

# Preliminary Investigation on the Epidemiology of Fairy Ring in Turfgrass

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## Objectives:

1. Develop a technique to facilitate the successful isolation of fairy ring-causing basidiomycete organisms from a turf/soil sample.
2. Develop a technique to induce the vegetative mycelium from fairy ring-causing basidiomycetes to produce a basidiocarp (i.e., fruiting body or mushroom) that could be used to accurately identify the organism.
3. Examine weather conditions associated with the appearance of fairy ring symptoms in turf.

**Start Date:** 2009

**Project Duration:** 2 years

**Total Funding:** \$6,000

Visual symptoms of fairy ring in intensively managed turfgrass stands are categorized as type I, type II, or type III, and all three types can occur alone or in various combinations at the same site. Type I is the most severe, characterized by necrotic or dead turf in circle or arc patterns and often accompanied by soil hydrophobicity and localized dry spot conditions. Type II symptoms are easily identified by the appearance of rings or arcs of stimulated, rapidly growing turf that is typically darker green in color than the surrounding turf. Type III symptoms are simply the appearance of the basidiocarps or “fruiting body” (i.e., mushrooms or puffballs). Fairy ring symptoms in turf are attributed to a basidiomycete fungal organism that interacts with the rootzone’s biological, chemical, and physical environment, thus indirectly causing turf damage or reduction in turf stand quality and function.

Fairy ring is often confirmed in turf if the fairy ring-causing basidiomycete organism is successfully isolated from the affected area and examined under a microscope. In the field, the basidiocarp is the most accurate way to identify the species. More than 60 species of fairy ring-causing basidiomycetes exist, and their range of susceptibility to fungicides labeled for fairy ring or cultural practices to suppress fairy ring symptoms has not been determined.

Most basidiomycete organisms collected from fairy ring-affected turf sites in the Mid-Atlantic region grew well on either potato dextrose agar or malt extract agar, especially when either growth media was amended with an antibiotic. A total of 20 different growth media recipes were tested for the purpose of facilitating rapid extraction and growth of these fairy ring-



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causing basidiomycete fungi from turf/soil samples. In addition to standard potato dextrose agar and malt extract agar, oatmeal agar and Leonian media were equally effective at growing *Marasmius* spp., *Coprinus* spp., and *Bovista* spp. during in vitro testing.

The basidiomycetes grown in pure culture were transferred into a potting soil mix containing wood chips since these fungi are classified as wood-decaying fungi and therefore prefer a diet of lignin, which is also a major component of thatch. The soil mix was subjected to a series of wet/dry cycles to induce fungal colonization of the soil mix and eventually produce a basidiocarp or mushroom. Future research will continue to examine methods to rapidly produce basidiocarps to make rapid and accurate identification of the fairy ring-causing species.

Fairway and green sites with a history of fairy ring activity at Blue Ridge Country Club (Harrisburg, PA) were visually monitored from May through September 2010 for the appearance of fairy ring symptoms. Local weather information was obtained from the Harrisburg International Airport located in close proximity to the golf course. Therefore, airport weather data was chosen to represent envi-

ronmental conditions within this central Pennsylvania region. Weather data obtained included air temperature, relative humidity, and natural rainfall.

A severe fairy ring outbreak of type I symptoms was observed during the last week of July and persisted into the first week of August, 2010. Although overall weather conditions were not strongly correlated with the severe fairy ring outbreak, an observed trend revealed the onset of type I fairy ring symptoms at this location corresponded to a period of low rainfall (i.e., dry cycle) from June 17 through July 9, higher than normal rain activity (i.e., wet cycle) from July 10 through July 19, then another dry cycle from July 20 through mid-August.

High humidity (i.e., prolonged periods of > 90% maximum relative humidity) and high air temperatures (i.e., several consistent days > 90° F maximum daily air temperature) during the dry cycle in early July and into the wet cycle in mid-July preceded the onset of severe type I fairy ring symptoms on several golf course fairways at this location. These wet/dry cycles may be the key to understanding fairy ring epidemics in turf.

## Summary Points

- Basidiomycete fungi attributed to fairy ring symptoms in turfgrasses are difficult to isolate from the soil and thatch of affected turf areas, although progress is being made in this area.

- Techniques are being tested to develop a reliable and rapid procedure to identify the species of the fairy ring-causing basidiomycete, and thus may lead to improved recommendations for control.

- Destructive, or type I, fairy ring symptoms are often seen during periods of heat/drought stress, often associated with hot/humid weather and may be exacerbated by repeated wet/dry weather patterns.