Lawn Diseases

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Patch disease symptoms in a lawn. Note the circular pattern and sunken appearance. (POL)

Turf diseases can be serious when weather and/or lawn management favor disease development. Plant diseases, including the common lawn diseases described in this publication, develop when several conditions occur simultaneously and persist. Fungi, the most common cause of lawn diseases, are microscopic, thread-like organisms that spread by means of air- or water-borne spores. The spores function like seeds, producing new infections whenever the environment is favorable for a period of time and the host is susceptible. Disease develops when the pathogen (fungus) is present on a susceptible host (bluegrass) in a favorable environment (temperature, moisture/water, light, nutrients, and stress factors).

Lawn diseases are not always easy to diagnose. Some key factors and symptoms to help recognize disease include: size and shape of dead and dying plants, specific spots on leaves, quality of root system, leaf color and growth characteristics, time of year, and temperature when disease developed. When diagnosing a lawn disease it is helpful to have a record of treatments such as fertilizer, herbicides, mowing height and frequency, watering frequency and amounts.

Grass disease can ruin a lawn's appearance. However, good turf management practices usually are adequate to prevent serious damage. Integrated cultural practices for turf management and pest control will limit the need for fungicides. Disease development often is associated with the lack of proper application of these turf management practices: 1) selection and planting of an adapted grass variety, 2) sufficient water at the correct time, 3) timely fertilization with the right amounts and balanced nutrients, 4) regular mowing at the recommended height, 5) provision for adequate sunlight and air movement, 6) maintenance of good soil aeration and drainage, and 7) thatch management.

Leaf Spot and Melting Out

Leaf spot and melting out are among the most frequent and destructive lawn diseases of common bluegrass. Melting out is caused by the fungus *Drechslera poae* and leaf spot by the fungus *Bipolaris sorokiniana*. Excess thatch, heavy nitrogen

fertilization, excess shade, mowing too close, and broadleaf herbicides promote these diseases. The melting out pathogen, *D. poae*, can also cause leaf spots. Conversely, the leaf spot pathogen, *B. sorokiniana*, can also causing melting out symptoms.

Figure l. Purple to brown spots with lighter centers develop on leaves and leaf sheaths infected with leaf spot/melting out fungi. (RWS)

Leaf spot occurs in warm weather and is easily recognized. Spots on the leaves develop purplish-red to purplish-brown borders and brown to tan centers (Figure 1). The spots may extend the width of the leaf and are somewhat longer than wide. Leaf spots may cause the death of leaf tips. Leaf sheaths are also infected, and may die, resulting in thin stands of grass. Melting out begins as spots on the leaf blades and rapidly moves down the leaf sheath and into crowns and roots. In advanced stages, when many plants die in a large irregular patch, it is known as "melting out" (Figure 2). These patches may range in size from several inches up to many feet and may produce an irregular patchwork across an entire lawn.

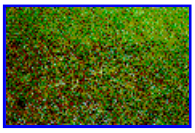

Figure 2. Thinning out of the turf occurs when crowns are killed by leaf spot/melting out fungi. (WCS)

Once established, melting out is difficult to control. Proper watering and fertilization for bluegrass varieties in your lawn will reduce the danger of melting out. Common Kentucky bluegrass should not be fertilized as heavily as the elite blue grass varieties or high maintenance diseases will develop. It is particularly important to avoid excess use of nitrogen fertilizer and evening watering. Remove excess thatch -- the layer of plant material tightly interwoven with living tissue between the soil surface and the green vegetation. Fungicides may be needed to control leaf spot disease. Their effect is temporary and beneficial only when combined with a change in cultural practices. Fungicides are most effective if the initial application is made when leaf spot first becomes serious and less effective when small patches of lawn begin to die. When large areas of a lawn are dying or dead from melting out, dead patches should be reseeded with a resistant variety. Bluegrass varieties differ in their susceptibility to melting out. Older common bluegrass types are often very susceptible while newer elite varieties are usually quite resistant.

Fusarium Blight

Figure 3. Donut or crescent shaped areas of dead or dying grass are symptomatic of the patch disease complex. (WCS)

The disease formerly called "Fusarium Blight" or "Fusarium Blight syndrome" was once thought to be a distinct disease characterized by patches of grass that develop "frog-eye" patterns. These consist of donut-or crescent-shaped areas of dead or dying grass with a center of green grass. Now this disease is recognized to be a complex of rather similar appearing diseases that include Necrotic Ring Spot, Rhizoctonia Yellow Patch, and Summer Patch (Figure 3).

Necrotic Ring Spot

Figure 4. Decomposition of thatch in patch affected turf resulting in sunken or depressed areas. (WCS)

This is a serious disease of Kentucky bluegrass that is especially common on high maintenance lawns. Necrotic Ring Spot is caused by *Leptosphaeria korrae*, a fungus which is most active in spring and fall, although symptoms may be observed throughout the season. Initial symptoms are patches 6-24 inches in diameter with a mixture of normal, straw- and red-colored blades around the outer portion of the ring, resulting in a "frog-eye" pattern. The roots and crowns of affected plants are covered with black strands of the Necrotic Ring Spot fungus. Thatch may decompose in the patch areas, giving them a sunken or depressed appearance (Figure 4). In warm weather, the red blades are seldom seen. Plants affected in the cooler weather of spring and fall are weakened and very susceptible to summer heat and drought stress. This stress may lead to the death of weakened plants and an apparent resurgence of symptoms, even though the fungus **may not be active** at this time.

Once Necrotic Ring Spot is established, it is difficult to control and damage may remain or reappear yearly for 2-4 years. Control requires a combination of management practices including: thatch control, adjustment of fertilizer practices, relieving soil compaction, changing watering practices, and possible use of a fungicide.

Thatch should be kept less than 1/2 inch thick. Vertical mowing or power raking should be done in spring or fall to reduce thatch. The power rake blades should be set to penetrate the thatch to the soil. Lawn mower attachments are less effective

in thatch removal. It may take several years for vertical mowing to effect sufficient thatch removal. Top dressing, that is, spreading a thin layer of soil on the grass, is another means to speed thatch breakdown. An aerator can also be used to remove a core of thatch and soil. The soil when deposited on the surface, will aid thatch breakdown. Aeration also reduces soil compaction, improves water penetration, and stimulates root development. In areas where sod of one soil type is placed on soil of another type (for example, peat sod on heavy clay), shallow roots often develop. Aeration will help alleviate this problem. Reducing thatch by any of these methods will help reduce summer drought stress.

Fertilizer practices need to be adjusted. Avoid excessive use of nitrogen fertilizer in the spring. One pound of actual nitrogen per 1,000 square feet can be applied in early September, and another when the grass goes dormant after the last mowing (late October to early November). Use a light application (1/2 pound of nitrogen) in the spring and summer only if it is needed to keep the grass growing.

Watering practices must be changed. Use frequent light waterings, to keep the top 1/2-2 inches moist. Irrigation is critical during the summer heat, as the water applied during the day will help relieve both heat and drought stress.

Fungicides may also assist in control, if applied before damage is too severe. Dead patches may be reseeded using a resistant bluegrass variety or ryegrass suitable for lawns. Resodding is usually not effective and the disease may reappear quickly.

Rhizoctonia Yellow Patch

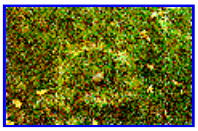

Figure 5. Rings of yellow to brown grass surrounding green grass. This "frog eye" symptom is characteristic of Rhizoctonia yellow patch. (POL)

Rhizoctonia Yellow Patch is also a serious disease of Kentucky bluegrass. It is caused by the fungus *Rhizoctonia cerealis* and is favored by cool, wet weather. Since excessively wet conditions favor Rhizoctonia Yellow Patch, it frequently damages new sod laid on heavy soils and it may occur in lawns with heavy thatch and compacted soils.

Early symptoms are 2-3 inch patches of light green to yellow green grass. These areas soon turn light tan or brown and may increase up to 2 feet in size. A "frog-eye" symptom is common, with yellow-green to brown grass surrounding green centers (Figure 5). The patches may have a sunken appearance due to thatch decomposition. Leaf blades near the margin of the patch may have a reddish to reddish-purple tint beginning at the leaf tip and continuing downward. Tan spots with dark borders may develop on the blades prior to complete blighting. The symptoms and the time of year of occurrence overlap with Necrotic Ring Spot. The roots and crowns of Rhizoctonia Yellow Patch diseased turf **do not** have black strands of fungus on them.

Cultural controls discussed under Necrotic Ring Spot can be used on Rhizoctonia Yellow Patch. Particular emphasis should be placed on reducing wet conditions and providing aeration where sod is laid on heavy soils. No fungicides are effective for control of Yellow Patch.

Summer Patch

Summer Patch, caused by the fungus *Magnaporthe poae*, is less common on Kentucky bluegrass. It is a disease that occurs during the hot portion of the summer. The initial symptoms are yellow patches 6-12 inches in diameter. The turf in these patches thins and the remaining turf turns bronze in color. If warm weather continues, all of the turf in the patch may die. The dead patches may be colonized by weedy grasses.

Soil moisture is important in disease development. Excess irrigation or an absence of irrigation during hot weather may make the disease more severe.

Sclerotinia Dollar Spot

Figure 6. Light colored blotchy areas of bluegrass turf infected by the fungi which cause dollar spot. (CLA)

Dollar Spot, caused by the fungi *Lanzia* spp. and *Moellerodiscus* spp., produces 23 inch circular patches on creeping bentgrass turf and 4-6 inch circular to blotchy areas on bluegrass lawns. These patches are straw colored (Figure 6). Early in the morning, when the grass is covered with dew, a faint cobwebby growth may be seen on the leaves

of affected plants (Figure 7). In the early stages of disease, leaves develop distinct tan-colored spots and bands; quite often a reddish-brown border can be seen on the leaf spots.

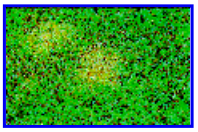

Figure 7. Cobwebby growth visible early in the morning when dew is present on dollar spot affected turf. (WCS)

Dollar Spot develops at temperatures of 60-85 degrees Fahrenheit with high humidity and low soil moisture. The disease usually develops on lawns which are unfertilized but occasionally occurs on high maintenance lawns under stress. It can be controlled by keeping lawns adequately fertilized and watered and by using a fungicide as necessary. Bluegrass varieties differ in Dollar Spot susceptibility with most being moderately susceptible or moderately resistant.

Rhizoctonia Blight (Formerly Brown Patch)

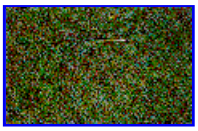

Figure 8. Rhizoctonia blight produces roughly circular patches of discolored turf one to three feet in diameter. (WCS)

Rhizoctonia Blight is a hot weather disease. The fungus, *Rhizoctonia solani,* produces roughly circular patches on lawns. These patches are 1-3 feet in diameter. In humid weather, the outer edge of each patch may have a dark gray to dark purple ring early in the morning while the grass is still covered with dew. This diagnostic symptom, called a "smoke ring," disappears later in the day. At first the grass has a dark, watersoaked appearance but soon dries out to a light brown (Figure 8).

The Rhizoctonia Blight fungus is most active at 80-90 F temperatures when grass leaves stay wet for a long time. It is most severe when excess nitrogen fertilizer has been used. A night temperature above 70 F and a long dew period favors rapid Rhizoctonia Blight development.

The danger of Rhizoctonia Blight is reduced by following recommended management practices, particularly by avoiding excessive use of nitrogen before hot weather and avoiding excessive thatch buildup. When weather favors this disease, a fungicide may be needed.

Powdery Mildew

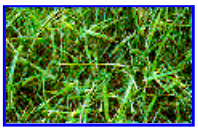

Figure 9. Powdery mildew produces a white powder-like growth on the leaves of infected turf. (POL)

Powdery Mildew is a common problem on bluegrass lawns in shady areas. The mildew fungus, *Erysiphe graminis*, attacks the surface of the grass leaves, developing a fine, fungal growth that resembles a white powdery substance on the leaves (Figure 9). In dense shade, Powdery Mildew causes the affected areas of leaves to turn yellow, eventually resulting in the yellowing and dying of lower leaves or even in the death of plants.

Powdery Mildew develops in areas of dense shrubbery or trees where there is poor air circulation, considerable shade, and high humidity. It is favored by temperatures of 60-72 F. In many cases, Powdery Mildew can be controlled by selective pruning of shrubs to allow better air circulation and greater penetration of sunlight. Where Powdery Mildew is a problem, avoid susceptible grass varieties or plant alternate ground covers.

Typhula Blight (Formerly Gray Snow Mold)

Figure 10. Circular patches of diseased turf coalesce to form larger areas of turf affected by Typhula blight. (MCS)

The snow molds usually appear in the spring as the snow melts from lawns (Figure 10). There are two common types of snow mold: Typhula Blight and Fusarium Patch. They usually can be distinguished by their symptoms, develop under slightly different conditions, and are controlled by different fungicides. Typhula Blight is caused by the low temperature fungi, *Typhula incarnata* and *T. ishikariensis*, especially active under the snow covering unfrozen ground.

Typhula Blight damage first appears when the snow is melting. Roughly circular patches 2 to 40 inches or more in diameter develop. These patches are straw colored, and enlarge as long as the grass remains cold and wet from melting snow. The

grass in the patches has a matted appearance, and may have a visible gray colored mold growth on the whole patch or on the advancing margin. Hard fungus bodies called **sclerotia** develop on or are imbedded in the leaves and crowns of affected plants. These sclerotia are more or less spherical in shape. The sclerotia of *T. ishikariensis* are the size of a pinhead and black; those of *T. incarnata* are up to 3/16 of an inch in diameter and brown. These sclerotia's presence help diagnose Typhula Blight.

The Typhula fungi survive the summer in the soil or thatch as sclerotia. Active growth of the fungus resumes in the absence of light under snow cover on unfrozen ground. Growth takes place at temperatures as low as freezing (to slightly below freezing) and continues after snow melt in the spring for as long as the grass remains wet and the temperatures cold. Typhula activity stops when the temperature exceeds 45 F or the surface is dry.

Management practices for control of Typhula Blight are similar to those for Fusarium Patch. Fungicides are seldom needed in bluegrass lawns.

Fusarium Patch (Formerly Pink Snow Mold)

The Fusarium Patch fungus, *Microdochium nivalis*, produces yellowish patches from several inches to a foot in diameter which usually appear as soon as the snow begins to melt and continue to enlarge as long as the weather is cool and the grass wet. The patches soon take on a bleached appearance. When the grass remains wet, it may be covered by a mat of cottony mold which is off-white or faint pink. This pink color and the absence of sclerotia distinguish Fusarium Patch from Typhula Blight. Usually only the leaves of Kentucky bluegrass are killed but entire plants may be killed in years of severe snow mold activity.

Fusarium Patch develops under a snow cover on unfrozen ground and also can develop in cool wet weather in fall and spring as long as the temperature is between 32 and 60 F.

The two snow mold diseases do not occur every year on lawns, but are most apt to occur in a year when an early and deep snow cover prevents the ground from freezing. A cold open winter will not promote snow mold on lawns but may cause winter injury, with patches of grass dying because the crowns were killed by freezing and/or drying (desiccation).

Proper lawn management will reduce the danger of snow molds. Management practices include keeping the lawn mowed in the fall so that there is no thick mat of grass for the snow molds to develop on. Lawn areas where snow molds occur should not be heavily fertilized in late summer or early fall. A late fall application of fertilizer (after October 15) will not promote lush growth and snow mold. Snow molds do not occur often enough on lawns to merit a fall application of fungicide as a preventive measure unless there is a history of snow mold. When snow mold is observed in the spring it is usually too late to apply fungicide. Typhula Blight normally continues development for only a few days after the snow is gone. Fusarium Patch can develop longer, following snow melt, especially when cold rain or late spring snow is expected. The application of a fungicide might prevent additional damage from Fusarium Patch but is seldom recommended.

Rust

Figure 11. Rust on turf is identified by the orange pustules that break through the leaf surface. (RWS)

Rust, caused by *Puccinia* spp., is not seen every year, but sometimes becomes severe on susceptible varieties during hot periods of the summer when grass growth is reduced. When rust is severe, the lawn may have a yellowish to reddish-orange appearance. A red-orange dust fills the air when the grass is mowed and also collects on shoes and clothing. Individual blades of grass will have slightly elongated yellow-orange to red-orange spots or pustules (filled with a rusty colored powder -- the spores of the rust fungus) that break through the leaf surface (figure 11). When rust is severe, the grass blades turn yellow, wither and die. Rust may also weaken a lawn, making it more susceptible to winter kill the following winter.

Rust is favored by humid weather with night temperatures of 70-75 F, day temperatures of 85-95 F, wetness from dew lasting many hours after sunrise, and frequent light rain (or watering). Rust may be especially severe on Merion and Touchdown varieties of bluegrass, which are highly susceptible. When weather favors rust, the disease is more likely to be severe on low maintenance lawns -- lawns with low soil fertility and some degree of drought stress. It is also apt to be a problem in shady areas, on closely cut grass, and on newly laid sod.

Rust is easily controlled by maintaining good lawn growth with adequate fertilization and adequate watering. Once normal growth is obtained, mow the grass frequently at recommended mowing heights and remove the clippings, an important source of the rust fungus. Fungicides are not usually needed or economical for homeowners, but may be required to help

protect new growth when rust is severe and weather promotes rust development.

Stripe Smut

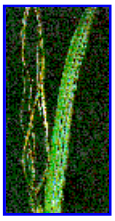

Figure 12. Shreading of leaf blades by the stripe smut fungus. (RWS)

Stripe Smut, caused by the fungus *Ustilago striiformis*, is a cool weather disease that sometimes shows up during long periods of cool weather in spring or fall. It is favored by extended periods of 50-60 F weather. No symptoms develop when summer temperatures are 90 F for long periods.

Lawns with Stripe Smut exhibit poor growth and often are patchy, uneven, and thin. Leaves on infected plants develop elongated streaks that are yellow-green, later turn gray, then finally black. When the streaks turn black, the leaf surface is broken and a black powder (spores of the smut fungus) is liberated from the black streaks (Figure 12). This lengthwise rupturing splits the leaves lengthwise into narrow strips or ribbons. The tips of these strips curl downward, the leaves turn brown and die. Infected plants may be killed, resulting in thin stands of grass.

Stripe Smut attacks some varieties of bluegrass, as well as creeping bentgrass. Control is seldom required since the disease is rarely severe. Where damage is occurring, an application of nitrogen and deep watering early in the day will stimulate growth and aid recovery. Avoid frequent light watering in late afternoon or evening, as this may promote disease development. If disease is severe, the fungicide benomyl may be used in late fall or early spring.

Red Thread

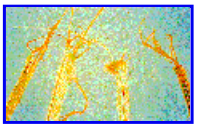

Figure 13. Bright red threadlike strands of the red thread fungus form near the tips or cut surfaces of the leaf blade. (POL)

Red Thread caused by the fungus *Laetisaria fuciformis*, is favored by cool, humid weather. Red Thread may become more common on lawns with fescue and ryegrass blends. Red Thread causes the lawn to have a bleached patchy appearance. Irregular areas, from several inches to several feet across, develop a whitish to pinkish color. Leaf blades and sheaths are attacked; at first they develop water-soaked or greasy green areas, then the affected parts dry out and become tan-colored. In wet weather the affected leaves are covered with a gelatinous pink fungus which then forms bright red threadlike strands near the tips of the leaves and from leaf to leaf (Figure 13).

The best temperatures for Red Thread development are 68-75 F. Red Thread can be quite severe on red fescue (a component of many shade-tolerant lawn grass mixtures) and may occasionally be severe on bluegrass.

Control with fungicides is not usually required for Red Thread. If soil nitrogen levels are low, fertilizing the lawn may help it to recover more rapidly. Deep watering and avoiding frequent light waterings, especially in late afternoon, may help to reduce damage. Collect grass clippings when the disease is active.

Pythium Blight

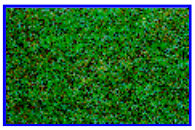

Figure 14. Watersoaked appearance of Pythium blighted turf. (WCS)

Pythium Blight, caused by *Pythium* spp., occurs during hot, humid weather. Circular to irregular spots appear -- initially 1-6 inches in diameter. Early in the morning these spots have a greasy green or water soaked appearance (Figure 14), and the grass feels slimy or greasy. Later the grass in these spots dies and the dead grass becomes light tan and shriveled. The affected areas may have a matted appearance and a cottony white growth may develop on the dead leaf blades during wet periods. Grass blades at the edges of dead patches may have straw-colored borderless lesions. This lack of a dark brown border on lesions distinguishes Pythium lesions from the lesions of Dollar Spot. If the grass was mowed while wet, Pythium Blight may be spread by mowing and develop in irregular streaks and patches in the direction of mowing. Pythium Blight also tends to follow drainage patterns.

Pythium Blight is most severe with day temperatures of 84-95 F and night temperatures above 68 F. The disease is more severe on heavily fertilized cool-season grasses. Wet soil and thatch also favor the disease. A film of water on the leaves is necessary for infection.

Control of Pythium Blight requires careful water management. Avoid excess water or watering late in the day when the plants may stay wet all night. Do not mow when the grass is wet, especially in hot weather. Avoid excess fertilizer, especially nitrogen fertilizer in hot weather. If the thatch is over 1/2 inch thick, remove excess thatch by dethatching. No

fungicides for Pythium control are readily available to the homeowner, but several commercially applied products are very effective.

Fairy Rings

Figure 15. Inner and outer zones of stimulation, and zone of inhibition in turfgrass caused by fairy ring fungi. (CLA)

Sometimes mushrooms will develop and form large circles in lawns. Each year the circle expands. When these circles or "Fairy Rings" are small there may be no effect on the grass, but as they continue to expand, a zone of stimulation forms where the mushrooms come up. Inside this is an area of poor grass growth, or even dead grass. This is the zone of inhibition. Another zone of stimulation may occur inside the dead or dying zone (Figure 15).

Fairy Rings are unsightly but very difficult to control, and the average homeowner may prefer to live with the problem. One way to eliminate Fairy Ring is to dig it out, although this is seldom practical. Mark out an area at least one foot beyond the ring and remove all sod in that area. Then remove all the soil in that area to a depth of one foot, being careful not to spill any on the lawn. Refill the hole with new soil and reseed or resod. Seeding is preferable as there is less danger of reintroducing the Fairy Ring fungi. Doing this job without spilling any soil and reintroducing the Fairy Ring fungi is extremely difficult.

For those who decide to live with the problem, there are several ways to minimize damage to the grass in Fairy Rings. The grass should be fertilized with nitrogen several times a year to help mask symptoms. Most of the Fairy Ring growth (a fungal mat) is in the ground underneath the Fairy Rings, and this growth causes the soil to become nearly impervious to water. Using a "root feeder" attachment on a garden hose, punch holes at least every foot in the yellowing or dying area and pump large amounts of water into the ground to a depth of 10-24 inches. Repeat frequently. Increasing the soil moisture may also change the ecological balance enough to retard the growth of the Fairy Ring fungi. Application of a wetting agent to the area may also increase soil permeability and help to lessen symptoms. Aeration also reduces the symptom severity.

Mushrooms

In addition to Fairy Rings, various other mushrooms may appear in lawns, but not injure the grass. However, they may be unsightly and cause people to worry that children or pets may eat them. Some lawn mushrooms are poisonous to very poisonous, others are not poisonous There is no way to distinguish poisonous from non-poisonous except by correct identification as to genus and species.

There is no easy control for lawn mushrooms which appear whenever there is a protracted rainy period. These mushrooms grow on organic matter (including thatch) and decaying wood. Where possible, the removal of buried wooden scraps and old stumps will reduce greatly their food source and the number of mushrooms in future years. Mushrooms that do appear can be raked up and destroyed, minimizing danger to children or pets.

Slime Molds

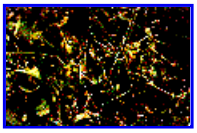

Figure 16. White to gray slime mold on bluegrass turf. (WCS)

Slime Molds occasionally form on grass during periods of prolonged rainfall and high humidity. A creamy white slimy substance accumulates on the grass (Figure 16). Later, this slimy substance becomes powdery and white, gray or blue-gray. Slime Molds do not cause any direct damage to the grass because they only grow over the surface of the leaf and do not attack it. However, they may cause some injury if they remain on the grass for a long period of time. The exclusion of light may cause a yellowing and weakening of the grass, making it more easily attacked by other organisms. The simplest control of Slime Molds is to brush them off the grass with a broom or rake.

Moss and Algae

Moss and algae are primitive green plants often found in densely shaded and moist lawn areas and sometimes on landscape materials and buildings. The best control involves improving soil drainage, increasing air circulation and light intensity, and planting shade-tolerant ground covers or turfgrass varieties. Chemical controls for algae are available but are only a temporary solution and may cause injury to adjacent vegetation.

Dog Damage

Grass may be injured by dog urine. The spots resemble Dollar Spot or Rhizoctonia Blight. The difference is that outside the area of dead grass there is often a zone of grass with luxuriant growth. Heavy watering will wash down excess salts and help the grass recover.

Abiotic (Non-Living) Agents of Disease

Chemical agents (pesticides, salts, fertilizers, and fuel or oil) can cause direct damage. Materials applied to turf for a purpose, such as fertilizer or herbicides, usually produce damage in a pattern that repeats or follows the applicator technique. Spills of products such as oil, gas, and cleaners usually result in severe, long lasting dead patches. It is often necessary to know what was done on the turf area to correctly diagnose the damage. If the spilled product is quickly removed and/or washed away some damage can be prevented. Some products can be inactivated with absorbent materials such as activated charcoal.

Physical agents (temperature, water and ice, soil compaction, buried objects, and thatch) can damage turf. So can high or low temperatures. Winter kill may be direct from ice crystals forming in cells or indirect (dehydration) when unfrozen plants are in frozen soil. Hot objects like engine exhaust or containers of hot liquids placed even for a short period on live grass will kill plants. Even solar radiation and lightning strikes can kill grass. Water extremes cause many turf problems and cannot always be separated from temperature effects. Lack of water obviously restricts plant growth and makes plants more susceptible to damage. Water deficiency symptoms are greater next to sidewalks, driveways and buildings, on sloped areas or in shallow soil. Soils can become impervious to water due to compaction or biological activity (referred to as a localized dry spot). An excess of water, either flooding or saturation of soils, creates conditions for poor root growth and results in weakened or dead turf. Ice layers can cause turf suffocation. Thatch, the layer of plant litter on the soil surface, can reduce movement of water, air, and nutrients into the soil and restrict movement of gases out of the soil. Roots growing in a thatch layer are at high risk to drought, high temperature damage, and disease.

Mechanical agents (mower injury, scalping, and abrasion) also have negative effects on turf. A dull mower blade does not cut the leaf cleanly. Leaf shredding, common with dull rotary mowers, causes the leaf tip to turn brown and die. The injury can assist disease entry and gives the lawn a grayish cast. Mowing grass so short that yellow or brown tissue is exposed is called scalping. This may result from a wheel dropping into a depression or from infrequent mowing. Grass can die after being scalped. Some recovery does occur from underground stems and rhizomes if scalping is not repeated. Grass can wear out and die from excessive use: such as base areas from softball games, the front line of a volley ball game, or push-off areas under swings. If the activity did not remove the grass crown, recovery can be expected. Rotate activity zones and aerify soils to prevent damage and encourage plant regrowth.

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