

FAMILIES OF FUNGICIDES FOR TURFGRASS

■ CHEMICAL FAMILY: DITHIOCARBAMATES

Common name	Trade names ¹	Mode of action	Placement/mobility	Concern over resistance	Comments
Mancozeb	Fore, Mancozeb, Dithane, T/O, Protect T/O	general	contact	low	Broad-spectrum control; used as protectants
Thiram	Spotrete				

■ CHEMICAL FAMILY: DICARBOXIMIDES

Iprodione	Chipco 26019, Chipco 26GT, Iprodiane Pro	specific	local	moderate to high (not persistent)	Broad-spectrum activity penetrant, developed in mid 1970s
Vinclozolin	Touché, Curalan				

■ CHEMICAL FAMILY: BENZIMIDAZOLES

Thiophanate-methyl	Fungo 50, Cleary's 3336, Cavalier, T methyl Pro	specific	systemic (upward)	high	First popular systemic fungicides, became available in the late 1960s
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■ CHEMICAL FAMILY: STEROL INHIBITORS OR DEMETHYLASE INHIBITORS

Fenarimol	Rubigan	specific	systemic (upward)	high	Broad-spectrum, introduced in the late 1970s
Myclobutanol	Eagle				
Triademefon	Bayleton, Accost				
Propiconazole	Banner MAXX				

■ CHEMICAL FAMILY: STROBILURINS

Azoxystrobin	Heritage	specific	systemic (upward)	moderate to high	Broad-spectrum, first product made available in 1997. Chemical structures found in various naturally occurring, wood-destroying fungi
Trifloxystrobin	Compass				

■ ADDITIONAL FUNGICIDES

Chlorothalonil	Daconil, Manicure, Concorde, Echo	general	contact	low	Chlorothalonil is a protectant fungicide. PCNB is often considered to be a protectant but may be locally systemic. Compounds from different groups
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¹Product list by trade name may not be all inclusive.

■ ADDITIONAL FUNGICIDES (CONTINUED)

Flutolanil	ProStar	specific	systemic (upward)	low	Broad-spectrum control.
PCNB	Terrachlor, Turfcide, Revere, FFII, PCNB, Defend, Engage	general	contact	low	
Fludioxonil	Medallion	specific	contact	moderate to low	

■ CHEMICAL FAMILY: STEROL INHIBITORS OR DEMETHYLASE INHIBITORS

Mefenoxam	Subdue MAXX	specific	systemic (upward)	high	Controls few diseases besides those caused by <i>Pythium</i> or closely related water molds. Azoxystrobin (Heritage) is unique with activity against <i>Pythium</i> species and the fungi.
Propamocarb	Banol	not well known	systemic (upward)	low	
Fosetyl-aluminum	Prodigy, Chipco Signature (Aliette)	not well known	systemic (upward & downward)	low	
Azoxystrobin	Heritage	specific	systemic (upward)	moderate to high	
Chloroneb	Teremec Sp	general	contact (local penetrant)	low	
Ethazol (Etridiazol)	Koban, Terrazole	general	contact	low	

SOURCE: "2002 MANAGEMENT OF TURFGRASS PESTS," OHIO STATE UNIVERSITY EXTENSION, AUTHORS MICHAEL J. BOEHM AND JOSEPH W. RIMELSBACH, TURFGRASS PATHOLOGISTS

5 tips to beat resistance

BY RICH HANRAHAN

Fungicides are valuable turfgrass management tools. To preserve their usefulness, develop a strategy to prevent resistance, which begins to take place when a fungus makes a genetic adjustment or undergoes a mutation that reduces its sensitivity to a particular fungicide. This change allows the affected fungus to survive the fungicide. In time, this surviving organism is likely to become the dominant strain when

the same fungicide is used frequently and exclusively with it. It becomes more difficult to control.

It's a class thing

When resistance develops, it's typically not limited to individual chemical compounds. Usually, strains of fungi that have become resistant to a fungicide will be resistant to all fungicides in the same chemical class.

Overexposure to just one fungicide might destroy the usefulness of several.

Here are five quick tips for maintaining the effectiveness of your disease-fighting chemical tools:

1 Mix it up. Use multiple fungicides from different chemical classes with varying modes of action. The two basic approaches are rotation and tank mixing. If a fungus has developed resistance to one of your fungicides, multiple

fungicides will increase your odds of riding turf of the fungus before it has a chance to spread and mutate further.

2 Reduce the frequency. Never make more applications than you absolutely need to achieve control. The fewer applications you make, the less the fungus is exposed to the chemical class.

3 Apply at the right rate. It's extremely important to apply enough product. Cutting the rate used in a single application will increase the likelihood of resistance developing. Observe recommended rates and strive to achieve complete coverage of the plants.

4 Reduce your dependence. Develop a solid Integrated Pest Management approach to disease control. Whenever possible, use plant species and/or vari-

eties that are disease resistant. Keep abreast of the newer varieties entering the market.

5 Fungicide selection. Although a product may be labeled for a particular disease, it doesn't guarantee it will solve your problem. Efficacy

can vary from region to region. How do you know which to choose? Consult with an expert such as a turf pathologist or university researcher.

— *The author is technical development manager of fungicides for Chipco Professional Products.*

Basic resistance info

Here are some points to keep in mind when developing your resistance strategy:

- ▶ The chemistries of some fungicides are more inclined to provide resistance than others.
- ▶ Fungi with higher reproductive rates are more likely to develop resistance because they pass on the mutated gene more quickly and broadly.
- ▶ Site-specific fungicides run a higher risk of resistance because they work by inhibiting just function in the fungal cell. Multi-site fungicides interfere with several vital functions of the fungal cell.
- ▶ When rotated and used in tank-mix combinations, certain fungicides can effectively control a broad spectrum of diseases without the concern for resistance development.



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