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Biology and Control of Dollar Spot Disease

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Introduction

Dollar spot is the most prevalent disease of turfgrass in North America, particularly on intensively managed golf course putting greens and closely mown fairways. In Canada, dollar spot can be found in the Maritimes, the Prairies and the West Coast, but it is most severe in the Great Lakes Region. Fortunately for golf course superintendents, it usually can be recognized and managed without too much difficulty. A good understanding of the biology of dollar spot is key to controlling this disease.

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The Pathogen

The pathogen causing dollar spot is currently classified as the fungus *Sclerotinia homoeocarpa*. Experts on classifying fungi believe it belongs in another genus, but are uncertain which one. Turf text books and research articles still refer to the disease by the scientific name Sclerotinia homoeocarpa. Dollar spot causes disease on all cool season turfgrass species. On golf courses, we are mainly concerned with dollar spot on annual bluegrass and creeping bentgrass. Dollar spot occurs during the summer and early fall.

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Conditions Favouring the Disease

As with every turfgrass disease, environmental conditions affect the occurrence and the development of the disease. The dollar spot fungus will start growing at 15EC, with optimal growth between 21E and 27EC, combined with relative humidity greater than 85% and heavy dew at night. Dollar spot is more prevalent on turf which has been grown under a low nitrogen fertility regime.

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Symptoms

Dollar spot patches start out on annual bluegrass and creeping bentgrass with a few adjacent leaves turning brown. After a couple of days these diseased areas take on a bleached appearance, ending with patches that have an average diameter of 3 cm. The spots rarely expand, but they can coalesce to form larger dead areas (Figure 1).

On longer grass leaf blades, individual lesions can be seen. They are hourglass in shape, with dark margins and a straw coloured centre across the leaf blade (Figure 2). The symptoms on longer grass appear as irregularly shaped patches with blighted turf in amongst healthy turf.

During periods of warm days and nights coupled with high humidity, dense, aerial mycelium can be found on the affected turf blades in the early morning (Figure 3). When this occurs, this disease is sometimes misdiagnosed as Pythium blight.

Figure 1: Dollar spot patches on creeping bentgrass. Diseased areas take on a bleached appearance, to a maximum size of 3 cm across, but spots can coalesce to form larger dead areas.

Figure 2: On longer grass leaf blades, individual lesions can be seen as hourglass shaped with with dark margins and a straw coloured centre across the leaf blade.

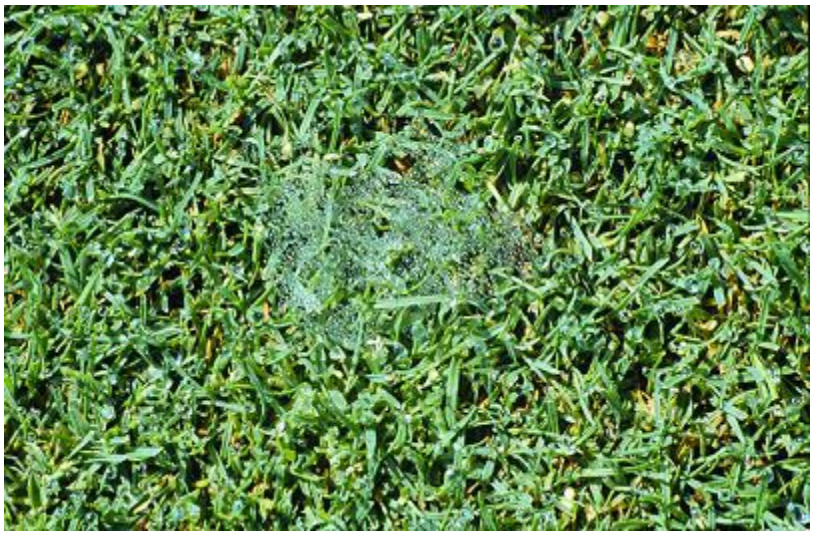

Figure 3: During periods of warm days and nights coupled with high humidity, dense, aerial mycelium can be found on the affected turf blades in the early morning.

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Life Cycle

The dollar spot fungus is thought to overwinter as sclerotial flakes in the thatch near the edges of dollar spot lesions. These are very hard to see, since they are almost indistinguishable from soil. The fungus also likely survives as dormant mycelium in the tissues of infected turf plants. In North America, this fungus is not known to produce any spores, but recent research has found that sexually produced spores may also play a role in dispersal of this fungus (Hsiang & Mahuku, 1999).

When daytime temperatures warm above 15EC in the spring, fungal strands called mycelium start to grow out from the thatch onto wet leaf surfaces to cause the initial infections. The fungus can spread from diseased leaves to infect healthy leaves, and diseased tissue can be transported by grass clippings on golf shoes, golf carts and maintenance equipment to areas of healthy turf. This disease attacks the foliage and the crown of the plant, while roots and rhizomes are not infected. Thus in most cases, grass plants are not killed by the attack and can recover with proper maintenance.

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Cultural Controls

Cultural controls can be very effective for managing this disease. As with most fungi, limiting the amount and duration of leaf wetness can greatly reduce the occurrence of this disease. Drag a hose or pole the turf in the early morning to reduce the duration of leaf wetness. Other ways of promoting drying of dew are as follows: encouraging air movement by pruning out the lower crowns of trees or thinning stands of trees surrounding greens and along fairways; reducing shade so that early morning sunlight hits the greens; mowing turf in the early morning to displace the dew; or avoiding evening watering during times very conducive to disease spread.

Dollar spot can also usually be minimized by growing turf with adequate nitrogen nutrition. Turf which is low in nitrogen is more susceptible to infection by the dollar spot fungus and is much slower to recover from dollar spot injury. It is important however, to maintain a balanced nitrogen status in the turfgrass plant. Over-fertilization with nitrogen can encourage other diseases.

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Resistant Cultivars

Cultivars of creeping bentgrass vary in their susceptibility to dollar spot. L-93, A-1, Providence and Pennlinks have shown superior tolerance to dollar spot (Hurley, 1999). Cultivars which have been shown to be the most susceptible to dollar spot are Crenshaw, 18th Green and Century (Hurley, 1999). Putter, Emerald, Forbes 89-12 and SR1020 were also reported to be the most susceptible bentgrass cultivars based on trial conducted at the University of Guelph (Hsiang and Charbonneau, 1994). By choosing some of the newer cultivars that are less susceptible to dollar spot, fungicide treatments to manage dollar spot, especially on fairways, can be reduced.

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Chemical Control

Fungicides containing one or more of the following active ingredients are registered for control of dollar spot: chlorothalonil, iprodione, benomyl, anilazine, propiconazole, thiophanate-methyl, and thiram. Consult provincial publications and product labels for registered uses and recommended rates.

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Biological Control

Several commercially available organic fertilizers have shown suppression of the dollar spot fungus (Liu et al., 1995; Nelson and Craft, 1991), although the exact mechanism of suppression is not clearly understood. There has also been research on the use of

strains of the dollar spot fungus which do not cause disease, but can inhibit the growth of strains which do cause disease (Zhou & Boland, 1998).

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Fungicide Resistance

Because dollar spot disease is so prevalent geographically and throughout the growing season, repeat applications of fungicides are made to control the disease. This has lead to a long history of resistance development to fungicides (Barton, 1999). After using demethylation inhibiting (DMI) fungicides on turf for over 10 years, Americans have found fungicide resistance in dollar spot (Golembiewski et al., 1995) where normal applications failed to control the disease. Propiconazole was the first DMI fungicide registered on turf in Canada. A baseline sensitivity study conducted before the use of the fungicide in 1994 indicated that a population near the U.S. border had already been exposed to a DMI fungicide. However, the sensitivity of this particular population to the DMI fungicide has declined since 1994 (Barton 1999). To ensure that dollar spot does not become resistant to this new class of fungicides, it is important to either tank mix DMI fungicides with a broad spectrum fungicide or to alternate DMI fungicides with fungicides from other families.

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