

## Contact vs. Systemic

Contact fungicides (a.k.a. "protectants") are an older type of fungicide. They intercept a fungus and prevent it from attacking or getting inside a grass plant. They **don't** penetrate plant tissues. Contact fungicides inhibit fungi by interfering with their growth and development in a number of ways (i.e., multiple site inhibitors). This creates a very low risk that fungal resistance will develop. For a fungus to develop resistance, it needs to change its DNA.

However, contact fungicides are toxic to many different fungi, including many non-target fungi that are beneficial to your turf. In addition, they must be applied frequently.

In contrast, *systemic* fungicides "move" once applied to the turf and redistribute inside the plant. Some fungicides are locally systemic, meaning they only move a few cells away from the point of entry.

Generally, systemic fungicides require 3 to 5 days to become fully effective. To work well, disease severity at the time of application must be low. So it is important to scout your turf and watch for the start of disease. — H.W.

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manager, you are the reason that turf diseases become severe problems. Every year you manage it, most of the Big 25 diseases will occur. However, only occasionally do any of them become severe enough for you to notice or take action.

### Is it a *real* problem?

Turf diseases are only considered serious if they are conspicuous and last for a considerable period of time. Most turf professionals estimate that a disease is only noticed if it develops in 3% to 5% of the total turf, so the goal of turfgrass disease management is to limit the severity of a disease to less than that. This is a tremendous goal, because it acknowledges that disease is necessary and should not be eliminated from the ecology of the turf. In fact, we know that turf with a low level of disease severity is more protected from severe disease outbreaks. The reason this is so is biological buffering.

When your soil has many different, active microorganisms, they tend to control one another. If you eliminate one of the players in this system, everybody else must adjust.

For example, if you selectively kill fungi that control Pythium, the Pythium fungi might grow unchecked and attack your turf. Nothing in



The delicate biological balance in a turf ecosystem can easily get out of kilter, allowing diseases like pythium to attack young, vulnerable turf.

turf is this simple, but it does illustrate biological buffering.

Biological control is a well-known term that is quite different from biological buffering. Biological control is the action by one living organism to suppress the activity of another. It is a natural process and, collectively, all the one-on-one episodes of biological control add up to biological buffering.

### Complex turf ecosystem

Adjusting the biological buffering of a turf is a slow process. Don't attempt to rapidly change the biology of a turf-grass ecosystem because it is strong and will resist changes because of the many organisms in it. You can change it, but if you go too fast, you imbalance the entire system, resulting in havoc. Here are two cases of how the balance gets upset:

**Case one:** Fumigation with methyl bromide kills microbes,

animals and plants.

All biological balance is eliminated when you treat a soil with this chemical. When you seed grass plants into such a soil, it will take months and maybe years to reestablish biological balance. In the process, diseases like Pythium blight, Rhizoctonia blight and take-all patch will rapidly attack the young turf.

**Case two:** You apply fungicide at a therapeutic rate to control dollar spot. Initially, the severity is reduced, but what you do not see are other changes in the microbial community taking place. It also inhibits non-target fungi, while other fungi race to fill the void created by those inhibited ones. In short, the turf ecosystem is out of balance. Note that fungicidal activity is greatly diminished for 2 to 4 weeks after application, but some effects last

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# Why ornamental fungicides fail

BY BAL RAO, PH.D

**G**enerally, fungicides fail because of the conditions to which they're exposed.

Unreasonable expectations can also cause someone to call a fungicide application a failure. By following label specifications and using the process of elimination, you can identify the cause(s) of disease management failures. This will help you develop better strategies. Some of the following factors may be responsible for poor disease management on ornamentals.

■ **Not following label specifications**

■ **Not knowing the disease** or plants well — improper identification or misunderstanding resistance, plant sensitivity, disease characteristics or pathogen life cycle.

■ **Product failure** due to improper selection, activity, concentration, surface penetration, solvent action, product age/breakdown, incompatibility of products, short residual, label limitations or heavy disease pressure.

■ **Misunderstanding treatment** methods by miscalculating active ingredient, improper mixing/cleaning, failure to add agents, failure of application/water in, improper equipment or calibration, poor plant uptake, weather.

■ **Poor timing** related to pathogen's life cycle, degree days, cool and moist periods favoring disease, activity after residual is gone.

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for much longer. At the University of Illinois, we have seen the effects of fungicides last more than 12 months, following application for the control of dollar spot on bentgrass.

## Fighting Mother Nature?

As turf managers, you are expected to produce a uniform and perfect turf, but all the forces of nature are going to fight you unless you harness them. So how do you approach turfgrass management using biological buffering and ecological balancing? Can fungicides be a part of such a program?

Good turfgrass management does not start with a fungicide budget. Table 1 on page 52 lists 28 factors to consider when managing turf (not just disease management). Note that fungicides are last, because I believe it should be the last factor considered for disease management. However, a good understanding of fungicides, how they work and how best to use them should improve your management results.

## Realistic management strategies

How should you effectively use fungicides? Here are a few tips from a turfgrass pathologist:

■ Realize that fungi are a necessary part of your turf ecology; you do not want to eliminate them, just manage them.

■ Know that disease management is just one component of turf management, and think seriously about integrated turf management.

■ Make every effort to use as many of the first 27 management factors listed in Table 1 before going on to number 28.

■ When choosing a fungicide, think of it as a short-term solution to re-establishing the balance in your turf.

■ Stop using a fungicide for treatment as soon as possible in the treatment cycle.

■ Choose fungicides that are appropriate for the disease problem that you have.

■ Use them according to the manufacturer's recommendations.

■ Consult a plant pathologist and review your disease management program.

■ Remember, effective turf management emphasizes the benefits and minimizes the problems diseases create. **LJM**

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## Know a fungicide from a fungistat

**T**he popular definition says *fungicides* are any chemical that can inhibit the growth or development of a fungus.

Technically, a "fungicide" is any chemical that *kills* a fungus. On the other hand, *fungistats* are chemicals that inhibit—but do not kill—the fungus.

In our industry, the term "fungicide" is used for any chemical that prevents the development of a fungal disease. But this is different than the true action of a fungicide.

There are many ways chemicals can inhibit or kill a fungus. And there are many different fungi, each of which can react differently to the fungicides.

The effectiveness of a fungicide is determined by much more than just its chemical nature. — H.W.