



# Cooperative Extension Service

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# LAWN DISEASES



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Lawn and turf diseases can be a serious problem when weather or lawn management favor disease development. When diseases strike, they may ruin the appearance of a lawn. They can be kept in check through an integrated control program involving sound cultural practices and the use of fungicides when needed. Such a program is called integrated pest management (IPM). Good management practices include sufficient watering, adequate fertilization, mowing frequently at the recommended height, promoting good air movement in shrubby areas, providing good soil aeration and drainage, and planting adapted grass varieties.

The most common lawn diseases in North Dakota are caused by fungi. These are microscopic, thread-like organisms that spread by means of air-borne and water-borne spores. The spores function like seeds, producing new infections whenever the grass is wet for long periods. This is why proper watering is so important. Frequent shallow watering encourages shallow root systems that are drought susceptible and also promotes disease by wetting the grass more frequently.

Watering should be done before the grass becomes drought stressed because stress increases susceptibility to certain diseases. When watering, make sure the water penetrates to a depth of 6-8 inches. This requires 1-2 inches of water, depending on soil type, and should provide adequate soil moisture for about a week. Watering is best completed early enough in the day so that the grass dries out before nightfall, reducing the danger of disease. Early morning watering also reduces water loss by evaporation.

Fertilize lawns according to the recommendations in North Dakota Extension Circular H-244, "Your Lawn . . . It Can Be Beautiful." Avoid excess nitrogen fertilizer. Pythium blight, brown patch, Fusarium blight, snow mold and Helminthosporium leaf spot/melting out are all promoted by excess nitrogen fertilizer. Do not apply nitrogen when these diseases are active. Fertilization after the end of July could promote snow mold if the first permanent snow comes early. Fall application of fertilizer (after September 15) should not promote snow mold, as lush growth is not stimulated by this late application.

Mow frequently at the recommended height, which is 2 inches for common Kentucky bluegrass or according to recommendations for elite bluegrass varieties. Increasing the mowing height during stress periods will decrease the possibility of disease. The grass should be mowed often enough so that no more than 1/4 to 1/3 of the leaf area is removed at a time. Normally, clippings do not need to be removed unless they are very heavy. A buildup of clippings on the soil surface is referred to as thatch. The fungi that cause lawn diseases survive on this thatch, so thatch should not be allowed to build up over 1/2 inch in depth. Excess fertilization promotes the buildup of thatch. If necessary, thatch can be removed with a power rake in the spring. It may be advisable to catch clippings when mowing elite lawns to prevent excessive thatch accumulation. In the case of severe disease, clippings should be collected and removed as the grass is mowed.

In areas where the lawn is surrounded by dense shrubs, it may be necessary to prune the shrubs to

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allow better circulation of air and greater penetration of sunlight.

Proper surface and subsurface drainage is important for disease control, as is the promotion of soil aeration in compacted areas.

### KEY TO RECOGNITION OF LAWN DISEASES

Lawn diseases are not easy to diagnose. However, a few key items that help recognition are the size and shape of the dead patches (if any), whether the lawn has irregular areas of thin or discolored turf, any characteristic color features, time of the year when they occur and whether they tend to be associated primarily with high maintenance lawns. These characters are summarized in Table 1.

### HELMINTHOSPORIUM LEAF SPOT AND MELTING OUT

Leaf spot and melting out is the most common and destructive lawn disease of bluegrass in North Dakota. Caused by the *Helminthosporium* fungus, the disease is promoted by frequent watering or rainfall, excess thatch, and heavy nitrogen fertilization.

During cool moist weather, such as spring and fall, the disease is easily recognized in the leaf spot phase. The leaf spots that develop have purplish-red to purplish-brown borders and brown to tan centers. 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. As the weather becomes warmer, fewer leafspots are observed and many lower leaves may die without showing any leaf spotting, resulting in thin stands with only a few leaves per square foot. In summer, crowns and roots may be infected, turning purplish-brown or black; at this time of the year plants may die in large irregular patches in advanced stages of the disease known as "melting out." These patches may range from several inches in size up to many feet and may produce an irregular patchwork across an entire lawn.

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 cannot be fertilized as heavily as the elite bluegrass varieties or high maintenance diseases will develop. It is particularly important to avoid frequent watering or excessive use of nitrogen fertilizer. Remove excessive thatch and be sure to remove clippings of severely diseased grass. Fungicides also may be needed to aid in control. Their effect is temporary and beneficial only when combined with a change in cultural practices. Fungicides are most effective if the first application is made when leaf spot first becomes serious or when very small patches of lawn begin to die. Do not wait until large areas of lawn are dying or dead from melting out. Fungicides for con-

trol of leaf spot and melting out in home lawns are listed in Table 2.

Dead patches in the lawn should be reseeded with a resistant variety. Bluegrass varieties differ in their susceptibility to melting out. Common Kentucky bluegrass and varieties Kenblue and Park are very susceptible to leaf spot and Newport is moderately susceptible. The bluegrass variety Merion is resistant. Many elite varieties are resistant, including Adelphi, America, A-34, Bristol, Bonniblu, Baron, Birka, Columbia, Cheri, Eclipse, Enmundi, Glade, Majestic, Parade, Plush, Ram I, Shasta, Sydsport, Touchdown and Victa. Fylking, Nugget and Pennstar are also resistant but are less desirable because they are very susceptible to *Fusarium* blight.

### FUSARIUM BLIGHT

*Fusarium* blight, caused by several species of the *Fusarium* fungus, is a disease that develops during hot summer weather. The disease first shows as scattered patches of grass that are light in color. These patches are 2-6 inches in diameter at first, but may reach 1-3 feet in diameter. The patches soon turn tan or straw colored. These patches may have a 1-2 inch border that is red-brown in color. As the disease develops, many patches become sunken, elongate or crescent-shaped streaks. Patches frequently have a characteristic island of green grass in the center. This "frog-eye" or "donut-shaped" pattern along with crescent-shaped patches is diagnostic for the disease.

*Fusarium* blight is favored by high temperatures and is most severe when daytime temperatures are 80-95°F and night temperatures are over 70°F. The disease is also favored by high humidity and stress. It is a disease that is common on high maintenance lawns with heavy thatch accumulations.

*Fusarium* blight is easier to prevent than control. Reduce thatch, preferably to less than ½ inch. If the soil is compacted, aerate. Thatch, of course, is heavier when nitrogen applications are heavy, so avoid excessive applications of nitrogen fertilizer in the spring. Mow regularly at the maximum recommended height to reduce heat stress. When *Fusarium* blight is actively damaging lawns during hot weather, frequent light syringing during the heat of the day will cool the lawn and reduce stress. This does not replace regular deep watering. This watering recommendation is contrary to what is stated elsewhere in the circular but is necessary to help reduce drought and heat stress — factors that lead to more *Fusarium* blight.

When night temperatures remain above 70°F, a fungicide may be required (Table 2). Research has shown that combinations of benomyl (Tersan 1991) with a protectant fungicide such as Tersan 75, Fore, or Daconil 2787 give better control of *Fusarium*

Table 1. Some features of common lawn diseases.

| Disease         | Dead Patches               |                           |           |                     | Thin or discolored patches         | Other characters                         | Early spring | Spring | Summer | Fall | Common on high maintenance lawns |
|-----------------|----------------------------|---------------------------|-----------|---------------------|------------------------------------|--|--------------|--------|--------|------|----------------------------------|
|                 | Circular, less than 1 foot | Circular more than 1 foot | Irregular | Crescents, "donuts" |                                    |  |              |        |        |      |                                  |
| Brown Patch     |                            |                           |           |                     |                                    | light brown patches, "smoke ring"        |              |        |        |      |                                  |
| Dollar Spot     |                            |                           |           |                     |                                    |  |              |        |        |      |                                  |
| Fusarium Blight |                            |                           |           |                     |                                    | straw-colored patches                    |              |        |        |      |                                  |
| Leaf Spot       |                            |                           |           |                     |                                    | tan leaf spots, purple border            |              |        |        |      |                                  |
| Melting Out     |                            |                           |           |                     |                                    | blackened or purple roots and crowns     |              |        |        |      |                                  |
| Powdery Mildew  |                            |                           |           |                     |                                    | white powder on leaves                   |              |        |        |      |                                  |
| Red Thread      |                            |                           |           |                     | bleached or pink patches           | red "threads" on leaf blades             |              |        |        |      |                                  |
| Rust            |                            |                           |           |                     | yellow-orange patches              | rusty powder on leaf blades              |              |        |        |      |                                  |
| Snow Mold, Gray |                            |                           |           |                     | gray fungus mat when moist         | sclerotia present                        |              |        |        |      |                                  |
| Snow Mold, Pink |                            |                           |           |                     | yellow to bleached or pink patches | no sclerotia present                     |              |        |        |      |                                  |
| Stripe Smut     |                            |                           |           |                     |                                    | black stripes on leaf blades             |              |        |        |      |                                  |
| Fairy Rings     |                            |                           |           |                     |                                    | May produce mushrooms during wet periods |              |        |        |      |                                  |

**Table 2. FUNGICIDES FOR HOME LAWN DISEASE CONTROL\***

| <b>Disease</b>                             | <b>Fungicide</b>                            | <b>Tablespoons of fungicide per 1000 sq. ft. (use 5-10 gal water for good coverage).</b> |
|--|---|--|
| Helminthosporium Leaf Spot and Melting Out | Daconil 2787                                | 6-25   |
|  | Ortho Liquid Lawn Disease Control           | 8-32   |
|  | Pro Turf Fungicide III                      | **   |
|  | Pro Turf 101V Broad Spectrum Fungicide      | **   |
|  | Pro Turf Fungicide VI                       | **   |
|  | Fore 80W                                    | 25   |
|  | Maneb or Tersan LSR, 80W                    | 9-25   |
|  | Scott's Lawn Disease Preventer              | **   |
| Fusarium Blight                            | Benomyl or Tersan, 1991, 50W                | 31-50  |
| Dollar Spot or Brown Patch                 | Daconil 2787                                | 6-25   |
|  | Ortho Liquid Lawn Disease Control           | 8-32   |
|  | Pro Turf Fungicide III                      | **   |
|  | Fore 80W                                    | 38-50  |
|  | Benomyl or Tersan 1991, 50W                 | 6-12   |
|  | Scott's Lawn Disease Preventer              | **   |
|  | Pro Turf Fungicide VI                       | **   |
|  | Pro Turf 101V Broad Spectrum Fungicide      | **   |
| Gray Snow Mold                             | Thiram or Tersan 75                         | 34   |
|  | Scotts Lawn Disease Preventer               | **   |
| Pink Snow Mold                             | Fore 80W                                    | 38-50  |
|  | Benomyl or Tersan 1991, 50W                 | 12   |
|  | Scott's Lawn Disease Preventer              | **   |
|  | Thiram or Tersan 75                         | 34   |
| Red Thread                                 | Daconil 2787                                | 6-25   |
|  | Ortho Liquid Lawn Disease Control           | 8-32   |
|  | Fore 80W                                    | 25-38  |
| Rust                                       | Pro Turf Fungicide III                      | **   |
|  | Tersan LSR                                  | 12-16  |
|  | Scott's Lawn Disease Preventer              | **   |
|  | Fore 80W                                    | 25   |
| Stripe Smut                                | Benomyl or Tersan 1991, 50W                 | 38   |
|  | Scott's Lawn Disease Preventer              | **   |
| Slime Molds                                | Fore 80W                                    | 25-38  |
| Fairy Ring                                 | No effective or practical chemical controls |  |
| Algae                                      | Fore 80W                                    | 38   |

\*The fungicides in this table are listed for educational purposes. There is no intention of discrimination or endorsement over other products that may also be effective. The above products are available to North Dakota homeowners, and are listed for their convenience. The recommendations here may not be complete, so be sure to read and follow all label directions for use of the product.

\*\*See label for dose. 16 Tablespoons = 1 cup.

blight than Tersan 1991 alone. Strains of the Fusarium fungus which are resistant to benomyl have also developed.

Varieties differ in their susceptibility to Fusarium blight. Common Kentucky bluegrass and the varieties Fyking, Nugget, Park, and Pennstar are very susceptible and should be avoided for lawns that are to be highly fertilized. Elite varieties resistant to Fusarium blight include Adelphi, Columbia, Parade and Sydsport, all of which are also resistant to

melting out. In addition, Banff is resistant, but no information is available on its resistance or susceptibility to melting out. Rugby is Fusarium resistant and also is moderately resistant to melting out.

#### **DOLLAR SPOT**

Dollar spot, caused by the fungus *Sclerotinia homeocarpa*, produces 2-3 inch circular patches on creeping bentgrass turf and 4-6 inch circular to blotchy areas on bluegrass lawns. These patches are

straw colored. Early in the morning, when the grass is covered with dew, a faint cobwebby growth may be seen on the leaves of affected plants. In the early stages of disease, leaves develop distinct tan-colored spots and bands; sometimes a reddish-brown border can be seen on the leaf spots.

Dollar spot develops best when the temperature is 70-80°F, the humidity is high, and the soil moisture is low. The disease develops on lawns which are underfertilized but occasionally occurs on high maintenance lawns. It can be controlled by keeping lawns adequately fertilized and watered and using a fungicide if necessary (Table 2).

Bluegrass varieties differ in dollar spot susceptibility. Nugget is very susceptible. Moderately susceptible varieties include: Baron, Cheri, Glade, Merion, Ram I, Sydsport, Touchdown and Victa. A few varieties are moderately resistant: Adelphi, Bristol, Kenblue, Majestic and Plush.

### **BROWN PATCH**

Brown patch is a hot weather disease. The brown patch fungus, *Rhizoctonia solani*, produces roughly circular patches on lawns. These patches are 1-3 feet in diameter. At first the grass has a dark, water-soaked appearance but soon dries out and turns light brown. 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 symptom, called a "smoke ring," is diagnostic but disappears later in the day.

The brown patch 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 brown patch development.

The danger of brown patch is reduced by following recommended management practices, particularly by avoiding excessive use of nitrogen or excessive thatch buildup. When weather favors disease, a fungicide may be needed (Table 2).

### **POWDERY MILDEW**

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, white, cobwebby growth that produces a white powdery substance on the leaves. 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 around 65°F.

In many cases, powdery mildew can be controlled by some selective pruning of shrubs to allow better air circulation and greater penetration of sunlight.

Commercial turf managers may wish to consider the use of triadimefon fungicide for powdery mildew control.

Some elite varieties show good shade and powdery mildew tolerance, including A-34, Birka, Glade, Nugget and Touchdown. Where powdery mildew is a problem avoid such very susceptible varieties as Merion and Windsor.

### **GRAY SNOW MOLD**

The snow molds usually appear in the spring as soon as the snow has melted from lawns. There are two types of snow-mold — gray snow mold and pink snow mold. They usually can be distinguished by their symptoms, develop under slightly different conditions and are controlled by different fungicides.

Gray snow mold is caused by the low-temperature fungi *Typhula incarnata*, *T. idahoensis*, and *T. ishi-kariensis*, which are especially active under snow which covers unfrozen ground.

Gray snow mold first appears when the snow is melting. Roughly circular patches 1-2 inches in diameter develop. These patches are light yellow, and grow in size as long as the grass remains cold and wet from melting snow. The patches turn grayish in color, have 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 and range from the size of a pinhead up to 3/16 of an inch. The *sclerotia* are light brown at first, becoming darker with age. The presence of these *sclerotia* is diagnostic for gray snow mold.

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

Management practices for control of gray snow mold are similar to those for pink snow mold and are discussed under pink snow mold. Note, however, that fungicides differ in their activity against pink and gray snow mold.

### **PINK SNOW MOLD**

The pink snow mold fungus, *Fusarium nivale*, produces yellowish patches from several inches to a

foot in diameter. These patches usually appear as soon as the snow melts 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 is covered by a mat of cottony mold which at first is off-white but later turns a faint pink to dirty pink. This pink color and the absence of sclerotia distinguish pink snow mold from gray snow mold. Usually only the leaves of affected plants are killed but entire plants may be killed in years of severe pink snow mold.

Pink snow mold 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 snow molds (both gray and pink) are diseases that do not occur every year on North Dakota lawns. They 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.

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 mold occurs should not be fertilized within three months of the first permanent snow, which in some years may come in early November — in other words do not fertilize after the end of July. Snow mold does not occur frequently enough to merit a fall application of fungicide to lawns as a preventive measure unless a certain portion of a lawn has a history of snow mold. When snow mold is observed in the spring it is usually too late to apply fungicide. Gray snow mold normally continues development for only a few days after the snow is gone. Pink snow mold can develop longer; if it is present after snow melt and a cold rain or late snow is expected, application of a fungicide might reduce additional damage.

## RUST

Rust, caused by *Puccinia* spp., is not seen every year in North Dakota, but sometimes becomes severe on susceptible varieties during hot humid periods of the summer. 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 elongate yellow-orange to red-orange spots or pustules that break through the epidermis. These pustules are covered with a rusty colored powder, the spores of the rust fungus. When rust is severe the grass blades turn yellow and may 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 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.

Rust is not easily controlled, but maintaining good lawn growth with adequate fertilization and adequate watering will reduce rust damage. It may also reduce the tendency for rust development, but there is some controversy on this point among turfgrass pathologists. Once normal growth is obtained, mow the grass frequently at recommended mowing heights and remove the clippings, which are 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 the weather favors continued rust development. Fungicides that homeowners can use for rust control are listed in Table 2. Commercial turf managers may wish to consider triadimefon, which has provided the best available rust control but is not available for general use by homeowners.

The Kentucky bluegrass variety Newport is immune to the current races of rust, and Park is highly resistant. Park should be avoided, however, because it is very susceptible to leaf spot/melting out and to Fusarium blight. Several elite varieties are resistant to stem rust, which is the most damaging of several rusts that attack bluegrass. These stem rust resistant varieties include Adelphi, Bristol, Columbia, Eclipse, Majestic, Rugby and Plush.

## STRIPE SMUT

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. These streaks 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. This lengthwise rupturing of the leaves causes the leaves to split lengthwise into thin 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. Merion and Windsor bluegrass varieties are very susceptible.

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, benomyl fungicide may be used in late fall or early spring. Commercial turf managers may also wish to consider thiophanate methyl or triadimefon fungicides.

The bluegrass varieties Park and K-1 are resistant to stripe smut. In addition, many elite bluegrass varieties are resistant, including Adelphi, A-34, America, Bristol, Bonniblu, Baron, Birka, Columbia, Cheri, Eclipse, Glade, Majestic, Nugget, Parade, Plush, Ram I, Shasta, Sydsport, Touchdown and Vic-ta.

### RED THREAD

Red thread, caused by the fungus *Corticium fuci-forme*, is favored by cool, humid weather. Red thread is an uncommon disease in North Dakota since it is mainly a problem on fescue and ryegrass. Red thread causes the lawn to have a bleached patchy appearance. Irregular areas from several inches to several feet across develop with a whitish to pinkish color to the turf. Leaves and sheaths are attacked; at first they develop water-soaked or greasy green areas, then later 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 leaves and from leaf to leaf.

Red thread is favored by cool humid weather. 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 nitrogen is low, fertilizing the lawn may help it to recover more rapidly. Deep watering and avoidance of frequent light waterings may help to reduce damage. Collect grass clippings when the disease is active.

### BROAD SPECTRUM DISEASE RESISTANCE

A few elite varieties of Kentucky bluegrass have been reported to have resistance to a broad spectrum of the most common turf diseases. Adelphi and Columbia are resistant to leaf spot/melting out, stripe smut, Fusarium blight, stem rust, and are moderately resistant to dollar spot. Sydsport is resistant to leaf spot/melting out, stripe smut, and Fusarium blight. Several other varieties (Bristol, Eclipse, Majestic and Plush) are resistant to dollar spot, but they have not been reported resistant to Fusarium blight. Fusarium blight has become an important lawn disease in North Dakota, and resistance to this disease would be highly desirable.

### FAIRY RINGS

Sometimes mushrooms will grow forming 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 (Fig. 1).

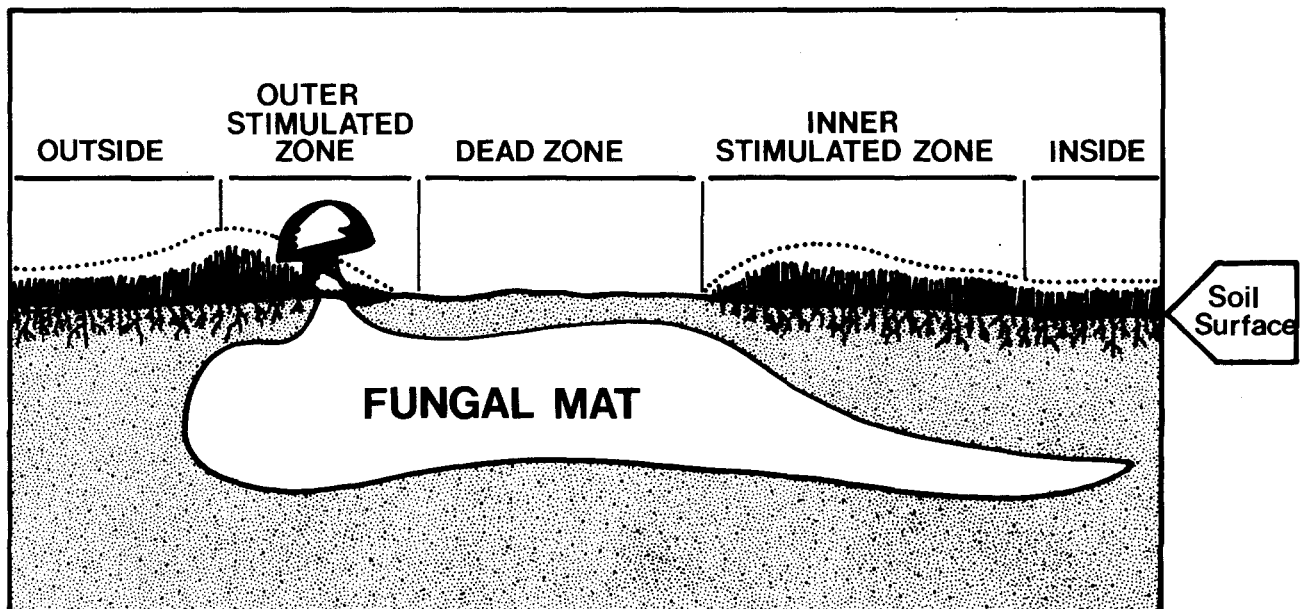


Figure 1. Cross section of a fairy ring.



Fairy rings are unsightly but very difficult to control, and the more effective control measures cost enough that the average homeowner may prefer to live with the problem. The most effective and expensive control is to fumigate with methyl bromide. This is an extremely toxic gas, and the fumigation should be done only by a trained nurseryman who is certified for handling restricted use pesticides and has both the know-how and equipment for a safe and successful job. The affected zone and 2 feet beyond should be fumigated. This will kill the grass, and the fumigated area will have to be replanted or resodded.

The only other way to get rid of the fairy ring is to dig it out. 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 uninfested or sterile soil and reseed or resod. Seeding is preferable as there is less danger of reintroducing the fairy ring fungi.

For those who decide to live with the problem, there are several things that can be done which will reduce damage to the grass in fairy rings. The grass should be fertilized with nitrogen several times a year, as fairy ring mushrooms rob the grass of nitrogen, causing the grass to turn yellow. 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 (see Fig 1). Using a "root feeder" attachment on a garden hose, punch holes at least every foot in the yellowing or dying area and pump lots of water into the ground to a depth of 10-24 inches. Repeat frequently. Application of a wetting agent to the area may also increase soil permeability and help to lessen symptoms. Increasing the soil moisture may also change the ecological balance enough to reduce the growth of the fairy rings.

## **MUSHROOMS**

In addition to fairy rings, various other mushrooms may appear in lawns. These mushrooms do not grow in rings and do not injure the grass. However, they may be unsightly. Some people may also worry that

children or pets may eat them. There is no easy control for these 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 building scraps and old stumps will greatly reduce their food source and reduce the number of mushrooms in future years. If desired, mushrooms that do appear can be raked up and destroyed.

## **SLIME MOLDS**

Slime molds occasionally form on grass during periods of prolonged rainfall and high humidity. A creamy to white slimy substance accumulates on the grass. 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 grow only on the surface of the leaf and do not attack it. However, they can cause some injury if they remain on the grass for a long period of time. In this case, the exclusion of light will cause a yellowing and weakening of the grass, and then it is more easily attacked by other organisms. The simplest control of slime molds is to brush them off the grass with a broom or rake. During very wet weather, a fungicide may be needed (Table 2).

## **MOSS AND ALGAE**

Mosses and algae are primitive green plants. They are often found in densely shaded and moist areas of the lawn and sometimes on landscape materials and buildings. The best way to control moss and algal problems involves improving soil drainage, increasing air circulation and light intensity and planting ground covers or turfgrass varieties which are shade tolerant. Chemical controls for algae are available but are only a temporary solution and may cause injury to adjacent vegetation under certain conditions. See Table 2.

## **DOG DAMAGE**

Grass may be injured by dog urine. The spots resemble dollar spot or brown patch. The difference is that outside the area of dead grass is a zone of grass with luxuriant growth. Heavy watering will wash down excess salts and help the grass recover.