

Commonly used turfgrass fungicides and the diseases they are labeled to control

G. Jung, B. Dicklow, Y. Jo, S. Chang, and R. Wick, University of Massachusetts-Amherst, Department of Plant, Soil, and Insect Sciences

FRAC*	Fungicide	Algae	Anthraxnose	Bentgrass Dead Spot	Copper Spot	Dollar Spot	Downy Mildew (Yellow Tuft)	Fairy Rings	Fusarium Blight	Gray Leaf Spot	Leaf Spots/Melting out	Microdochium Patch	Necrotic Ring Spot	Powdery Mildew	Pythium Blight	Red Thread or Pink Patch	Rhizoctonia Brown Patch	Rhizoctonia Yellow Patch	Rusts	Slime Molds	Smuts	Summer Patch	Take-All Patch	Typhula Blight
11	azoxystrobin		X					X		X	X	X	X		X	X	X	X	X	X		X	X	X
7	boscalid			X		X																		
M4	captan										X						X							
14	chloroneb														X		X							X
M5	chlorothalonil	X	X		X	X				X	X	X				X	X	X	X					X
21	cyazofamid														X									
14	ethazole (etridiazole)														X									
3	fenarimol		X		X	X			X			X	X	X		X	X			X	X	X	X	X
12	fludioxonil		X	X							X	X					X	X				X		X
11	fluoxastrobin		X							X	X	X				X	X					X	X	X
7	flutolanil							X								X	X	X						X
33	fosetyl-AI						X								X									
2	iprodione					X			X		X	X	X			X	X							X
M3	mancozeb	X			X	X			X	X	X	X			X	X	X		X	X				
M3	maneb	X			X	X			X		X	X			X	X	X							
4	mefenoxam						X								X									
4	metalaxyl														X									
3	myclobutanil		X		X	X			X		X	X	X	X		X	X		X	X	X	X	X	
14	PCNB					X					X	X					X							X
33	phosphates (salts)														X									
19	polyoxin D		X					X		X	X	X				X	X	X						X
28	propamocarb														X									
3	propiconazole		X			X				X	X	X	X	X		X	X	X	X	X	X	X	X	X
11	pyraclostrobin		X	X		X		X		X	X	X		X	X	X	X		X			X	X	X
1	thiophanate-methyl		X	X	X	X			X	X	X	X	X	X		X	X	X	X		X	X	X	
M3	thiram					X						X					X							X
3	triadimefon		X		X	X			X	X		X		X		X	X		X		X	X	X	X
11	trifloxystrobin		X							X	X	X				X	X		X			X		
3	triticonazole		X																					
2	vinclozolin					X					X	X				X	X					X		X

FRAC*	Pre-mixed Products	Algae	Anthraxnose	Bentgrass Dead Spot	Copper Spot	Dollar Spot	Downy Mildew (Yellow Tuft)	Fairy Rings	Fusarium Blight	Gray Leaf Spot	Leaf Spots/Melting out	Microdochium Patch	Necrotic Ring Spot	Powdery Mildew	Pythium Blight	Red Thread or Pink Patch	Rhizoctonia Brown Patch	Rhizoctonia Yellow Patch	Rusts	Slime Molds	Smuts	Summer Patch	Take-All Patch	Typhula Blight
11 + 3	azoxystrobin + propiconazole		X	X		X		X		X		X	X	X	X	X	X		X			X	X	X
M5 + 3	chlorothalonil + fenarimol		X	X	X				X	X	X	X	X	X		X	X		X			X	X	X
M5 + 28	chlorothalonil + propamocarb					X				X	X				X	X	X							
M5 + 3	chlorothalonil + propiconazole		X		X					X	X			X		X	X		X			X		
M5 + 1	chlorothalonil + thiophanate-methyl	X	X	X	X	X	X		X	X	X	X		X		X	X	X	X					X
M5 + 12 + 3	chlorothalonil + fludioxonil + propiconazole		X			X				X	X	X				X	X	X	X			X		X
M3 + M1	mancozeb + copper hydroxide	X			X	X					X	X		X	X	X	X		X					
M3 + 3	mancozeb + myclobutanil	X	X		X	X			X	X	X	X		X	X	X	X		X		X	X		X
1 + 14	thiophanate-methyl + chloroneb				X	X						X			X		X							X
1 + 12	thiophanate-methyl + flutaloniil		X		X	X				X	X	X				X	X	X						X
1 + 2	thiophanate-methyl + iprodione		X			X					X	X					X							
1 + M3	thiophanate-methyl + mancozeb					X				X	X						X							
1 + M3	thiophanate-methyl + thiram		X			X					X						X		X					
3 + 7	triadimefon + flutolanil					X								X		X	X		X					X
3 + 11	triadimefon + trifloxystrobin		X			X				X	X	X				X	X		X			X		
3 + 11 + ?	triadimefon + trifloxystrobin + stress guard		X			X				X	X	X				X	X		X		X	X		

*Fungicide Resistance Action Committee Codes (FRAC): fungicides with the same FRAC code have the same mode of action. M-codes indicate multi-site chemicals with low risk of resistance development.

The information has been prepared partially based on M. Bess Dicklow, University of Massachusetts-Amherst. 2006. "Commonly used turfgrass fungicides and diseases they control" and Vincelli, P. and A.J. Powell, University of Kentucky. 2007. "Chemical control of turfgrass diseases 2007."

Chemical classes and modes of action of fungicides registered for use on turfgrasses

G. Jung, B. Dicklow, Y. Jo, S. Chang, and R. Wick, University of Massachusetts-Amherst, Department of Plant, Soil, and Insect Sciences

Common Name	FRAC ¹	Group Name	Trade Name(s) ²	Topical mode of action ³
azoxystrobin	11	Strobilurin	Heritage 50WG	Acropetal Penetrant
boscalid	7	Anilene	Emerald 70EG (WDG)	Acropetal Penetrant
captan	M4	Thiophthalimide	Captan 80WP, Captec 4L	Contact
chloroneb	14	Aromatic Hydrocarbon	Terraneb SP, Teremec SP, Andersons Fungicide V, Proturf Fungicide V	Contact
chlorothalonil	M5	Nitrile	Andersons 5% Daconil 5G, ArmorTech 825 DF, ArmorTech CLT 720, ChloroStar 6F, Concorde SST 6F, Daconil 5G, Daconil Ultrex, Daconil WeatherStik, Daconil 2787, Daconil Zn, Echo 720F, Equus 500ZN, Manicure 6F, Manicure Ultrex, Lebanon Daconil 5G, Pegasus L, Pentathalon	Contact
cyazofamid	21	Cyanoimidazole	Segway	Localized Penetrant
etridiazol (ethazole)	14	Aromatic Hydrocarbon	Koban 30WP, Terrazole 35WP	Contact
fenarimol	3	Demethylation Inhibitor	Rubigan AS	Acropetal penetrant
fludioxinil	12	Phenylpyrrole	Medallion 50WP	Contact
fluoastrobilin	11	Strobilurin	Disarm 480SC	Acropetal Penetrant
flutolanil	7	Carboximide	ProStar 70WP, Moncut 70-DF	Acropetal Penetrant
fosetyl-Al	33	Phosphonate	Chipco Aliette, Chipco Signature, Lesco Prodigy Signature, Terra Aliette T&O	Systemic Penetrant
iprodione	2	Dicarboximide	Andersons Fungicide X, ArmorTech IP 233, Chipco 26 GT, Chipco 26019, Iprodione Pro, Lesco 18 Plus, Proturf Fungicide X	Localized Penetrant
mancozeb	M3	Carbamate	Dithane 37WF, Dithane T/O, Fore Flo-XL 4F, Fore Rainshield 4F, Formec 80W, Junction 61WF, Lesco Mancozeb 75DG, Lesco 4 Flowable Mancozeb 4F, Manzate 200, Pentathlon, Protect T/O	Contact
maneb	M3	Carbamate	Maneb Plus Zinc F4, Maneb 75DF, Pentathlon 4F (75DG)	Contact
mefenoxam	4	Phenylamide	Andersons Pythium Control 1.2G, Mefanoxam, Quell, Ridomil, Subdue, Subdue MAXX	Acropetal Penetrant
metalaxyl	4	Phenylamide	Subdue2E, Proturf Pythium Control, Apron (seed treatment)	Acropetal Penetrant
metconazole	3	Demethylation Inhibitor	Tourney	Acropetal Penetrant
myclobutanil	3	Demethylation Inhibitor	Andersons Golden Eagle 0.39G, Eagle 20EW	Acropetal Penetrant
PCNB	14	Aromatic Hydrocarbon	Andersons FFII 15.4G, Defend 4F, Engage 75W, Fluid Fungicide II, Lesco Revere 4000 4F (10G), Parflo 4F, PCNB 12.5G, Penstar 75WP, Terraclor 400F (75WP), Turfcide 400F (10G)	Contact
phosphites (salts)	33	Phosphonate	Alude 5.2F, Biophos, Fosphite, Magellan 6.69F, Phostrol, Reliant, ReSyst 5F, Vital 4L	Systemic Penetrant
polyoxin D zinc	19	Polyoxin	Endorse 2.5WP	Localized Penetrant
propamocarb HCl	28	Carbamate	Banol 6S	Localized Penetrant
propiconazole	3	Demethylation Inhibitor	ArmorTech PPZ 143, Banner GL 3.6WSP, Banner MAXX, Lesco Spectator 3.6EC, Propiconazole Pro 1.3MEC	Acropetal Penetrant
pyraclostrobin	11	Strobilurin	Insignia 20WDG	Localized Penetrant
thiophanate-methyl	1	Benzimidazole	Absorb TM, Allban, Andersons Systemic Fungicide 2.3G, ArmorTech TM 462, Cavalier 2G (4.5F, 50WSB), Cleary's 3336 50W, Fungo Flo 4.5F, Fungo 50WSB, Lesco T-Storm 50WSB, Proturf Systemic Fungicide, Systec 1998 85WDG, Tee-Off 4.5F	Acropetal Penetrant
thiram	M3	Carbamate	Difiant 75WDG, Lesco Thiram 75DG, Spotrete 4F	Contact
triadimefon	3	Demethylation Inhibitor	Accost 1G, Bayleton 50WSP, Andersons Fungicide VII 0.59G, Andersons 1% Bayleton 1G, Lebanon Bayleton 1G, Lesco Systemic Fungicide 50WDG	Acropetal Penetrant
trifloxystrobin	11	Strobilurin	Compass 50WDG	Localized Penetrant
triticonazole	3	Demethylation Inhibitor	Trinity	Acropetal Penetrant
vinclozolin	2	Dicarboximide	Curalan 4F (50EG, WSB, 50DF), Lesco Touche EG, Vorlan 50DF	Localized Penetrant

Pre-mixed Products (Common Name)	FRAC ¹	Trade Name(s) ²
azoxystrobin + propiconazole	11 plus 3	Headway
chlorothalonil + fenarimol	M5 plus 3	Lesco Twosome
chlorothalonil + propamocarb	M5 plus 28	Lesco Par, Banol C
chlorothalonil + propiconazole	M5 plus 3	Echo Propiconazole Turf Fungicide
chlorothalonil + thiophanate-methyl	M5 plus 1	ConSyst, Spectro, Broadside
chlorothalonil + fludioxonil + propiconazole	M5 plus 12 plus 3	Instrata
mancozeb + copper hydroxide	M3 plus M1	Junction
mancozeb + myclobutanil	M3 plus 3	MANhandle
thiophanate-methyl + chloroneb	1 plus 14	Proturf Fungicide IX
thiophanate-methyl + flutalonil	1 plus 12	SysStar
thiophanate-methyl + iprodione	1 plus 2	ArmorTech TMI 20/20, 26/36 Fungicide, Proturf Fluid Fungicide
thiophanate-methyl + mancozeb	1 plus M3	Duosan WP, Duson WSB
thiophanate-methyl + thiram	1 plus M3	Bromosan
triadimefon + flutolanil	3 plus 7	Prostar Plus
triadimefon + metalaxyl	3 plus 4	Proturf Fluid Fungicide II
triadimefon + thiram	3 plus M3	Proturf Fluid Fungicide III
triadimefon + trifloxystrobin	3 plus 11	Armada
triadimefon + trifloxystrobin + stress guard	3 plus 11 plus?	Tartan

¹Fungicide Resistance Action Committee Codes (FRAC): fungicides with the same FRAC code have the same mode of action. M-codes indicate multi-site chemicals with low risk of resistance development.

²Trade names are used for identification purposes only, no endorsement is implied, nor is discrimination intended against similar materials. The information has been prepared partially based on M. Bess Dicklow, University of Massachusetts-Amherst. 2006. "Commonly used turfgrass fungicides and diseases they control" and Vincelli, P. and A.J. Powell, University of Kentucky. 2007. "Chemical control of turfgrass diseases 2007."

³Topical Mode of Action:

- Contact fungicides remain on the outside of the plant and protect the plant from new infection. These fungicides do not have curative activity and new growth is not protected. The length of activity is short due to exposure to the environment (rain, traffic, ultraviolet light).
- Localized penetrants form a protective barrier on the plant surfaces and permeate into the plant leaf in the area in which it was deposited. These fungicides have some curative activity, but do not move upward or downward in the plant.
- Acropetal penetrants form a protective barrier on the plant, permeate into the plant, and move upward in the plant's xylem. These fungicides have protective activity including new growth, and have good curative activity.
- Systemic penetrants form a protective barrier on the plant, permeate into the plant, move upward in the plant's xylem, and move downward in the plant's phloem. These fungicides have protective activity including new growth, and have good curative activity.

THIS FILE LAST UPDATED: 06/17/2008