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FAIRY RINGS IN TURF



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FAIRY RINGS IN TURF

Fairy rings are some of the most troublesome problems in the management of Idaho lawns, parks and athletic fields. The unsightly, circle-shaped rings of various sizes mar the appearance of many otherwise attractive lawns. Frequently, the poor grass in the central part of the ring dies and is replaced by weeds. Symptoms are most prominent when the soil becomes dry and the grass is stressed from early to late summer season.

A dark green border often appears in the outer part of the rings where the fungi live. This lush grass dies in drought periods, leaving a light brown band of grass, 2 to 4 inches wide, that does not recover. Fairy rings are found in turf of many grass species throughout the world. The disease has been attributed to several causes (Fenwick 1976).

Causes of Fairy Rings

Fairy rings are associated with more than 50 species of fungi known as basidiomycetes (Smiley 1983). They produce fruiting bodies, or basidiocarps, commonly known as mushrooms, toadstools and puffballs.

In the Moscow, Idaho, area, we have observed three distinct species: *Marasmius oreades*, which produce small, tan to dark brown fruiting bodies; *Agraricus campestris*, which produce larger, white, puffball-type basidiocarps; and

Clitocybe tarda, which has a small, round, violet-purple fruiting body near the soil surface and is usually covered by the grass. Other fairy ring-causing fungi may be present in the state as well. *Marasmius oreades* fungi cause the most severe damage to the turf, possibly because of the aggressive growth of the fungus and the toxic levels of hydrogen cyanide gas it produces.

Symptoms of Fairy Rings

Fairy rings grow in an outward pattern from the central infection area. Spread is usually rapid after initial infection by fungi spores. Rings 2 to 4 feet in diameter may develop in 5 to 10 years, depending on environmental and soil conditions (Fig. 1). The fungi decompose the dead grass, giving off nitrogenous compounds (Fenwick

1976; Smiley 1983). This nitrogen promotes lush green growth in the living grass at the margins of the ring, leaving behind a ring of fruiting bodies and dead grass as the rings expand in diameter. The central core area of the circular bond may become filled with weeds.

Severe fairy ring symptoms are most prominent during warm or hot periods of insufficient moisture. The fruiting bodies appear in spring and fall, however. Compacted, fine, silty-clay soils, once dehydrated, will re-absorb water slowly and accentuate the symptoms (Fig. 1). The incidence and severity of the rings are also caused by an impervious fungal, thread-like mycelial layer 4 to 6 inches below the soil surface. This whitish, dense layer is produced from years of fungus growth. It will prevent water, oxygen and nutrient



Fig. 1. Classic group of fairy rings shown in outward circular patterns in an Idaho lawn.

Cover photo: Typical fairy ring symptoms in an Idaho lawn caused by *Marasmius oreades*.

movement through the soil profile and will inhibit proper root and tiller growth of the grass plants (Ensign 1979).

Control of Fairy Rings

Research workers in central Europe, England, Canada, New Zealand and the United States have attempted to control fairy rings by various means (Smiley 1983; Smith 1978 and 1980). Soil sterilization by flooding with a 2 percent solution of formaldehyde and other chemical sterilants has not been effective. Some research indicates that fruiting and fungal growth can be suppressed for 1 to 2 years with systemic fungicides, but lasting effects of these chemicals has not been ascertained (Smiley 1983; Smith 1978). Researchers in Canada indicate that microflora in some soils are highly antagonist to the fairy ring fungi. Scientists are attempting to isolate the proper antagonistic microflora and employ this antagonism in infested turf situations (Smith 1978 and 1980).

Aeration Treatment For Fairy Rings

Fungal growth and spread in actual Idaho turf situations have sometimes been stopped by an aeration treatment. The soil profile is pierced to a 12-inch depth every 8 to 10 inches around the periphery of the fairy ring. The soil and the impervious fungal mycelium layer can be easily perforated using a 3/4-inch steel pipe attached to a water hose (Fig. 2). The holes are then filled with clean, medium grade sand to provide an avenue for water, air and nutrients to penetrate the soil profile. After the aeration treatment is completed around the fairy ring, recommended quantities of fertilizers should be applied to the soil and the turf should be irrigated well and kept moist during drought stress periods (Ensign 1979).

These turf and soil treatments should be repeated each spring and fall for 4 or 5 years. The treatments have been most successful if started when mush-

rooms are evident, when the rings are small and before large areas of the turf are destroyed. The objective of treatments is to improve the soil environment, which in turn promotes conditions for vigorous, competitive grass growth. Treatment may not eradicate the fairy ring fungi or their spores but should improve the biological processes for healthy grass growth. This may possibly enhance favorable antagonistic microflora as advanced by Smith (1978 and 1980).

For severely infested lawn areas where the grass is dead and the fungi are growing profusely, the only treatment is to remove the top 10 to 12 inches of infected turf and soil and replace it with fresh loam soil. The new soil should be packed well and resodded or seeded to new grass to match existing turf.



Fig. 2. Equipment used to pierce the soil profile to improve the soil environment and control fairy rings.

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Summary for Fairy Ring Control

1. Apply early mechanical treatments when mushroom fungi are first observed.
2. Aerate the soil 10 to 12 inches deep biannually with 3/4-inch pipe under water pressure from hose bib. Then fill the holes with clean medium grade sand.
3. Use and apply recommended fertilizers. See Idaho Agricultural Experiment Station Bulletin 565.
4. Irrigate well especially in drought periods. Keep the infected area moist. Fairy rings are less frequently observed in moist soil.
5. Remove mushrooms before they sporulate. This will not control fairy ring fungi but may help reduce spread.
6. Use recommended practices in mowing, thatch removal, fertilization, weed control and irrigation to minimize fairy ring problems.

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