products were applied on both dates so that the individual fungicides or tank mixes could be evaluated for snow mould control.

The site at Greywolf Golf Resort in Panorama, British Columbia was chosen due to consistently high disease at the golf course and the fact that the golf course has creeping bentgrass fairways. This site is considered to be a worst case scenario for snow moulds due to the susceptibility of the grasses and the long winters with deep snow cover.

Materials and Methods

Plots were laid out on a Penncross creeping bentgrass fairway at the Greywolf Golf Resort. Each plot consisted of a 1 by 2 meter rectangle laid out in a Randomized Complete Block Design. A 0.5 meter buffer was maintained around each plot. Each treatment was replicated four times. Treatments were applied on October 16 and November 7, 2002 with a compressed air sprayer. The sprayer was equipped with TeeJet 11008 nozzles and was calibrated to apply 10.3 litres/100m². Plots were not inoculated as significant natural infections typically occur at this site. Plots were evaluated April 16, 2003 for effectiveness of the various treatments. Disease ratings were based on percent area that showed symptoms of disease.

All treatments were applied on both application dates unless otherwise indicated. All treatments listed as amount of product per 100m². Treatments were as follows:

- 1) Untreated control
- 2) Rovral Green 250 ml/100m²
- 3) Eagle 40 WP 30g/100m²
- 4) Eagle 40 WP 30g and Rovral Green 250 ml/100m²
- 5) Eagle 40 WP 20g and Rovral Green 250 ml/100m²
- 6) Eagle 40 WP 30g and Daconil 2787 250 ml/100m²
- 7) Triticonazole 70WG 9g and Compass 50WG 6g/100m² (final application date only)
- 8) Triticonazole 70WG 9g and Compass 50WG 6g/100m²
- 9) Senator 70WP 125 g and Daconil 2787 250 ml/100m²
- 10) Triticonazole 9g/100m²
- 11) Compass 50WP 6g/100m²
- 12) Quintozene 7-3-12 240g a.i./100m² (final application date only)
- 13) Daconil 2787 250ml and Rovral Green 250 ml/100m²
- 14) Quintozene 7-3-12 180g a.i./100m²
- 15) Quintozene 7-3-12 120g a.i./100m²
- 16) Arrest 75W 375 g/100m²
- 17) Quintozene 7-3-12 240g a.i./100m²
- 18) Daconil 2787 250 ml/100m²
- 19) Terraclor 75W 320 g/100m²
- 20) Senator 70WP 125g/100m²

Typically, winter injury is considered to be from either overwintering diseases, freezing injury, ice cover injury, or dessication. Plots were evaluated on April 16, 2003 on a percent of area infected with disease. This was carried out on a visual basis where one hundred percent is complete area infected by disease and zero percent would indicate complete absence of disease. The percentages were converted to a numeric value using the Horsfall-Barratt grading system (Horsfall-Barratt, 1945). The following grades were assigned: 0=0% disease, 1=0-3%, 2=3-6%, 3=6-12%, 4=12-25%, 5=25-50%, 6=50-75%, 7=75-88%, 8=88-94%, 9=94-97%, 10=97-100% and 11=100%.

Product Formulation Active Ingredient

Daconil 2787	Contact	Liquid	Chlorothalonil 500g/l
Compass 50WG	Systemic	Wettable granular	Trifloxystrobin 50%
Eagle	Systemic	Wettable Powder	Myclobutanil 40%
Triticonazole 70WG	Systemic	Wettable granular	Triticonazole 70%
Rovral Green	Contact	Liquid	Iprodione 240g/l
Terraclor 75W	Contact	Wettable Powder	Quintozene 75%
Quintozene 7-3-12	Contact	Granular	Quintozene 15.4%
Arrest 75W	Contact	Wettable Powder	Thiram/Oxycarboxin/Carbathiin
Senator 70WP	Contact	Wettable powder	Thiophanate methyl 70%

Results

Overwintering Conditions 2002-03

The Greywolf Golf Resort is located in Panorama, British Columbia. It is a golf/ski resort and is located above the town site of Invermere in mountainous terrain. The winter of 2002-03 had below normal snow pack. Maximum snow cover on the test site was about 45 cm during the winter. A number of snowfalls occurred during the months of October and November, but were not maintained. Significant snowfall occurred on October 24 when 10 cm fell, and then again on November 2, when 4 cm fell. Permanent snow cover duration was 110 days, from December 11 to April 6. Disease pressure was considered moderate as the untreated control plots had 34% damage.

Identification of Pathogens Present

Pathogen identification was by means of visual assessment. This year, there was only disease pressure from *Microdochium nivale* (pink snow mould). There was no evidence of *Typhula ishkariensis* (long duration snow cover grey snow mould) this year.

Table 1 Disease grading for various fungicides (April 16, 2003).

Product and Rate	Horsfall-Barratt grading system** (0-11 scale)
Triticonazole 70WG 9g & Compass 50WG 6g/100m ² (single)	2.50 A*
Eagle 40 WP 30g/100m ² (double)	2.75 AB
Eagle 40 WP 30g and Rovral Green 250ml/100m ² (double)	2.75 AB
Rovral Green 250 ml/100m ² (double)	3.25 ABC
Triticonazole 70WG 9g and Compass 50WG 6g/100m ² (double)	3.25 ABC
Eagle 40WP 30 g and Daconil 2787 250 ml/100m ² (double)	3.25 ABC
Quintozene 7-3-12 1154 g/100m ² (double)	3.25 ABC
Daconil 2787 250 ml and Rovral Green 250 ml/100m ² (double)	3.50 ABCD
Eagle 40WP 20 g/100m ² and Rovral Green 250 ml (double)	3.50 ABCD
Compass 50WG 6g/100m ² (double)	3.75 ABCDE
Senator 70WP 125g and Daconil 2787 250 ml/100m ² (double)	3.75 ABCDE
Arrest 75W 375g/100m ² (double)	3.75 ABCDE
Senator 70WP 125 g/100m ² (double)	4.0 BCDEF
Triticonazole 70WG 9g (double)	4.00 BCDEF
Daconil 2787 250 ml/100m ² (double)	4.25 CDEF
Untreated control	4.75 DEF
Terraclor 75W 320 g/100m ² (double)	4.75 DEF
Quintozene 7-3-12 1538 g/100m ² (double)	4.75 DEF
Quintozene 7-3-12 1538 g/100m ² (single)	5.0 EF
Quintozene 7-3-12 770 g/100m ² (double)	5.25 F
LSD value	1.345

*Numbers followed by the same letter are not significantly different at p=0.05

**Horsfall-Barratt rating scale 0-11 where 0=no disease and 11=100% disease.

Comparison of Various Treatments

Effective control was obtained with the following treatments (Table 1):

- Triticonazole 70WG 9g and Compass 50WG 6g/100m²(final application date only)
- Triticonazole 70WG 9g and Compass 50WG 6g/100m²
- Eagle 40WP 30g/100m² and Rovral Green 250ml/100m²
- Eagle 40WP 30g/100m²
- Eagle 40WP 20g/100m² and Rovral Green 250ml/100m²
- Rovral Green 250 ml/100m²
- Eagle 40WP 30 g and Daconil 2787 250ml/100m²
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- Arrest 75W 375g/100m²

Discussion

In the four years of snow mould trials at Greywolf Golf Resort, this year showed the least disease severity as the control plots only had 34% disease. This was attributed to reduced snow depth and shorter duration of cover. In addition, this also affected the species of snow mould that was present, as only pink snow mould was noted. Long duration grey snow mould (*Typhula ishikariensis*) was not evident this year, in spite of 110 days of continuous snow cover. Typically, a continuous snow cover of 90 days is required before it begins to form. As there was less disease and more variation in disease severity from plot to plot, the validity of the results was likely reduced when compared to previous years.

Applications of the product were 56 and 37 days prior to permanent snow cover. Smith, 1987, mentioned that systemic fungicides gave longer protection than did contact fungicides and that application of fungicides for the prevention of grey or cottony snow mould should be applied as late as possible before the development of permanent snow cover. The applications, which were well in advance of permanent snow cover may have reduced the effectiveness of some of the fungicides.

As in past years, the tank mix of Rovral Green and Eagle was very effective in controlling the disease present. In addition, Eagle and Rovral, as stand alone products were also effective, which might simply be because of the reduced disease pressure. The fact that only pink snow mould was present this year, would also indicate that these products are effective against this disease but may not be as effective, as standalone products, against grey snow mould.

The new strobilurin fungicide, Compass, was effective by itself at the rate of 6 grams/100m². As well, the tank mix of Compass and Triticonazole was effective, but, Triticonazole, by itself, was not as effective. Both of these fungicides are expected to be registered in the near future.

Again this year, the quintozene products and Arrest 75W were inconsistent in their control of pink snow mould. The fact that disease pressure was only moderate this year may not truly represent how these products would perform under normal conditions at Greywolf. The products Senator and Daconil, by themselves were not effective, but when tank mixed were slightly more effective.

References

Smith, J. Drew. 1987 Winter hardiness and overwintering diseases of amenity turfgrasses with special reference to the Canadian Prairies. Agriculture Canada Technical Bulletin 1987-12E. 193pp.

Li, D-W, Hsiang, T. and J.B. Ross. 2000 The Effects of Various Fungicides on the Control of Overwintering Diseases. Prairie Turfgrass Research Centre Annual Report 2000: 17-19.

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