

Managing diseases



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Don't be a "fungicide addict." Know how contact and systemic products differ, and use them effectively

BY HENRY T. WILKINSON

Editors' note: Last month, Part 1 of this two-part series looked at ecological factors that cause turf disease development, as well as basic strategies for management. Unfortunately, the first page of that article was omitted from the magazine. You can read the entire article at www.landscapemanagement.net, or, if you call 440/891-2623, we'll fax you the missing page. This month's article explains the difference between contact and systemic products and explains how to choose which kind of product best suits your turf.

Fungicides are only "needed" because of our high expectations for turf quality, but more people are relying on them because of their availability and the increasing demand for "perfect" turf. I describe this as "fungicide addiction," and believe it leads to poor grass and anxiety.

Chemicals used as fungicides

Tables 1 and 2 list chemicals that are registered for turfgrass use. Check your local regulations to determine what you can use. Also, some of these materials are no longer available. Table 1 lists fungicides considered systemic, while Table 2 lists those considered to have contact activity.

The common name refers to a fungicide's active ingredient; the trade name refers to the marketed name; and the chemical class refers to the active ingredient's chemical structure. The mode of action refers to how the active ingredient inhibits a fungus, and the resistance risk indicates how likely it is that a fungicide will perpetuate a genetic change (i.e. chemical resistance) in a fungus.

How contact fungicides work

Contact fungicides are also known as protectants because they're intended to intercept a fungus and prevent it from infecting (getting inside) a grass plant. They inhibit fungi not by penetrating plant tissues, but by interfering with their growth and development in a number of ways, i.e. multiple site inhibitors (MSI). MSIs reduce the risk of fungal resistance. To develop resistance, a fungus needs to change its DNA. In nature, changes in fungal DNA are brought about by several mechanisms.

I won't explain these complicated processes, but you should know that most genetic changes kill fungi, and these changes hardly ever occur. When a fungus has to change its DNA more than once, the chances of it succeeding are so rare that it won't happen. Therefore, contact fungicides remain effective even if you use them repeatedly.

Since they're toxic to many non-target fungi that are beneficial to your turf, repeated use of contact fungicides isn't a wise choice. To work, they must cover plant surfaces before fungi attack. If the fungal pathogen attacks the leaves, it's easy to apply the contact fungicide to them. Remember to apply the fungicide frequently since the leaves are growing and the new leaf tissue will be unprotected. In

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the spring, this could be every week or more.

The growth of the crown, rhizomes, stolons or roots can also leave their new leaf tissues exposed to fungal pathogens, but the problem is further complicated by the fact that they're surrounded by soil. Soil and organic matter will filter and bind many chemicals to their surfaces, which forces you to use more compound to achieve disease control. It's a vicious cycle you won't win because these compounds also unbalance the turf ecosystem and create weak turf.

How systemic fungicides work

Systemic fungicides have been around for only 20 years. They're called "systemic" because, once applied to turf, they move.

Beware: Systemic implies that the compound will move into all of a plant's cells. You might think that if you apply it to the leaves, it will end up in the roots, and if you apply it to the soil, it will end up in all the roots and leaves. This, however, is not the case!

Some fungicides are described as locally systemic, which means they only move a few cells away from the point of entry. This is most likely the case for the majority of systemic fungicides.

Table 1 lists 19 systemic fungicides. For the most part, they have different active ingredients (chemistries). They also have different carriers, or materials upon which the active ingredient is loaded for the purpose of application. The carrier itself can have fungicidal activity and can affect how the active ingredient reacts and enters a plant. Companies that develop a fungicide test

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TABLE 1: SYSTEMIC FUNGICIDES GROUPED BY CHEMISTRY AND MODE OF ACTION^a

Common name	Trade name	Mode of action	Resistance risk
(benzimidazoles):			
benomyl	Tersan 1991*	mitotic poison (SSI)	high
thiophanates	Fungo, Cleary 3336	mitotic poison (SSI)	high
(phenylamide):			
metalaxyl	Subdue, Apron	RNA synthesis inhibitor	high
mefanoxam	Subdue MAXX	RNA synthesis inhibitor	high
(1,2,4-triazoles):			
cyproconazole	Sentinel*	demethylase inhibitor	moderate
myclobutanil	Eagle	DMI	moderate
propiconazole	Banner	DMI	moderate
tebuconazole	Lynx	DMI	(expmtl)
triadimefon	Bayleton	DMI	moderate
triticonazole	Triton	DMI	(expmtl)
(pyrimidinemethanol):			
fenarimol	Rubigan	DMI	moderate
(strobilurins):			
azoxystrobin	Heritage	respiration inhibitor	moderate
kresoxim-methyl	Experimental	cytochrome bc complex	moderate
trifloxystrobin	Compass	in mitochondria	moderate
(dicarboximides):			
iprodione	Chipco 26019, GT	not well known	moderate
vinclozolin	Vorlan, Curalan	not well known	moderate
(benzamide):			
flutolanil	Prostar	multi-site	low
(carbamate):			
propamocarb	Banol	membrane disruption MSI	low
(phosphonate):			
fosetyl-aluminum	Aliette	indirect plant activity	low

(a) Some are single-site inhibitors (SSI), and a few are multi-site inhibitors (MSI). SSIs have a moderate to high risk of developing fungicide resistance.

(*) Systemic fungicides marked with an asterisk are no longer available.

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many carriers to determine which works best. However, each grass type has different surface chemistries, and each will react dif-

ferently to a carrier. Sometimes, one fungicide can be more effective than another because of the carrier.

Don't overestimate how well fungicides

with translocative or systemic properties work. In most cases I've seen, the compound's movement, once applied, is limited to short distances within the plant. Proof of this is how quickly fungicidal protection is lost when the grass plant actively grows or when the pathogen is aggressive.

Another limitation with systemics is that they take three to five days to move into a plant, redistribute and build up enough active ingredient.

I've observed systemics fail to control a disease they purportedly are effective against. This results from applying systemic

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Contact fungicides that control dollar spot (shown here) well are chlorothalonil, mancozeb and thiram.

fungicide when disease pressure is high; the pathogen simply overruns the plant before the fungicide reaches full effectiveness. Combine this with rapid or poor turf growth and it appears as though the fungicide failed.

To be effective, systemic fungicides must be applied when disease severity is low. This means you have to scout your turf and look for the start of disease. This is why it's important to use as many turf management techniques as possible to slow down the rate of disease development.

Which systemic is best?

Use a fungicide that's effective against the fungus causing the disease in your turf.

Circle 123

TABLE 2: CONTACT FUNGICIDES^a

Common name	Trade name	Chemical class
captan	Captan	carboximide
chloronebb	Terraneb SP	chlorinated aromatic
chlorothalonil	Daconil	nitrile
etridiazole (ethazole) ^b	Terrazole, Koban	triazazole
mancozeb	Fore, Manzate	ethylene bis-dithiocarbamate
PCNB (quintozene) ^b	Turfcide, Terraclor	chlorinated aromatic
thiram	Spotrete	dithiocarbamate

a Also known as "protectant" fungicides. Contact fungicides remain on plant surfaces and don't penetrate into tissues. All are multi-site inhibitors and have low risk for supporting fungal resistance development.

b Purported to have some systemic activity.

They don't work equally against all fungi. It's important that you develop your own information on fungicide effectiveness.

One of the main differences among the active ingredients of

systemic fungicides is their mode of action. In selecting a systemic fungicide, use this checklist of considerations:

▶ What disease do you want to control?

▶ What fungicides have good activity against "my" disease?

▶ What order of resistance risk do various products show?

Then, choose the most effective

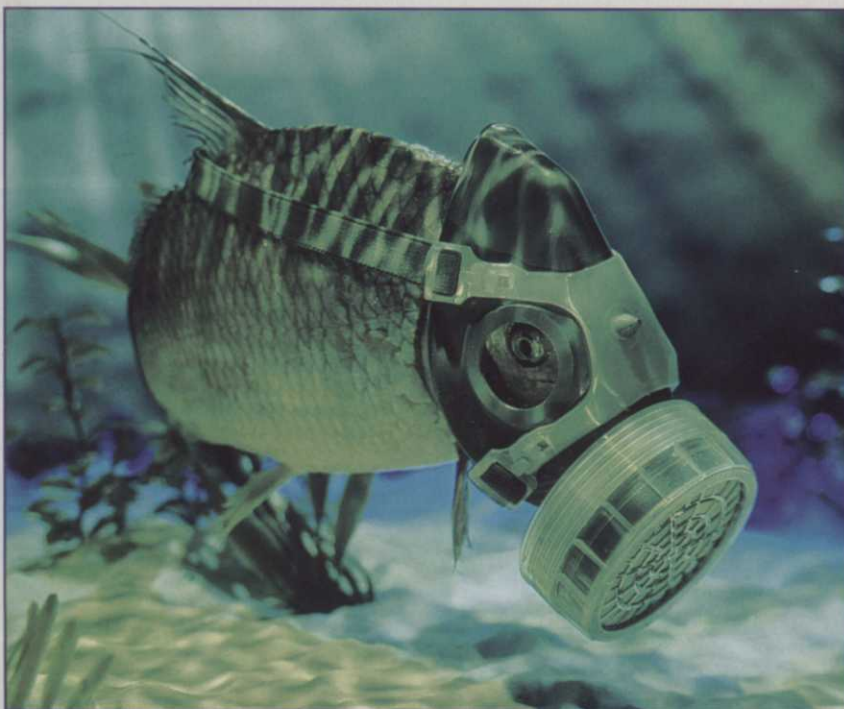
fungicide. If repeated applications are needed during a single season, use another product with a different mode of action.

If you aren't achieving adequate disease control, consult with a turfgrass pathologist before selecting other fungicides. **LJM**

— The author is a professor at the University of Illinois.

Read More www.landscapemanagement.net

Visit our Web site's "This Month's Features" page for a Quick Reference Guide to contact and systemic fungicides for managing turfgrass diseases that spells out which products are most effective against which diseases.



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