EXPERIMENTS ON THE CHEMICAL CONTROL OF SNOW MOLD IN TURF

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Abstract

Seven commercial fungicidal preparations were tested for their effectiveness in the control of snow mold on a naturally-infected golf green. Single applications of all the materials tested proved to be effective when used at the following rates per 1000 square feet: Actidione-Thiram Turf Fungicide, 6 ounces; Calo-Chlor, 3 ounces; Merfusan, 2 to 3 pounds; Mersil, 4 to 6 ounces; Panogen Turf Spray, 3 to 4 ounces; Puraturf, 3 ounces; and Tersan OM, 6 ounces.

Introduction

Snow mold is a troublesome disease of grasses in lawns and in golf and bowling greens in most parts of Canada. In response to numerous inquiries regarding the control of snow mold, the author carried out small-scale experiments in 1959-60 and 1960-61 in order to determine the effect and value of some of the recommended commercial turf fungicides under conditions prevailing at Guelph, Ontario.

The disease causes unsightly dead patches of grass early in the season as illustrated in Figures 1, 2 and 3. The turf usually recovers in May or June but in the meantime it is unsightly and rough. The affected areas, as observed at Guelph, are of two distinctly different types:

(1) Small, circular spots with sharp, brownish margins. These overlap to form irregular areas of pale colored, dead leaves. (Figure 2).

(2) Larger, more regularly circular spots with the pale, dead-appearing areas mostly confined to a band or halo surrounding an area of less severely affected grass which appears quite green. (Figure 3). These spots are several times larger than those described in (1); the damage does not appear as severe, and recovery is more rapid.

Studies are underway to determine the exact cause or causes of the different symptoms, The present paper is confined to the study of *the* effect of fungicidal treatments in the control of the snow mold complex as it occurs in the Guelph area.

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Experimental Results

The experiments were conducted on the fourteenth green of Cutter Golf Club at Guelph; a green that has been affected annually by snow mold. No artificial inoculum was added.

The fungicides tested, their manufacturers, and the active ingredients were:

1. Actidione - Thiram Turf Fungicide --- Cycloheximide, 0.75%; thiram 75%
   The Upjohn Co., Kalamazoo, Mich,
2. Calo-Chlor --- Mercuric chloride, 28%; mercurous chloride, 57%.
   Mallinchrodt Chemical Works, Ltd., Montreal, Que.
3. Merfusan --- Mercuric chloride, 2.15%; mercurous chloride, 5%; ferrous sulphate, 0.70%.
   May and Baker, Ltd., Dagenham, England.
4. Mersil --- Mercuric chloride, 15%; mercurous chloride, 30%.
   May and Baker, Ltd., Dagenham, England.
5. Puraturf --- Phenyl mercury acetate, 10%.
   Gallowhur Chemicals Canada, Ltd., Montreal, Que.
6. Panogen Turf Spray --- Methyl mercury dicyandiamide, 2.2%.
   Morton Chemical of Canada, Ltd., Winnipeg, Man.
7. Tersan OM --- Thiram, 45%; hydroxymercurichlorophenol, 10%
   E.I. Dupont de Nemours, Wilmington, Del.

In 1959-60 only 3 preparations were tested, The experiment comprised 32 plots, each 5x10 feet in area, randomized in 4 replications. The fungicides were mixed with Milorganite (activated sewage sludge with 5 per cent nitrogen) and the mixture applied with a fertilizer spreader at the rate of 3 lb/1000 sq. ft. The plots were treated on November 26, 1959 and disease index ratings were recorded on April 22, 1960. The results are shown in Table 1.

Table 1. Effect of fungicides on snow mold of turf, 1959-60.

Fungicide	Dosage /1000 sq. ft,	*Disease Index **
Mersil	3 oz	2.5
	4 oz	1.75
Puraturf	1 oz	3.0
	2 oz	2.25
Tersan OM	6 oz	1.0
	8 oz	1.0
Check (Milorganite alone)	---	3.25

* Disease Index - average of 4 replications.

** Rating - 1 - less than 5 per cent of area affected (trace)
2 - 5 to 20 " " " " "
3 - 20 to 35 " " " " "
4 - 35 to 50 " " " " " (severe)

Figure 1. Snow mold damage on an untreated golf green. Apron to left and green to right of center.

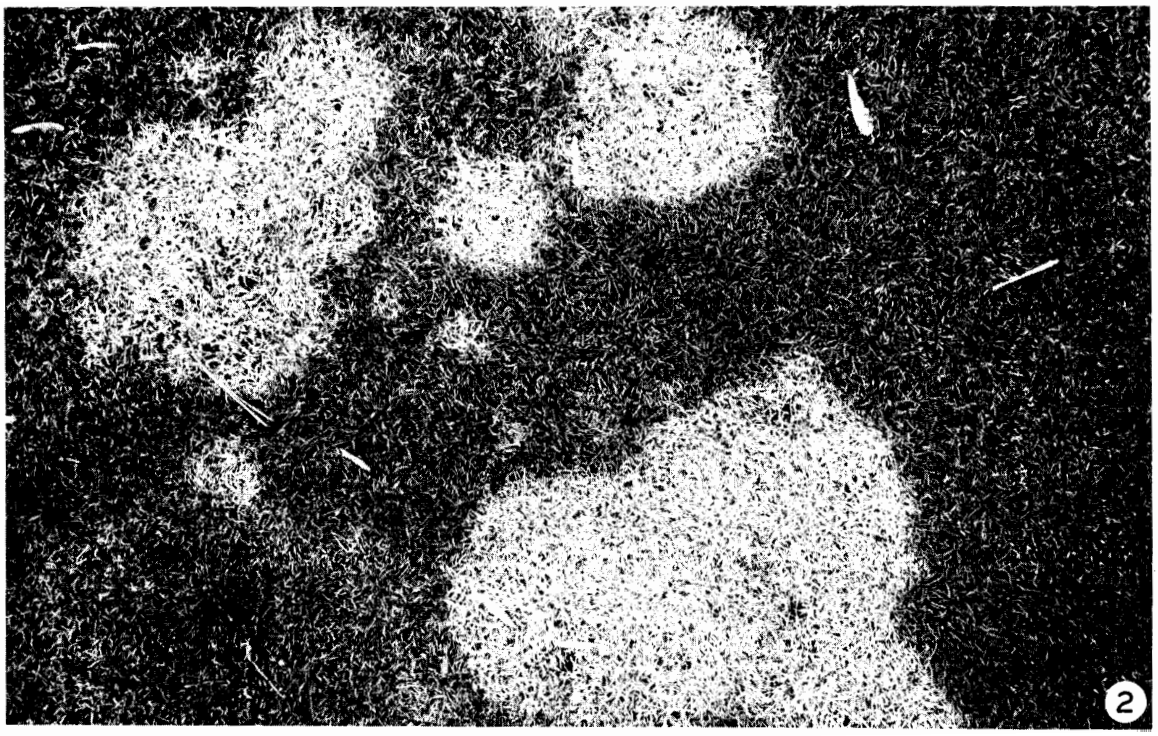

Figure 2. Spots with sharp, brownish margins.

Snow mold was severe in 1960 with approximately 30 per cent of the plot area affected in the untreated check plots. Tersan OM was the only material that give complete control in any of the plots and sufficient overall control to be regarded as effective for practical use. The striking difference between the appearance of an untreated plot and one treated with Tersan OM is illustrated in Figure 4. Mersil and Puraturf gave some control at the higher dosage rates but the level of effectiveness was inadequate for practical consideration.

In 1960-61 seven fungicides, including the 3 tested the previous season, were tested in the same site. In this instance they were applied as a spray in water solution or suspension on December 7, 1960 and ratings were recorded on April 20, 1961. The results are recorded in Table 2. A revised index for rating the amount of disease present was used in 1961, hence the results presented in Tables 1 and 2 are not directly comparable. They must be interpreted in terms of the estimated damage as given in the rating legend for each table.

Table 2. Effect of fungicides on snow mold of turf, 1960-61.

Fungicide	Dosage /1000 sq. ft.	*Disease Index
Actidione-Thiram	6 oz	** 1.0
Turf Fungicide	8 oz	*** 1.5
Calo-Chlor	3 oz	0.75
	4 oz	0.75
Merfusan	2 lb	1.5
	3 lb	0.5
Mersil	4 oz	1.0
	6 oz	0.5
Puraturf	3 oz	1.25
	4 oz	1.25
Panogen Turf Spray	3 oz	1.25
	4 oz	1.0
Tersan OM	6 oz	0.75
	8 oz	1.0
Check (no fungicide)	---	3.0

* Disease Index - Average of 4 replications
** Rating - 0 - no damage
1 - 1 or 2 small spots (trace)
2 - more than 2 spots but less than 5% affected
3 - 5-20% affected
4 - 20-50% affected
*** Disease index of less than 1.5 was considered effective control.

Snow mold was considerably less in 1961 than in 1960; no more than 10 per cent disease was observed in the untreated plots as compared to 30 per cent the previous year, All the fungicides applied at the dosage rates shown in Table 2 gave significant disease control, A comparison of the

Figure 3. Halo-like spots.

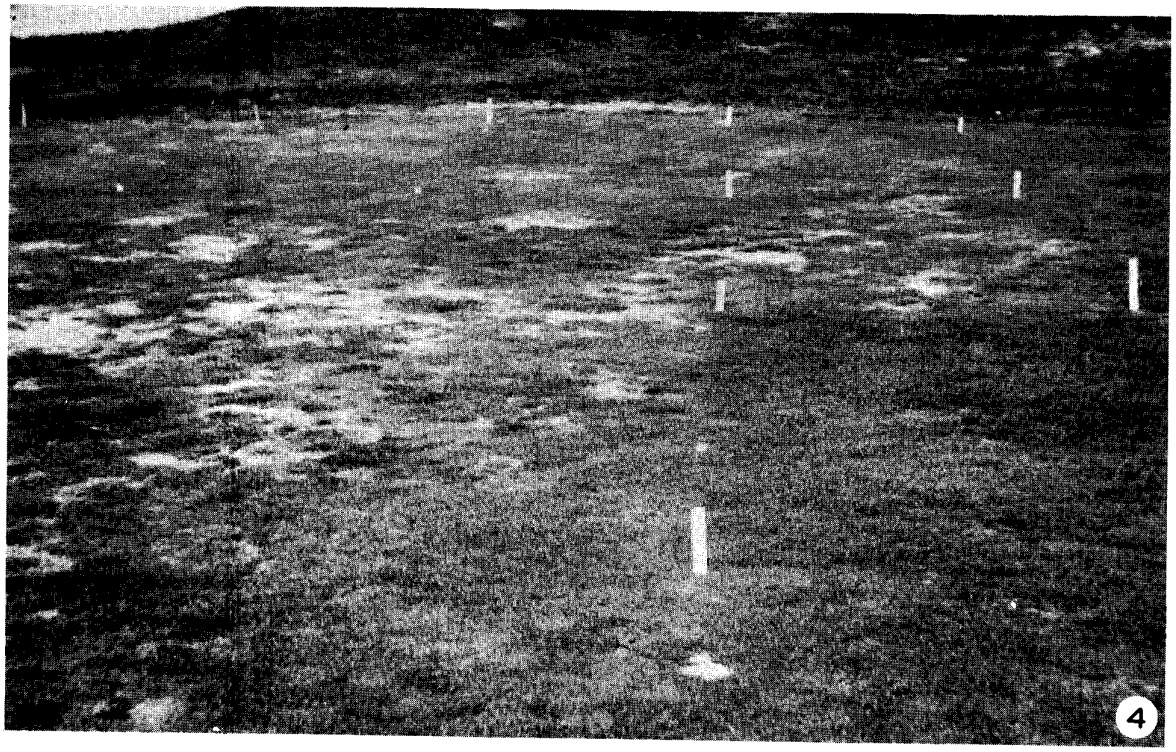

Figure 4. Effective snow mold control with Tersan OM. 6 oz./1000 sq. ft. Treated plot in right foreground. Untreated plot to left of stakes.

results obtained in 1961 with those of the previous year suggests that the poor performance of Mersil and Puraturf in 1960 was due to inadequate dosage rates. It is recommended that the dosage of Mersil be increased to 4 or 5 ounces, and Puraturf to at least 3 ounces, per 1000 sq. ft.

Discussion

The results of the two tests showed that reasonably good control of snow mold can be obtained with a single application of fungicide in the late fall, provided that an adequate amount of fungicide is used. In most cases the dosage rates recommended by the manufacturer were effective. Puraturf, however, did not give adequate control at the recommended 2-oz rate but gave reasonably good control at the 3-oz rate in 1961. On the other hand, Tersan OM was equally as effective at the 6-oz rate as it was at the recommended 8-oz level, thus the lower dosage appears to be adequate.

The use of the Actidione-Thiram formulation for snow mold control requires further investigation because, although disease control was reasonably good, there was evidence of phytotoxicity. The injury did not appear to be serious but plots treated with this material, especially at the 8-05 rate, showed a general tendency to develop a brownish discoloration of the foliage.

Most suppliers of fungicides for snow mold control recommend a second application in mid-or late winter at approximately one-half the initial dosage rate. This recommendation applies to areas where winter thaws and rains remove the snow cover and tend to leach away the fungicide. Most of the damage from snow mold in the Guelph area occurs in late winter and early spring so that additional protection at that time of year would appear to be highly desirable although no supporting data for this recommendation are available at the present time.

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