

1980

## EC80-1235 A Common Sense Approach to Turfgrass Disease Prevention and Control

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EC 80-1235



*Institute of Agriculture  
and Natural Resources*

# Integrated Pest Management

## A Common Sense Approach To **TURFGRASS DISEASE PREVENTION AND CONTROL**

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## INTRODUCTION

Turf diseases result from the combination of a susceptible host, virulent pathogen, and environmental conditions favorable for disease development. Cultural practices also influence disease severity. Some diseases become much more serious when turf is poorly maintained.

The interaction of environment and cultural practices to disease occurrence and development is not completely understood. Management practices that favor vigorous, but not lush, growth of the grass and are detrimental to growth of pathogens result in much less disease injury to the turf. The IPM Guide is designed to help the turf manager identify common diseases, to better understand environmental and cultural aspects of disease development and to promote an IPM approach to disease prevention and control. **Careful management is an effective disease deterrent.**

## PEST MANAGEMENT PRACTICES

### Mowing

Mowing height and frequency are important for maintaining a quality turf and must be adjusted to the time of year and growth rate of the grass. For example, mow Kentucky bluegrass and fine fescues at 1.5 to 2.0 inches (3.8-5.1 cm) in spring and fall and at 2.5 to 3.0 inches (6.4-7.6 cm) in the summer. Higher cutting height in summer maintains more vegetation which helps insulate the crown of the grass plant from high temperature stress. Change the mowing height gradually during the transition between seasons. As a general rule, remove no more than 30 to 40% of the leaf area with any mowing. Avoid scalping or mowing lower than the recommended height of cut.

## **Fertilization**

Fertilize to meet the nutritional needs of the turf, but avoid overstimulation. Slow-release nitrogen carriers or fertilizers containing a combination of fast-and slow-release carriers are preferred since they do not promote lush, succulent growth. Timing of fertilizer applications will also influence disease development. If two applications are made, they should be done in October and again in May. Avoid early spring (March and April) applications with fast-release nitrogen carriers.

## **Irrigation**

The amount of water needed varies with turfgrass species or cultivar, season of the year, location, climate, intensity of culture and use. Water deeply but infrequently to encourage the plant to develop a deep root system. Light, frequent watering encourages a shallow root system and weakened turf that is more prone to infection.

Early morning is the best time for wat-

ering. Avoid watering during the evening. Leaf spot, dollar spot, rust, stripe smut, and Fusarium blight are diseases that develop rapidly if grass blades are continuously wet for six or more hours.

## **Soil Cultivation**

Heavy soils compact readily when exposed to traffic. Soil compaction impedes turfgrass growth and development by limiting air, water, and nutrient penetration. Soil cultivation (coring or aerification) practiced when turf is actively growing, helps alleviate compaction and improves turfgrass root penetration. This allows the turf to better withstand high temperature and drought stress.

## **Thatch**

Practices that promote vigorous turf also contribute to thatch accumulation. Dethatching is necessary when thatch accumulation exceeds one-half inch (1.3 cm). Soil aeration or core removal will not eliminate thatch accumulation but will help slow its development. Turf with ac-

cumulated thatch should be power raked when turf is actively growing. Light power raking is preferred when thatch is excessive.

### Genetic Resistance

Adapted turfgrass cultivars are better able to tolerate stress and less likely to be damaged by disease than nonadapted grasses. Some turfgrass selections and cultivars exhibit tolerance to different diseases, however, this can be affected by environment and cultural practices imposed on the turf. For these reasons it is difficult to group turfgrass cultivars into highly resistant, moderately resistant, or susceptible categories.

Base turfgrass selection on cultivar (variety) trials conducted over a number of years under conditions similar to which it is to be grown. University recommendations are largely based on such regional trials.

In general, a blend of improved adapted grasses should be used rather than a single cultivar. This helps insure

good performance over a wide range of conditions. **A blend of at least three improved Kentucky bluegrass cultivars is suggested for best performance when a Kentucky bluegrass lawn is desired.**

### Fungicides

Fungicides can be divided into two groups: protectants and eradicants. Protectants are applied before the disease develops. To be most effective, protectant fungicides must be persistent or be maintained by repeated applications. Eradicant fungicides kill existing pathogens on contact, prevent further growth of the pathogen and restrict its development.

Fungicides are most effective when applied as preventatives before serious disease development occurs. Turf managers must be familiar with the disease to insure proper timing of fungicide applications.



## LEAF SPOT (Melting-Out)

**Cause:** *Helminthosporium* spp.

**Hosts:** Kentucky bluegrass, coarse and fine fescue, bentgrass, perennial ryegrass, Bermudagrass, zoysiagrass.

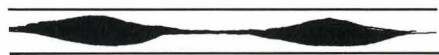
**Area Affected:** All areas where host grasses are grown.

**Occurrence:**

Crown  
and Root Rot



Leaf Spot  
Melting-Out



April

June

Sept.

Nov.



Leaf Spot



Melting-Out or Root Rot



## Symptoms

During cool wet months of spring and fall, infected leaves show small reddish-brown, purple, purplish-brown or straw-colored spots surrounded by a dark border. Lesions increase, becoming round to oval with the center gradually fading to light brown or straw color. Lesions may become so numerous on blades of susceptible cultivars that the turf appears brown. Severe leaf spot leads to melting-out which is characterized by leaf sheath infection causing blades to turn yellow and slough. Sheath lesions are dark brown and lack the tan center and regular outline of spots that occur on blades. Melting-out areas will first appear yellow, resembling nitrogen deficiency or iron chlorosis, and then may turn brown or die under stress. Leaf spot and melting-out is less evident in summer. The fungus causes a reddish-brown rotting of the crowns, roots and rhizomes during this period.

## Factors Favoring Leaf Spot

Leaf spot fungi are most active during cool, moist weather. The fungi survive in thatch. Turf exhibiting lush, succulent growth is particularly prone to leaf spot injury. Evening watering provides sustained moisture on the leaf surface which is sufficient for spore germination and infection. Continual mowing at low heights may stress the turf and enhance infection of turfgrass crowns and roots. Heavy activity on wet turf spreads the pathogen.

## Pest Management

1. Use leaf spot resistant cultivars.
2. Raise the mowing height to 2.5 to 3.0 inches (6.4-7.6 cm) in summer.
3. Aerate and power rake in spring, fall, or both to improve soil, enhance roots and remove thatch.
4. Avoid heavy early spring fertilization with soluble fertilizers.
5. Water infrequently but deeply.
6. Apply a registered fungicide when leaf spot is active in spring and fall.
7. Keep mower blades sharp.

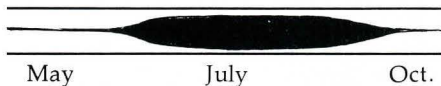
# FUSARIUM BLIGHT

**Cause:** *Fusarium roseum* and *F. tricinctum*

**Hosts:** Annual and Kentucky bluegrass, fine fescue, bentgrass, perennial ryegrass.

**Areas Affected:** Home lawns, golf course fairways and tees, park and athletic turfs.

**Occurrence:**



"Frog-eye" Pattern





## Symptoms

*Fusarium* blight occurs as a foliage blight and as a crown and root rot. Affected bluegrass stands show scattered patches of blue-green, wilted turf which rapidly changes to a dull, reddish-brown. Blighted areas are sunken and roughly circular, crescent or serpentine-shaped. Severely blighted turf areas appear pock-marked. Many patches contain centrally located tufts of healthy turf producing the "frog-eye" symptom. Large areas of turf may be destroyed. Lesions on individual blades are straw-colored and appear in alternating green and white bands.

## Factors Favoring *Fusarium* Blight

*Fusarium* may infect any bluegrass lawn but primarily occurs on 3- to 4-year-old or older turfs. Heat and water stress accentuate disease symptoms. Susceptible cultivars, excessive thatch, continuous low mowing, soil compaction and improper fertilization contribute to severity.

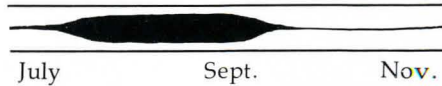
## Pest Management

1. Avoid heavy summer fertilization.
2. Use slow-release fertilizers.
3. Water deeply and infrequently. Prevent drought stress.
4. Daily syringing in July and August at midday. Syringing cools the turf.
5. Power rake to remove thatch.
6. Aerate in spring, fall, or both to improve rooting and penetration.
7. Use blends of heat and drought tolerant, improved cultivars.
8. Increase mowing height of bluegrass in summer to 2.5 to 3.0 inches (6.4-7.6 cm) where feasible. Even slight increases of mowing heights on golf fairways can be beneficial in minimizing stress.
9. If fungicide is necessary, drench the fungicide into the soil with ½ inch (1.3 cm) of water immediately after treatment.

# RUST

- Cause:** *Puccinia* spp.  
**Hosts:** Annual and Kentucky bluegrass, perennial ryegrass, Bermudagrass, zoysiagrass, fine fescue.  
**Areas Affected:** Seedlings and nutritionally stressed turfs.

**Occurrence:**



Orange Rust Pustules



## **Symptoms**

Rust infected turf becomes reddish-brown or yellow in appearance. Rust begins as yellow orange flecks on individual grass blades and stems that develop into orange or brick red pustules. Spores within the powdery pustules easily rub off when touched. A continuous, heavy rusting causes leaf blades to yellow, wither and die. Susceptible turfs may be substantially thinned. Clouds of orange dust (rust spores) can quickly discolor shoes, mowers, or clothing. Infected turf may be weakened and become more subject to winter-kill and other pest attacks.

## **Factors Favoring Rust**

Rust usually occurs in late summer following hot, dry periods when grass

growth has slowed. Severe rusting indicates inadequate fertilization. Infrequent mowing intervals results in a buildup of rust pustules on leaves and stems.

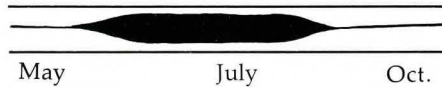
## **Pest Management**

1. Use rust resistant cultivars. Avoid Merion Kentucky bluegrass which is very susceptible.
2. Maintain proper mowing frequency and remove clippings from infected turfs.
3. Use a balanced fertilizer program.
4. Water early in the day so turf will dry quickly. Avoid evening watering.
5. When needed, spray the turf at 7 to 14 day intervals with a suggested fungicide.

# DOLLAR SPOT

- Cause:** *Sclerotinia homeocarpa*  
**Hosts:** Annual and Kentucky bluegrass, bentgrass, perennial ryegrass, fine fescue, zoysiagrass, Bermudagrass.  
**Areas Affected:** Home lawns, parks, golf course turfs.

**Occurrence:**



(Courtesy Bobby G. Joyner  
Chemlawn Corp.)



## **Symptoms**

On closely cut turf, the disease appears as small circular patches of bleached grass ranging in size from that of a dime up to a silver dollar. These patches may merge and become larger as disease activity increases. On lawn turfs, individual spots are larger and less distinct than on bentgrass. Affected lawns show irregular, straw-colored patches of dead grass resembling melting-out or drought damage. Infected leaf blades have bleach to tan lesions that span the width of the blade and are bordered by reddish-brown margins. A white cobweb-like mycelium may be observed on the foliage when dew is present.

## **Factors Favoring Dollar Spot**

The presence of dollar spot may signal a nutritionally deficient turf. Warm days and cool nights that result in heavy dews

favor the disease. Clippings may serve as a means of infection when the disease is active. Traffic may spread the pathogen especially when the turf is wet. The dollar spot causing fungus overwinters in thatch.

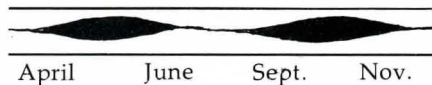
## **Pest Management**

1. Use resistant cultivars.
2. Fertilize to meet the nutritional needs of the turf.
3. Water infrequently but deeply and at a time when the grass blades will dry rapidly.
4. Syringe the turf in the morning to minimize duration and extent of dew formed.
5. Remove and dispose of clippings of infected turfs.
6. Power rake to reduce thatch buildup.
7. Apply registered fungicides at first appearance of disease where dollar spot has been a problem.

## STRIPE SMUT (LEAF SMUT)

**Cause:** *Ustilago striiformis*  
**Hosts:** Kentucky bluegrass, bentgrass, perennial ryegrass.  
**Areas Affected:** All areas where the host grasses are grown.

**Occurrence:**



**Black Smut Sori**





## **Symptoms**

Infection occurs on single plants or patches varying in size from a few inches to a foot or more in diameter.

Infected plants appear chlorotic and stunted. Symptoms may be mistaken for early leaf spot activity. Individual blades develop dull, gray stripes (pencil lead color and size) running parallel to the veins and plants appear erect with stiff leaves. The gray stripes eventually turn black rupturing the foliage to release numerous sooty spores. Release of the spores causes the leaves to twist and shred from the tip down resulting in death of the plants.

## **Factors Favoring Smut**

Stripe smut is most active during cool, wet periods in the spring and fall. Activ-

ity ceases in hot dry weather, and the cycle is repeated with the onset of fall. Use of susceptible cultivars, evening watering and excessive nitrogen favor disease development. Once the plant is infected, it remains infected until it dies.

## **Pest Management**

1. Use stripe smut resistant cultivars. Avoid highly susceptible cultivars such as Merion and Windsor Kentucky bluegrass.
2. Water early in the day so turf will dry quickly. Avoid light, frequent irrigation or evening watering.
3. Meet the nutritional needs of the turf without overfertilizing.
4. Certain systemic fungicides can be used to control smut. Begin treatment in the fall where stripe smut has been a problem.

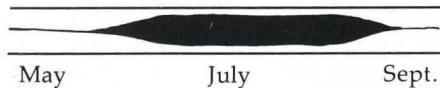
# PYTHIUM BLIGHT (COTTONY BLIGHT, GREASE SPOT)

**Cause:** *Pythium* spp.

**Hosts:** Bentgrass, perennial ryegrass, annual and Kentucky bluegrass, course and fine fescue.

**Areas Affected:** Golf greens, tees and fairways.

**Occurrence:**



**Pythium Blight**



## **Symptoms**

Pythium blight appears in a turf area as small (6 in., 15.2 cm) brown, sunken spots often following drainage or mowing patterns. Infected grass feels greasy to the touch and has a fishy odor. The spots rapidly increase in size and infected areas become matted. Leaves first appear water-soaked then straw-colored. A greasy, water-soaked border of blackened leaves and cottony fungus mycelium is usually present at the margin of the spot while dew is present. Due to rapid development of this disease, large areas of turf can be killed in a few hours.

## **Factors Favoring Pythium Blight**

The Pythium fungus survives in thatch and in the soil. It becomes active when day temperatures are above 85°F (29.4°C), night temperatures are above 68°F (20°C) and relative humidity is close to 100%.

The disease may occur to a limited extent under cooler conditions. Turfs that are heavily trafficked and poorly drained are especially prone to injury.

## **Pest Management**

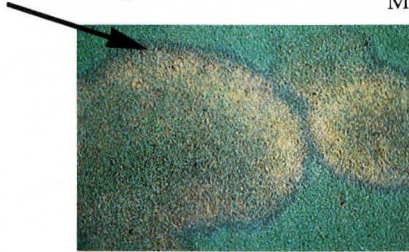
1. Avoid overwatering, light frequent irrigation and evening watering. Water deeply and infrequently.
2. Insure good surface and subsurface drainage.
3. Aerify or core to eliminate compaction, improve water penetration and enhance root development.
4. Fertilize to meet nutritional needs of the turf but avoid overstimulation.
5. Apply a registered fungicide when hot, humid weather is forecast and Pythium blight has been a problem.
6. Wash mowing equipment to minimize spread.
7. Have golfers thoroughly clean shoes before each round.

# BROWN PATCH

- Cause:** *Rhizoctonia solani*  
**Hosts:** Bentgrass, annual and Kentucky bluegrass, perennial ryegrass, coarse and fine fescue.  
**Areas Affected:** Golf course greens. Limited development on home lawns.

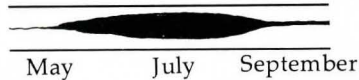
**Occurrence:**

Smoke ring



**Brown Patch**

(Courtesy Lloyd M. Callahan University of Tennessee)



## **Symptoms**

Brown patch appears in circular brown patches that may be several feet in diameter. Leaves first appear dark green and water-soaked, then wilt and turn light brown. Dead leaves remain upright. A dark, grayish-black ring (smoke ring) of wilted grass often is present at the perimeter of the diseased areas in early morning. This area disappears as the grass is stressed and dies. Symptoms on bluegrass may resemble the "frog eye" pattern caused by *Fusarium* blight.

## **Factors Favoring Brown Patch**

Brown patch occurs on dense, closely cut turfs in hot (above 85°F, 29.4°C), humid weather when night temperatures remain above 60°F (15.6°C) and leaf surfaces remain wet for 6 to 8 hours. High levels of nitrogen, low levels of phosphorous or potassium may contribute to increased disease severity. The use of a dull mower blade frays the edges of cut blades and serves as a point of entrance of the fungus into the leaf. Frequent low

mowing increases susceptibility of cultivars to brown patch.

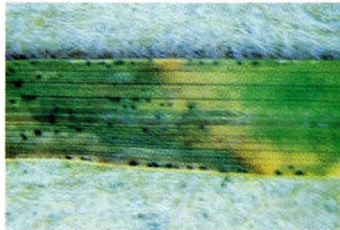
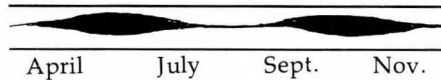
## **Pest Management**

1. Avoid heavy, early spring and summer fertilization.
2. Use slow-release fertilizers.
3. Promptly remove and dispose of clippings on infected areas or when conditions are conducive to disease development.
4. Relocate landscape plantings to allow for better air movement across golf course greens.
5. Water infrequently but deeply in the early morning.
6. Use a preventive fungicide program on bentgrass greens where brown patch is a persistent problem.
7. Apply a registered fungicide at first evidence of disease where brown patch has been a problem.
8. Avoid continuous low mowing coupled with high nitrogen fertilization of Kentucky bluegrass turfs.

# SEPTORIA LEAF SPOT AND TIP BLIGHT

- Cause:** *Septoria* spp.  
**Hosts:** Annual and Kentucky bluegrass, fine fescue, bentgrass, Bermuda-grass.  
**Areas Affected:** Home lawns, golf course fairways, parks, athletic turfs.

**Occurrence:**



**Black Fungus Pycnidia**  
(Courtesy Eric D. Kerr  
University of Nebraska)



(Courtesy Eric D. Kerr  
University of Nebraska)



## **Symptoms**

Infected lawns resemble injury from a dull mower without having frayed leaf tips. Leaf lesions are yellow to light tan with black dots (pycnidia) embedded within the lesion. Yellowing occurs from the leaf tip downward.

## **Factors Favoring Septoria Leaf Spot and Tip Blight**

Septoria is most noticeable during cool, wet weather and is of minor importance in summer. Heavy dews and

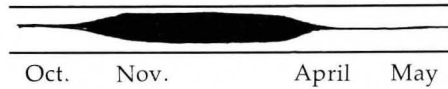
evening watering enhance spread and severity.

## **Pest Management**

1. Use resistant cultivars. Avoid susceptible cultivars like Merion and Delta Kentucky bluegrass.
2. Remove dew by syringing in early morning.
3. Water in early morning.
4. Avoid overfertilization and promotion of lush succulent growth.
5. Apply a fungicide during cool, wet weather where Septoria leafspot has been a problem.

# PINK SNOW MOLD (FUSARIUM PATCH)

- Cause:** *Fusarium nivale*  
**Hosts:** Annual and Kentucky bluegrass, bentgrass, perennial ryegrass, fine fescue.  
**Areas Affected:** Golf course greens. Limited development on home lawns.  
**Occurrence:**



Pink Snow Mold



## **Symptoms**

Irregular to circular bleached-tan to reddish-brown patches, approximately 2 inches (5.1 cm) to 2 feet (61 cm) in diameter are typical of pink snow mold. These may occur in fall, winter or spring whenever conditions are favorable. The margins of affected turf may appear light pink and are most noticeable at the advancing edge of melting snow. When wet, diseased areas may be covered with a dense, slimy mat of white fungal mycelium that later turns pink.

## **Factors Favoring Pink Snow Mold**

Disease development can occur anytime the temperature drops below 60°F (15.6°C). The greatest pink snow mold activity occurs when snow falls on unfrozen ground. Pink snow mold is most

serious on areas where air movement and soil drainage are poor and grass stays wet for long periods. Lush, tall growth in late fall, and plant injury due to activity on frosted turf enhance damage.

## **Pest Management**

1. Avoid overstimulation of the turf in late fall. Apply a slow-release fertilizer at the time of last mowing.
2. Use resistant cultivars.
3. Reduce snow buildup by proper placement of barriers, snow fences, or landscape plantings where snow mold has been a serious problem. (Precautions should be taken to prevent winter desiccation.)
4. Improve drainage.
5. Apply preventive fungicide treatment in late fall and during mid-winter thaws where snow mold has been a problem.

# GRAY SNOW MOLD (Typhula Blight)

- Cause:** *Typhula* spp.  
**Hosts:** Creeping bentgrass, annual and Kentucky bluegrass, perennial ryegrass, coarse and fine fescue.  
**Areas Affected:** Golf course turfs, home lawns.

## Occurrence:



Fungal Sclerotia



## **Symptoms**

Pale yellow to straw-colored patches of affected turf become visible in the spring. These areas are roughly circular and range from several inches to several feet in diameter. Several circles may merge to form large irregular areas. Diseased areas are often covered with a bluish-gray fungal mycelium when the turf is wet. As the turf dries the mycelium becomes a silvery crust-like mat. Close examination of infected turf reveals the presence of sand-grain sized, orange to brown fungal sclerotia. The presence of these sclerotia distinguish this disease from pink snow mold.

## **Factors Favoring Gray Snow Mold**

Disease development occurs when the ground is unfrozen, soil moisture is plentiful and the temperature is between 32 to 40° F (0-4.4° C). Initial development requires the absence of light which is brought about by snow cover in most instances.

Tall, lush growth; snow compaction, and injury to frosted turf due to traffic increase gray snow mold damage. Turf areas surrounded by landscape plantings are prone to gray snow mold. Gray snow mold development stops in the absence of a snow cover.

## **Pest Management**

1. Use tolerant cultivars.
2. Avoid excessive fertilization that stimulates lush growth in the fall.
3. Avoid snow accumulation by proper placement of barriers or snow fences. Where snow mold has been a serious problem precautions should be taken to prevent winter desiccation.
4. Apply a registered fungicide in late fall and during midwinter thaws where snow mold has been a problem.
5. Direct traffic patterns away from potentially diseased areas.
6. Mow frequently and maintain grass at the suggested height of cut as long as it remains green in the fall.

## **Symptoms**

The upper leaf surface of infected plants exhibits a white, powdery growth that gives the leaf an appearance of having been dusted with flour or lime. Infected leaves may yellow, wither and die. New plantings may be severely thinned.

## **Factors Favoring Mildew**

Mildew is most serious on new seedlings or in shady locations where light intensity and air movement are restricted. The disease overwinters in thatch and in infected plants. The spores are spread by air currents and become active when the air temperature approaches 65°F (18.3° C) and humidity is high. Unlike other pathogens, free water

is not required for infection.

## **Pest Management**

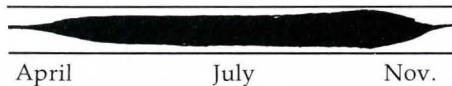
1. Use improved cultivars. Plant shade adapted mixtures or blends in shaded sites.
2. Selectively prune trees and shrubs to enhance light penetration and air circulation.
3. Avoid screening air movement over the turf.
4. Avoid lush growth but fertilize to meet the nutritional needs of the turf.
5. Apply a registered fungicide to turf areas with a history of mildew.
6. Avoid mowing turf too short.
7. Water infrequently but deeply.



# FAIRY RING

**Cause:** Soil-inhabiting mushroom-forming fungi.  
**Hosts:** All grasses.  
**Areas Affected:** All areas where turf is grown.

**Occurrence:**



Fairy Ring



(Courtesy Custer County  
Extension Office)

## **Symptoms**

Circles or arcs of a narrow band (3-8 in., 7.6-20 cm) of dark green, fast growing grass are typical symptoms of fairy ring. Rings may be several feet in diameter. A zone of thin, weak, or dead turf is often observed within the dark, green band itself. Mushrooms may form in the band when cool, wet weather occurs.

## **Factors Favoring Fairy Ring**

Fairy ring will occur whenever sufficient soil organic matter is present to support fungal growth. Rotting tree parts, lumber and excessive thatch are ideal sites for fairy ring development. Fairy ring will persist long after any visible evidence of organic matter is gone.

## **Pest Management**

Elimination of fairy ring is nearly im-

possible. However, certain practices can be employed to reduce turf damage.

1. Remove tree roots, boards and other organic debris before seeding or sodding.
2. Mow mushrooms before they open.
3. Fertilize to meet nutritional needs of the turf.
4. Remove soil cores or in some manner open the soil within the ring to allow better water and nutrient penetration. Use wetting agents to reduce surface tension and improve water percolation. Inject water into the ring with a tree root feeder.
5. Power rake to reduce thatch accumulations when they exceed one-half inch (1.3 cm).
6. Remove all soil from within one foot (30 cm) to either side of the ring and at least one foot deep, fumigate and replace with clean soil, if practical.

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