TURF DISEASES IN THE LOWER MAINLAND OF BRITISH COLUMBIA[1]

H. Vaartnou[2]

Abstract

In the Lower Mainland of British Columbia, pink snow mold caused by Fusarium nivale was the most frequently observed turf disease, and fusarium patch caused by Fusarium spp. the most destructive turf disease observed in 1964-66. Brown patch caused by Rhizoctonia solani can also be very serious. Helminthosporium diseases were destructive during warm, moist conditions. Red thread, caused by Corticium fuciforme, occurred on fescue turf in late summer, and rust and powdery mildew were found on bluegrass mainly in late summer and early fall; both diseases reduced the beaut; of turf. Dollar spot caused by Sclerotinia homoeocarpa and fairy ring caused by Marasmius spp. occurred occasionally, ruining the appearance of turf.

In this area turf diseases occur mainly between September and April. Bentgrasses are the most susceptible, followed by bluegrasses and fescues. Differences in susceptibility among species and clones are large.

Introduction

Gould (2) stated that in western Washington the most serious turf diseases are caused by Fusarium nivale, Corticium fuciforme, Ophiobolus graminis, and Marasmius oreades. He also suspected that with further research additional pathogens, including Helminthosporium species, would be found. Meiners (3) reported that in the Pacific Northwest, Fusarium nivale first appears on turf in October and November, coinciding with cool, wet weather and continues to develop under snow cover or wet conditions until February or March. Dahl (1) found that Fusarium nivale was destructive on the more vigorous plants.

A survey of turf diseases occurring in the Lower Mainland of British Columbia was conducted during the winter of 1964-65 and the spring of 1966 to determine which diseases were most destructive to established turf, when these diseases were most destructive, and if resistance to them existed among different grass species and clones.

Materials and methods

A survey of turf diseases was conducted at 10 locations in the Lower Mainland, extending from the University of British Columbia campus at Vancouver to Hope, B.C.

Visual records and samples for culturing were taken at each location. The following grass species and cultivars were inspected: colonial bent (Agrostis tenuis Sibth.), five clones; colonial bent, mixed: 'Highland' bent (Agrostis sp.); creening bent (Agrostis sp. cv. 'Congressional'); Kentucky bluegrass (Poa pratensis L.), mixed; Kentucky bluegrass cv. 'Merion'; annual blueqrass (Poa annua L.); creeping red fescue (Festuca rubra L.), mixed: and creepinq red fescue cv. 'Pennlawn'.

Turf samples were taken during three seasons, fall (August to December) 1964; winter (January to March) 1965; and spring (April to June) 1966.

Visual observations and photographs were made of each disease on the different species and clones at the various locations. Samples, composed of 5-cm plugs of turf, were taken from the juncture of healthy and diseased turf and were used for isolation of fungi in the laboratory.

Four sections of diseased leaf tissue were taken from each sample. The sections were surface sterilized in a 15% (v/v) Chlorox solution for 5 minutes and placed on Difco Bacto-agar in petri dishes, which were then set aside for 2-3 days in light to allow hyphae of the fungus to develop on the agar. When the hyphae had developed sufficiently, blocks of agar, each containing a hyphal tip, were cut from the culture and placed on potato-dextrose agar (PDA) slants.

To induce sporulation, fungus isolates were grown at room temperature for periods of up to 70 days on Bacto-agar containing approximately six grains of Quaker oats per petri dish. Several cultures on PDA slants were also placed outside for 14 days, where

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[1] Contribution No. NRG-70-17, Research Station, Canada Department of Agriculture, Beaverlodge, Alberta.

[2] Forage Ecologist, Research Station, Canada Department of Agriculture, Beaverlodge, Alberta. Present address: Plant Industry Division, Alberta Department of Agriculture, Edmonton, Alberta.

they were protected from rain and exposed to fluctuating temperature ranging from 23 to 50 F (−5 to 10C).

Spores produced in culture were examined microscopically after staining with cotton blue–lactophenol or with a combination stain of phloxine and congo red in a 3% solution of KOA. The latter combination was used to observe mycelial cell walls.

Results

It will be noted from Table 1 that during December 1964 and January 1965 the total snowfall was much above average. Snow covered the turf for a period of nearly 2 months in the Vancouver area. This abnormally severe winter followed an unusually wet summer.

From the samples collected, nine major pathogenic fungi were isolated (Table 2): Fusarium nivale (F.) Ces., Fusarium spp., Helminthosporium spp., Rhizoctonia solani Kuhn, Corticium fuciforme (Berk.) Wakef., Puccinia spp., Erysiphe graminis DC. ex Merat, Sclerotinia homoeocarpa F.T. Bennett, and Marasmius spp.

PINK SNOW MOLD (Fusarium nivale) was found in all turf species from September to April. The fungus killed the leaves, resulting in the formation of large unsightly pinkish–grayish–white irregular patches that ruined the appearance of the turf. 'Highland' bentgrass was particularly susceptible to this disease (Fig. 1). However, the plants usually recovered within a month after growth started in spring.

Morphological differences, especially in spore size, occurred between forms attacking the grass in fall and in winter.

Table 1. Climatological data, Vancouver, B.C.

Date	Avg temperature (°F) Mean	Low	High	Precipitation (inches) Total	Snow
1964					
August	60.5	54.2	66.7	1.45	0
September	55.2	49.5	60.9	5.57	0
October	50.7	44.6	56.7	2.34	0
November	41.5	37.4	45.6	5.71	2.0
December	34.4	30.1	38.6	6.19	43.7
1965					
January	36.7	33.1	40.2	7.07	12.8
February	39.7	35.9	43.5	7.42	0.6
March	41.1	34.5	47.6	2.24	2.0
1966					
April	47.2	40.6	53.8	1.10	0
May	52.2	45.8	58.6	2.24	0
June	56.8	51.1	62.4	1.79	0

FUSARIUM PATCH (Fusarium spp.) occurred on bentgrass lawns, mainly in February, and was found most frequently on creeping bentgrass. The fungus killed the plants, leaving dead patches 2 to 30 cm in diameter (Fig. 2) in lawns of creeping bent, 'Highland' bent, and annual bluegrass.

Table 2. Frequency of occurrence of turf disease fungi in the Lower Mainland of British Columbia during three periods, 1964-66

Turf grass	No. of locations	Fusarium nivale F*	W*	S*	Fusarium spp. F	W	S	Helmintho-sporium spp. F	W	S	Rhizocto-nia solani F	W	S	Corticium fuciforme F	W	S	Puccinia spp. F	W	S	Erysiphe graminis F	W	S
Colonial bent																						
Mixed	10	10	10	6	1	4		10	10	9				5			1			2		
Clone 1	4	4	4	2		1		2	4	2		1		2						1		
Clone 2	4	4	4	3		1		1	4	2				3			1					
Clone 3	4	4	4	2				2	4	3				1								
Clone 4	4	4	4	1				1	2	1				1			2					
Clone 5	4	4	4	1		1		2	3	1				3						1		
'Highland' bent	10	10	10	8	1	4	1	8	10	7				8			1			3		
'Congressional' bent?	5	4	4	2	2	5	1	3	5	2				1								
'Merion' Kentucky bluegrass	5	2	3	1				2	5					2			5			3	1	2
Kentucky bluegrass	5	2	4	1				5	5	2				3			5			5	2	2
Annual bluegrass?	10	8	10	5	1	3		6	10	6	1	1		6			7			6	1	1
'Pennlawn' creeping red fescue	5	3	4	1				1	3					5								
Creeping red fescue	8	7	7	5				1	6					8								
Total	78	66	72	38	5	19	2	44	71	35	1	2		48			22			23	4	5

* F = fall 1964, W = winter 1964-65, S = spring 1966.

† Also, Sclerotinia homeocarpa was found in one sample of 'Congressional' bent in fall 1964; and Marasmius spp. in a sample of annual bluegrass in fall 1964, and in winter 1964-65.

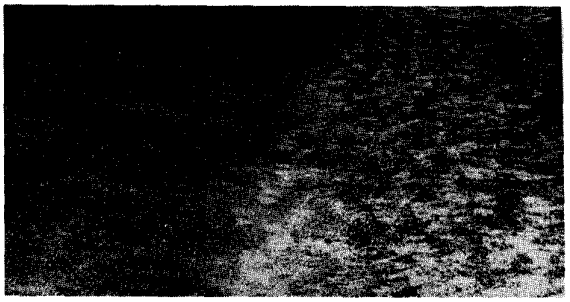

Figure 1. Injury to turf caused by Fusarium nivale. Left, 'Congressional' bentgrass. Right, 'Highland' bentgrass.

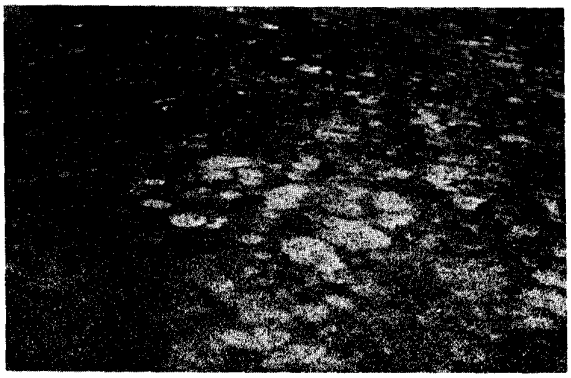

Figure 2. Injury caused by Fusarium spp. to a lawn of 'Congressional' bentgrass.

Colonial bent was able to recover partially. The fungus was not isolated from Kentucky bluegrass or creeping red fescue turf.

MELTING OUT (Helminthosporium spp.) At least two Helminthosporium spp. attacked turf in the Vancouver area. In September and October, when the weather was still warm but reasonably moist, helminthosporium diseases caused the lawns to be thinned out by killing some of the tillers. Bentgrasses in shady locations were most affected.

A strain causing leaf spot was isolated from all species of turf grasses but was particularly predominant on some of the bentgrass clones.

BROWN PATCH (Rhizoctonia solani) (Fig. 3) occurred in irregular gray'ish-brown rings up to 50 cm in diameter. The fungus killed the leaves but not the roots, and the turf recovered within a month. This fungus was isolated from samples of annual bluegrass in October and February and from colonial bentgrass in February in turf samples taken from well fertilized golf greens.

RED THREAD (Corticium fuciforme) was most commonly found in early September in fescue lawns, but it also appeared in lawns consisting mainly of annual and Kentucky bluegrasses and bentgrasses. Cloudy and moist weather in early fall favored the spread of the causal fungus.

RUST (Puccinia spp.) mainly attacked Kentucky bluegrass lawns in early fall and generally those in less fertile locations. It did not kill the grass and nearly disappeared later in the fall.

POWDERY MILDEW (Erysiphe graminis) occurred on bluegrasses in early fall. White mycelial patches formed on the surface of leaf blades and sheaths. The infected leaves finally turned yellowish brown, but the fungus did not kill the plants.

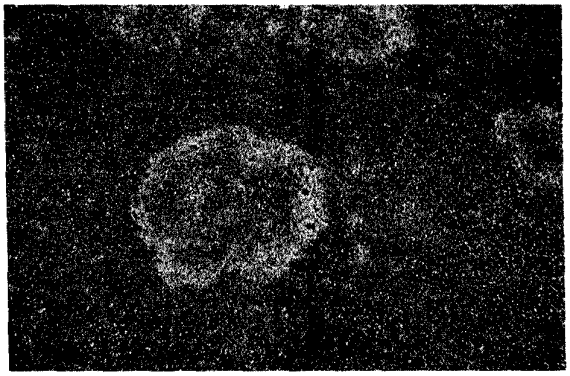

Figure 3. Injury caused by Rhizoctonia *solani* to a golf green of annual bluegrass.

DOLLAR SPOT (Sclerotinia homoeocarpa) occurred on creeping bentgrass in August. Regular dark-brown spots, 3-5 cm in diameter, turning later to a light, bleached color, appeared on the turf. White mycelium, which was very noticeable in early morning, covered the leaves.

FAIRY RING (Marasmius spp.) was identified from samples taken from an annual bluegrass lawn in fall and winter. Dark green rings 20-100 cm in diameter appeared, and grass growing within the rings displayed a lighter color than the rest of the lawn.

Discussion

Pink snow mold was the most frequent and one of the most destructive turf diseases in the Lower Fraser Valley. It was most active under snow cover and after the snow melted during cold, wet weather. It affected all turf grasses examined, but there were large differences in susceptibility among species and clones. Strains of the causal fungus damaging turf in the fall may be different from strains active during winter months.

Fusarium patch was the most destructive disease on bent grass and annual bluegrass lawns in winter. In addition to killing the

leaves, it also killed the roots of the plants and left round dead patches in the middle of the lawn.

Helminthosporium spp. ruined the quality of turf, mainly in early fall, causing the melting-out effect. During longer periods of favorable conditions, the turf was killed and this disease was very serious. Helminthosporium melting out was one of the most prevalent turf diseases, especially on bentgrass.

Brown patch, which previously was regarded as a disease occurring only in hot weather, damaged turf in October and February (Fig. 3). This disease affected turf grasses in winter as well as in late summer and fall in the Vancouver area.

Red thread, one of the most prevalent lawn diseases on fescue on the lower mainland in the warm, humid season, nearly disappeared when the weather became cool. Normally only the leaves were affected, and the turf recovered within 3 weeks.

Rust and powdery mildew were the most prevalent diseases of Kentucky bluegrass. Both occurred in late summer but were not very destructive. They did not kill the plants, but ruined the appearance of the turf.

Dollar spot occurred on creeping bentgrass in the turf nursery at Vancouver but did not spread to other species growing close by. It disappeared within a month and, therefore, was not considered as a major disease in the Lower Mainland.

Fairy ring occurred in only one lawn examined. It was not widespread, but it is considered to be one of the most destructive turf diseases in home lawns in Vancouver.

Acknowledgments

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