

DISEASES OF COOL-SEASON TURFGRASSES

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Turfgrass diseases are limiting factors in the successful management of high quality turf. Despite the best efforts of lawn care professionals, large numbers of lawns are either thinned or severely damaged by diseases each year. While the pathogens which cause these diseases cannot be eliminated from turf, it is possible to manage them to tolerable levels. This, however, requires knowledge of the turfgrass plants as well as the pathogens which attack them.

There are three factors necessary for a disease to occur: a susceptible grass, a pathogen, and an environment favorable for disease development. While turfgrass breeders have made tremendous strides in developing grasses with improved disease resistance, no turfgrass species is resistant to all diseases. Also, resistance may be overcome if the turf is subjected to extremes in weather or poor cultural practices.

Turfgrass pathogens are present in nearly all lawns. In most cases, however, they exist in a dormant or saprophytic state. Diseases become a problem only when environmental conditions become favorable for the build-up of pathogen populations or cause an increase in the susceptibility of the turf.

There is a group of disease problems for almost every environmental or cultural situation that may occur. Some turfgrass diseases become active during the frigid months of winter under a blanket of snow whereas other diseases only occur during hot and humid weather. Some diseases appear when soils are saturated with water and others are more likely to occur under drought stress.

PRINCIPLES OF DISEASE MANAGEMENT

The first step in the management of any turfgrass pest is to obtain an accurate diagnosis. While this is relatively easy with weeds and insects (because of their relatively large size), the pathogens which cause turf diseases are usually only visible under a microscope. Also, disease symptoms may not be easily recognizable when the disease is in an advanced stage. Diseases are easier to diagnose in the early stages of development and most universities will assist in diagnosing disease specimens.

Traditionally, disease management strategies have been grouped into four categories: cultural control, chemical control, disease resistant species and varieties, and the newest category, biological control. Cultural control measures should be the first line of defense against turf diseases and are geared towards modifying the environment of the turfgrass stand. Cultural practices that play a role in disease development or suppression include mowing, fertilization, liming, irrigation, thatch removal, and aeration.

Mowing practices may have a strong influence on some turfgrass diseases. Every time a mower removes leaf tissue a wound is created through which a pathogen can enter the plant. In some cases mowers may actually spread the pathogen from one location to another. Mowing below the height at which the turfgrass species is best adapted can place stress on the grass and make it more susceptible to some diseases, especially during the summer months.

Fertilization of turfgrasses is an important factor in the development of diseases. Some pathogens favor lush, succulent leaf growth that may occur as the result of heavy applications of nitrogen fertilizer. Diseases that are favored by large applications of nitrogen fertilizer include leaf spot, brown patch,

Pythium blight, stripe smut, and the snow mold diseases. Certain diseases are more prevalent under low fertility. Nitrogen-deficient turfgrass plants are more susceptible to dollar spot, red thread, pink patch, and the rust diseases.

The soil pH is an important factor in the management of at least two diseases; Fusarium patch and take-all patch. Both diseases are serious problems on golf course turf and tend to be favored by a high pH (7.0 or above). Studies have shown that the incorporation of acidifying fertilizers (such as ammonium sulfate and ammonium chloride) or sulfur can lower the pH of the soil and suppress these diseases. This is especially important for take-all patch since it is not readily controlled by fungicides.

Most fungal pathogens require free water to initiate the disease process (infection). While irrigation is essential during the summer to prevent drought damage it can also contribute to disease problems. Watering in the evening or at night should be avoided since it leaves a film of water on the plants for several hours. When diseases are active, watering should take place early in the morning.

Thatch is the tightly bound layer of dead and living stems and roots that develops between the zone of green vegetation and the soil surface. A moderate amount of thatch (≤ 1 inch) can act as an insulating layer between the turf canopy and the soil. However, an excessive amount of thatch can prevent wetting of the soil, act as a barrier to pesticides, and can provide a habitat for insects and disease organisms. A regular program of thatch reduction is an essential component of a disease management program.

Soil compaction can greatly affect the health and performance of turfgrasses. Compaction leads to poor infiltration and reduced oxygen diffusion into the root zone. Some root and crown diseases such as summer patch and necrotic ring spot are frequently associated with compacted soils. Aeration of compacted soils allows improved rooting, thus, increased resistance to root diseases.

Chemical control of turfgrass diseases is usually accomplished with the use of fungicides. Turf fungicides can be divided into two broad categories: (1) contact fungicides and (2) systemic fungicides. The contact fungicides are generally applied to the leaf and stem surfaces of turfgrass plants and do not move appreciably within the plants. Hence, these materials may be washed or mowed off the plant surfaces. Consequently, they are only effective for short durations (usually 7-14 days) and do not protect new foliage. These fungicides are usually used for the control of foliar diseases and not root/crown diseases. As a group, the contact fungicides have a broad spectrum of control and have been used extensively in the turf industry for a number of years. Examples of contact fungicides are Daconil 2787TM and ForeTM.

The systemic fungicides are a newer group of chemicals which are absorbed and translocated within the plant. Thus, they are not as likely to be removed from the plant by rainfall and mowing. The systemics may protect the plants for a period of 2-4 weeks and will protect new growth. Most systemic fungicides will control both foliar and root/crown pathogens, however, leaf spot diseases are better controlled with contact fungicides. Some common systemic fungicides include BannerTM, BayletonTM, RubiganTM, and Cleary's 3336TM.

THREE COMMON DISEASES OF COOL SEASON GRASSES

Leaf spot and melting out (*Bipolaris* and *Drechslera* spp.)

This group of diseases is incited by a group of fungi in the genera *Bipolaris* and *Drechslera*. These fungi used to be referred to as *Helminthosporium* and many individuals still use this name for convenience. Every grass species probably has a *Helminthosporium* leaf spot/crown rot disease associated with it. These organisms, under pasture and native grassland conditions, cause leaf spots of little consequence. However, as cutting height is reduced or the nitrogen levels increased, these leaf spot diseases may become so severe that complete loss of the turf can occur.

Symptoms. The causal fungi usually first invade the leaves, producing definite leaf spot symptoms. These may begin as dark purplish-red oval to round areas on the blades. The spots enlarge until the entire width of the leaf blade is affected. The leaf tips usually wither and die. The leaf-spotting or leaf-blighting phase is less damaging to the turfgrass stand than are the crown and root-rot phases of the diseases. Crown and root decay are responsible for the symptom known as melting-out. Melting-out is the term often used as the name for the *Helminthosporium* disease that occurs in the spring. In melting out, the turf is severally thinned and appears to melt away.

Cultural control. Applying excessive nitrogen in early spring will usually make spring Helminthosporium diseases more severe. This disease can also be severe under nitrogen deficiencies. The lush, dark-green growth seen as typical of a good turf is really the kind of growth that encourages the disease in May. Probably most important in controlling spring Helminthosporium diseases is not to apply excessive nitrogen fertilizer (more than 1.5 lbs. N/1000 sq ft) in early spring. Possibly the best nonchemical method for controlling Helminthosporium disease is to replant damaged and disease-prone areas with Helminthosporium-resistant grasses.

Chemical Control. Fungicides are effective for control of Helminthosporium diseases, but correct application and timing are critical. Fungicides applied at the melting-out stage, when the damage is readily apparent, usually produce little improvement. Recovery of the turf at this stage becomes a matter of encouraging regrowth of the weakened grass. If plant loss is severe, overseeding is required. An effective fungicide program requires that the first application be made when the grass begins show symptoms and be repeated, usually at two-week intervals. Contact fungicides are most effective in controlling leaf spot diseases.

Dollar spot (*Sclerotinia homoeocarpa*)

Symptoms. On home lawns cut at 1 to 3 inches, spots may reach 3 to 6 inches in diameter. These may run together, producing large areas of dead turf. Affected leaves initially show yellow-green blotches, which progress to a light straw color with a reddish-brown margin. Dollar spot symptoms occur anytime from early to late summer. The disease usually reaches its peak activity when air temperatures are in the 80° F range and under high humidity. Symptoms also may appear in the fall. Dollar spot is likely to occur on nonirrigated turf when humidity is high from prolonged muggy summer weather. Dollar spot is more severe under nitrogen deficiency or when grass grows slowly.

Cultural control. It is frequently suggested that the spring nitrogen fertilizer applications be delayed until late May or early June, so as to reduce problems with leaf spot disease. This practice can minimize dollar spot severity as well, since growth will be stimulated during the period when dollar spot infection begins. Irrigate deeply, infrequently, and early in the morning to minimize foliar moisture accumulation.

Chemical control. On turf with persistent dollar spot problems, most contact and systemic fungicides are very effective against the causal fungus.

Fairy ring, (*Basidiomycetes*)

Symptoms. Some fairy rings may appear as rings of yellow or dark green and fast-growing turf. They may also appear as rings of slow-growing or killed turf. The bands of affected turf are from 4 inches to a foot in width, forming more or less continuous rings ranging from 3 to 200 feet across. In some instances, the center of a stimulated band may contain weakened or dead grass, or it may appear as an inner zone of stimulated grass edged with bands of dead or stunted turf on either side.

Fairy rings are produced by colonies of mushroom fungi that live in soil and thatch, obtaining food from decaying organic matter. These colonies grow outward radially, increasing in size year after year. The fruiting bodies of the causal fungi often are called mushrooms and toadstools. They usually appear at the outer edge of rings in late summer or early fall, during periods of high soil moisture. Many different species of fungi have been associated with fairy rings. The fungi usually do not attack grass, but may repel water resulting in death due to drought. The ring of stimulated grass is thought to be caused by nitrogen substances produced by the breakdown of organic matter by the fungi.

Cultural control. Try to maintain a sufficient growth rate of the grass. Mow frequently to minimize the differences in grass vigor between the ring and the rest of the lawn. Persistent irrigation and application of wetting agents may help in alleviating drought-stress symptoms.

Chemical Control. Attempts to control fairy rings with fungicide drenches or soil fumigation have met with little or no success.