

Controlling LDS with a fungicide

A common fungicide does not always prevent water-repellent soil.

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- Localized dry spot has many causes, including water-repellent soil associated with several kinds of fungi. Some of these cause "fairy ring," a circle of mushrooms or lush turf.
- Fungicide is often used to prevent localized dry spot
- This study determined the effect of a common fungicide on water-repellent soil not associated with fairy ring.
- This study found that the tested fungicide alone has no effect on reducing the water repellency of an existing hydrophobic soil that is not associated with fairy ring.

Localized dry spot (LDS) is the occurrence of an irregular area of turf-grass that begins to show signs of drought stress for no apparent reason. The many causes of LDS include excessive thatch/mat, soil compaction, salinity, soil layering, improper chemical usage, certain fungi and insect pests or poor irrigation coverage. A primary cause of LDS on golf greens is the presence of water-repellent, or hydrophobic, soil. Water repellency is often associated with soils containing significant amounts of sand.

Most researchers agree that soil water repellency is a result of organic compounds derived from living and/or decomposing plants and microorganisms. The exact origin of these organic compounds is not completely understood. In some cases, the origin appears to be associated with particular types of vegetation and/or their decomposition.

Water repellency has been associated with fungal growth and soil microorganisms. For example, fairy ring is the name commonly given to circles of mushrooms or lush green circular bands observed in established turfgrass areas. A zone of water-repellent soil often develops in association with these characteristics. In many cases, fairy ring can result in the occurrence of LDS.

Although more than 50 species of

fungi cause fairy ring, all appear to be soil-inhabiting, basidiomycete-type or "mushroom" fungi. Fairy ring or basidiomycete-type fungi may cause LDS in several ways. The breakdown of organic matter, which provides the organic compounds necessary for soil water repellency, may be responsible for drought-like symptoms associated with fairy ring. The presence of thick fungal mycelia, which may prevent the movement of water into the soil, may also be responsible. Toxic materials produced by certain species of fairy ring fungi may also be responsible for LDS. Most likely, some combination of these three scenarios causes LDS.

The fungicide Prostar (flutolanil) (Aventis, [formerly AgrEvo], Montvale, N.J.) is labeled for the control of fairy ring. It can be used as a preventive or curative method of control of some fungal species that cause fairy ring. To ensure movement into the soil, it is recommended that flutolanil be applied with a soil wetting agent. Early treatment with flutolanil will prevent the formation of LDS caused by fairy ring, but some golf course superintendents commonly use the fungicide whenever LDS becomes apparent. Apparently, the belief is all LDS is caused by fairy ring and associated water-repellent soil.

With this in mind, a Study was con-

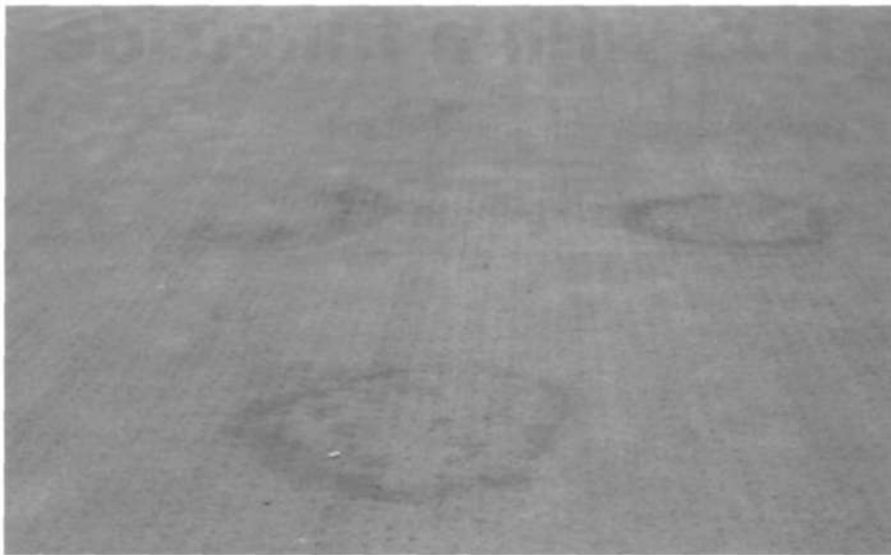


Photo by Mike Fidanza

Water-repellent soil is often associated with fairy ring (shown here on a creeping bentgrass green).

ducted to determine whether flutolanil would reduce the severity of an existing hydrophobic soil that was not associated with fairy ring.

Materials and methods

The study was initiated on June 9, 1998, on the University of Georgia's water-repellent experimental golf green in Athens. The green was constructed according to USGA recommendations except that the upper 4 inches of root-zone mix consisted of water-repellent sand. The sand was obtained from an abandoned research green on the University of Georgia campus. The green had exhibited severe LDS caused by water-repellent soil for many years. The water-repellent soil was harvested by removing the entire top 2 inches of sod and root-zone mix and passing it through a wire sieve. The water-repellent experimental green was sodded with Crenshaw creeping bentgrass on May 17, 1996.

The green was irrigated as needed to prevent wilt. Nitrogen was applied at 7 pounds per 1,000 square feet per year as ammonium nitrate (32-0-0), and other nutrients were maintained at satisfactory or above levels, according to soil testing. Pesticides were applied as needed for the control of insects and diseases.

On June 9, 1998, the following treatments were applied: uncored control, cored control, flutolanil (two applications), flutolanil + Primer wetting agent (two applications), Primer (two applications), Primer (three applications). Wetting agents are recommended when applying flutolanil to control fairy ring. (Primer is manufactured by Aquatrols, Cherry Hill, N.J.)

With the exception of the uncored control plots, the plot area was cored before treatment application on June 9, July 9 and Aug. 7, 1998. The area was cored with a Greensaire aerifier having 0.375-inch diameter tines on 2-inch centers. Coring depth averaged approximately 3 inches. The area was not top-dressed following coring. The Primer treatments were irrigated immediately after application with 0.5 inch of water. In all treatments with flutolanil, flutolanil was applied at 6 ounces in 30 gallons of water per 1,000 square feet. In the flutolanil + Primer treatments, flutolanil was applied 24 hours after the Primer applications.

Visual color and quality ratings of the turf were made before initial treatment application and throughout the course of the study. Soil water repellency was determined by the molarity

of ethanol droplet (MED) technique. A MED value of zero indicates soil with no water repellency, whereas a MED value of 4 would indicate extreme soil hydrophobicity.

The experimental design was a randomized complete block with four replications.

Results and discussion

Turfgrass color and quality

The turf showed no differences in color or quality before treatment application. Over the course of the study, there was a significant difference among treatments on only one observation date. On Aug. 24, the Prostar + Primer treatment had a slightly lower color rating than the two wetting-agent treatments.

The overall lack of turfgrass response in terms of color and quality among the treatments is understandable because the plot area was irrigated sufficiently to avoid the appearance of LDS and because there was no evidence of fairy ring in the plot area before or at the time of the study. Although flutolanil has been shown to be effective in reducing the symptoms of fairy ring when fairy ring is already present, the purpose of this study was to determine

the effect of flutolanil on water-repellent soil not associated with fairy ring. At no time during the study did any of the treatments cause phytotoxic effects.

Although the effect was not statistically significant, the turfgrass appeared to benefit from coring. Coring has been shown to relieve the effects of soil water repellency and facilitate the downward movement of wetting agents into the root zone.

Soil water repellency

Before the application of treatments on June 9, soil water repellency did not differ significantly among the plots (see the table). On every observation date following the initial treatment application, all treatments containing a wetting agent significantly reduced soil water repellency when compared to the controls. At no time during the course of the study did the flutolanil treatment decrease the severity of soil water repellency.

These data show that flutolanil alone has no effect on reducing the water repellency of an existing hydrophobic soil that is not associated with fairy ring. Furthermore, flutolanil will not necessarily prevent the formation of water-repellent soil because other, non-fairy ring basidiomycete fungi are known to provide the organic compounds associated with hydrophobic soil. However, if applied at the first signs of fairy ring, flutolanil may prevent the development of soil water repellency at that time.

Finally, remember that not all LDS is caused by water-repellent soil. Other potential causes were discussed earlier in this article. It is important that the superintendent identify the cause of LDS before beginning treatment.

Acknowledgments

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Effect of flutolanil. Primer on LDS

Treatment	Jun 9+ (initial)	Jun 24	Jul 9	Aug 7	Aug 24
Soil water repellency (MED)+					
Uncored control	2.5a§	2.2a	1.8a	1.8a	1.8a
Cored control	2.5a	2.2a	1.8a	1.8a	1.7a
Prostar + Primer (2 applications)	2.5a	1.5b	1.0b	0.7b	1.2b
Prostar (2 applications)	2.4a	2.2a	1.9a	1.8a	1.6ab
Primer (2 applications)	2.5a	1.4b	1.1b	0.9b	1.2b
Primer (3 applications)	2.5a	1.5b	0.9b	1.0b	0.7c

soil water repellency ratings (MED) taken before initial treatment application.

FSoil water repellency: 0 = non-water repellent, 4 = extremely water repellent.

§Means in the same column followed by the same letter are not significantly different from one another.

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