

The Effects of Various Fungicides on the Control of Overwintering Diseases

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Summary

A fungicide trial for the prevention of overwintering diseases was conducted in the mountains of British Columbia, Canada due to a history of high disease pressure and the presence of creeping bentgrass fairways. A single application of products was applied to one by two metre plots prior to permanent snow cover, which lasted about 150 days.

Pathogen identification at the spring rating period was by means of visual assessment. There appeared to high disease pressure from *Microdochium nivale* (pink snow mould) and *Typhula ishikariensis* (grey snow mould). There was little evidence of *Typhula incarnata*, the inoculated organism.

The most effective control was obtained with the following treatments:

- Terraclor 75W 180g/100m² plus Rovral Green 250 ml/100m²
- Banner 130 EC 170 ml/100m² plus Daconil 2787 500SC 240 ml/100m²
- Turfcide 400 400ml/100m²
- Terraclor 75W 250 g/100m²
- Banner 130 EC 246ml/100m²

A rainfall event, which occurred after the application of the various treatments, may have reduced the effectiveness of some products.

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, winter disease damage is a frequent occurrence in areas of long duration snow cover. Turfgrasses weakened or damaged by snow molds are extremely slow to recover and are often invaded by other microorganisms and displaced by opportunistic weedy grass species. New fungicides may be of benefit as changing climates alter winter conditions and as older fungicides are phased out.

A typical snow mold management program consists of three or four fall applications and a single application in the spring. Usually fungicides with different modes of action are alternated for the different applications or mixed for individual applications. However, in this trial, only a single fall application was made so that the single treatment could be evaluated for the control of commonly occurring snow molds.

The site at Greywolf Golf Resort was chosen due to consistently high disease at the golf course and the fact that the club has creeping bentgrass fairways. This site is considered

at high risk for snow moulds due to the susceptibility of the grasses to snow mould 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, Panorama, British Columbia. Each plot consisted of a 1x2 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 22, 1999 with a compressed air sprayer. The sprayer was equipped with TeeJet 8004 nozzles and was calibrated to apply 10.3 litres/100m². Plots were inoculated with *Typhula incarnata* at the rate of 8gm/m².

Plots were evaluated on April 27, 2000 for effectiveness of the various treatments. Disease ratings were based on percent area of injured turfgrass. The occurrence of sclerotia of *T. ishikariensis* and sporodochia of *M. nivale* served to indicate that biotic sources of winter injury were dominant in this area. Ratings were conducted visually on a scale where one hundred percent was complete area affected (by disease) and zero percent indicated complete absence of disease.

There were 25 treatments in this trial. Products from two companies are not reported in this report due to a confidentiality agreement. Treatment rates are listed as amount of product per 100m².

- 1) Untreated Control
- 2) Arrest 75W 375 g/100m²
- 3) Turfcide 400 400ml/100m²
- 4) Terraclor 75W 250 g/100m²
- 14) Heritage 250 SC 60 ml/100m²
- 15) Banner 130 EC 170 ml/100m²
Daconil 2787 500SC 240 ml/100m²
- 16) Terraclor 75W 180g/100m²
Rovral Green 250 ml/100m²
- 17) Untreated Control
- 24) Heritage 250SC 22.4 ml/100m²
- 25) Banner 130 EC 246ml/100m²

Product	Formulation	Active Ingredient
Heritage	Soluble Concentrate	Azoxystrobin 250g/l
Daconil 2787	Liquid	Chlorothalonil 400g/l
Rovral Green	Liquid	Iprodione 240g/l
Banner	Emulsifiable Concentrate	Propiconazole 130g/l
Turfcide 400	Liquid	Quintozene 40%
Terraclor 75W	Wettable Powder	Quintozene 75%
Arrest 75W	Wettable Powder	Thiram, Oxycarboxin, Carbathiin

Results

Overwintering Conditions 1999-2000

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 1999-2000 was considered a typical winter at the resort. Snow cover on the test site was about 40 cm at its deepest during the winter. A permanent snow cover was established on November 10 and snow melt was complete by April 15. The snow cover duration was over 150 days. Disease pressure was considered high since surrounding areas that were not treated by any fungicide suffered almost 100% injury.

A rainfall occurred on November 6-7 when there were approximately 25mm. Fungicide runoff from the rainfall was evident on other treated fairways on the golf course where grass remained greener in low lying areas, while sloped areas suffered injury.

Identification of Pathogens Present

Pathogen identification was by means of visual assessment. There appeared to be high disease pressure from *Microdochium nivale* (cause of pink snow mould) and *Typhula ishikariensis* (cause of grey snow mould). The occurrence of sclerotia of *T. ishikariensis* and sporodochia of *M. nivale* served to indicate that biotic sources of winter injury were dominant in this area. There was little evidence of *Typhula incarnata*, the inoculated organism.

Table 1 Percent area covered by disease for various fungicide treatments applied October 22, 1999 and rated April 27, 2000.

Product and Rate	Percent area covered by disease ¹
Terraclor 75W 180g/100m ² And Rovral Green 250 ml/100m ²	17.50 A
Banner 130 EC 170 ml/100m ² And Daconil 2787 500SC 240 ml/100m ²	19.50 AB
Turfcide 400 400ml/100m ²	22.50 AB
Terraclor 75W 250 g/100m ²	32.50 ABC
Banner 130 EC 246ml/100m ²	33.75 ABC
Heritage 250 SC 60 ml/100m ²	47.50 CD
Heritage 250SC 22.4 ml/100m ²	60.00 DEFG
Arrest 75W 375 g/100m ²	73.75 FGHI
Untreated Control	77.50 GHIJ
Untreated Control	85.50 HIJ

¹ Numbers followed by the same letter are not significantly different at p=0.05

Comparison of Various Treatments

The most effective control was obtained with the following treatments (Table 1):

- Terraclor 75W 180g/100m² and Rovral Green 250 ml/100m²
- Banner 130 EC 170 ml/100m² and Daconil 2787 500SC 240 ml/100m²

- Turfcide 400 400ml/100m²
- Terraclor 75W 250 g/100m²
- Banner 130 EC 246ml/100m²

The rainfall that occurred in early November may have influenced the effectiveness of some of the products. Although there was no evidence of migration of the products from one plot to the next, there was evidence on the surrounding fairways of movement of product.

At time of application in fall 1999, it was noted that the bottle containing the treatment for the fungicide Arrest 75W had a considerable amount of unsuspended product left after application. This could have affected the efficacy since two of the four replications showed some control while the other two showed no control.

This trial was conducted with funding support from Rhone-Poulenc Canada, BASF Canada and Uniroyal Chemical Ltd.