K·STATE Research and Extension Plant Pathology EP155

Fairy Rings in Turfgrass

Fairy rings are caused by many different fungi, including some that produce mushrooms and puffballs. These fungi grow through the thatch and soil, consuming organic matter. They do not infect the turf directly, but they can alter the soil environment, making it unfavorable to turfgrass. Sometimes, a layer of white, fungal mycelium is visible in the soil or thatch below the ring.

Symptoms

Fairy rings develop as circles or arcs. They can range from a few inches to many feet across. There are three major types of fairy rings, as shown in the photos below. Type 1 rings exhibit a ring of dead turf, and they sometimes develop a ring of mushrooms or puffballs. Type 2 rings exhibit lush, dark green growth, and they sometimes develop mushrooms or puffballs. Type 3 rings show a circle of mushrooms or puffballs with no visible effect on the turfgrass itself.

Why are they circles?

Fairy ring fungi start in the soil or thatch and grow outward, like a patch of mold growing as an expanding circle on a piece of rotten fruit or old bread. When two or more fairy rings meet, they do not grow together. This leads to a wavy pattern. Large fairy rings can expand several feet per year. The fungi accumulate nutrients as they grow through the soil; then, when it is time to reproduce, they produce the mushrooms or puffballs to disperse spores. Every mushroom or puffball you see in the ring is part of the same fairy ring organism. However, not all mushrooms are from fairy ring fungi. There are many mushrooms and puffballs that are not associated with fairy rings.

Conditions

Fairy rings tend to come and go depending on weather conditions. The mushrooms are most likely to appear after a rain. Type 2 rings sometimes develop into Type 1 rings when the weather is hot and dry. Fairy ring fungi can make the soil water-repellent (hydrophobic), especially in sandy soil. This leads to locally dry soil conditions that are highly stressful for the turf. In addition, fairy rings can lead to accumulations of potentially toxic levels of ammonium. The low soil moisture can lead to a buildup of other salts. In putting greens, fairy rings are more common in sand-based greens and especially in newly constructed greens, but they can occur anywhere.

Type 1. *Type 1 rings are the most serious, as they lead to dead turf. Sometimes they have mushrooms or puffballs.*

Type 2 (example 1). *All Type 2 rings have a ring of dark-green, stimulated growth. Some Type 2 rings have fungal structures (mushrooms or puffballs).*

Type 2 (example 2). *Some Type 2 rings do not have mushrooms, only a ring or arc of green, stimulated turf.*

Type 3. *Type 3 rings show no change in the growth of the turf. There is only a ring or arc of fungal structures.*

Management

Lawns and landscape

Fairy rings in taller-cut turf usually do not cause severe damage. If the mushrooms are a nuisance, they can be removed by mowing or raking. Some mushrooms are poisonous; if children or pets are around, removal by mowing is a good idea. If the green rings are a concern, a light application of nitrogen or iron helps mask the symptoms. Do not over fertilize. Always keep in mind the best fertility practices for the species of turf at the site. If the fairy ring becomes severe (Type 1), core aerification and watering helps move water to the hydrophobic areas around the roots. Affected areas can be physically removed by trenching out the affected areas, but this is time-consuming.

Golf courses

Cultural practices and fungicides can alleviate damage from fairy rings. Providing adequate water and fertilizer may prevent fairy rings, as fairy rings tend to be worse on "lean" turf. Remember that fairy ring pathogens are diverse, and that diversity can lead to variation in control. There are several fungicides labeled for fairy ring. See Table 1. There are additional factors to consider:

1) *Water application rates:* In recent fungicide studies, higher water application rates (for example, 4 gallons per 1,000 square feet) have performed better than lower water

Table 1. *Fungicides Labeled for Fairy Ring*

Active Ingredient	Fungicide Group[1]	Efficacy[2]	Typical Interval (days)	Example Trade Names
azoxystrobin	strobilurin/QoI	3	28	Heritage
fluoxastrobin	strobilurin/QoI	L	21-28	Disarm
flutolanil	carboximide	3	30	Prostar
hydrogen dioxide	oxidizing agent	L	7	Zerotol
metconazole	DMI	3	21	Tourney
polyoxin D	polyoxin	2.5	7	Affirm
pyraclostrobin	strobilurin/QoI	3	28	Insignia
tebuconazole	DMI	L	28	Torque[3]
triadimefon	DMI	3	14-21	Bayleton

[1]DMI=sterol demethylation inhibitor, QoI=quinone outside inhibitor.

[2] 4=consistently good to excellent control in published experiments; 3=good to excellent control in most experiments; 2=fair to good control in most experiments; 1=control is inconsistent between experiments but performs well in some instances; N=no efficacy; L=limited published data available.

[3]Fairy ring is not listed on main federal label but may be used with Section 2(ee) Recommendation.

rates (2 gallons per 1,000 square feet). Always follow label instructions.

2) *Surfactants*: In several studies, the use of a surfactant or wetting agent with some fungicides has significantly increased the performance of the fungicide. In some studies, a wetting agent alone reduced symptoms. Always follow label instructions. However, combining wetting agents with DMI fungicides has decreased efficacy and lead to phytotoxicity in some studies.
3) *Thatch:* Manage thatch levels and organic matter. Aerification before fungicide application may increase efficacy.
4) *Fertility:* Fairy rings are more severe when turf is nitrogen deficient. Apply adequate fertilizer.
5) *Watering:* Hand watering in damaged sites helps reduce turfgrass stress. A wetting agent may improve results.
6) *Fungicide timing:* Research in North Carolina indicated that springtime when soil temperatures reach 55 to 60 degrees Fahrenheit is the optimal time for preventative application.

References

Fungicide table modified and used with permission from *Chemical Control of Turfgrass Diseases 2015* by P. Vincelli and G. Munshaw, University of Kentucky.

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