

Turfgrass disease control for cooler areas of the U.S.

Fusarium
blight
(summer
patch)



Rhizoctonia
brown patch
is one
disease
worsened
by poor
drainage.



Proper cultural practices prevent and manage diseases; fungicides are a management tool.

■ When designing a program to combat turfgrass diseases, it is important that the cool-season turf manager know the plant disease triangle—the three factors which determine susceptibility to disease.

For a disease to occur, these three conditions are necessary: a pathogen (agent that causes disease), a susceptible host (in this case, turfgrass), and favorable environmental conditions (cultural practices or weather factors that increase plant stress).

The pathogen—Dr. J.M. Vargas Jr. of Michigan State University, in his text "Management of Turfgrass Diseases," notes that five groups of organisms cause plant diseases: fungi, bacteria, viruses, nematodes and mycoplasma. In descending order, fungi, nematodes and viruses are the three most important causes of disease in turfgrass. The vast majority are caused by fungi.

The host—Different turfgrass cultivars and species are more susceptible to different turfgrass diseases. For example, Drs. W.H. Daniel and R.P. Freeborg, in their

"Turf Manager's Handbook," say that take-all patch primarily affects bentgrass and bluegrass while red thread primarily affects red fescues.

Susceptibility of the host many times depends on the amount of stress placed on the turf. Healthy, vigorous turf is less susceptible to disease. Stress can be caused by a variety of factors, including:

- Either inadequate or excessive nitrogen fertility.

Certain diseases like dollar spot, red thread, pink patch and rusts are more prevalent under low fertility. Diseases that are favored by high fertility include leaf spot, brown patch, pythium blight, stripe smut and the snow molds.

- Improper cultural practices, including mowing.

Grass should not be mowed shorter than its minimum competitive mowing height (see table). And no more than 1/3 of the leaf blade should be removed at any one mowing to minimize stress.

- Improper irrigation practices, improper drainage, excessive rainfall, excessive traffic, thatch build-up, soil pH and other abnormal conditions.

Environmental conditions—Temperature, water, atmospheric water vapor, light, soil and wind are the environmental conditions affecting the development of turf diseases, according to Dr. J.B. Beard.

Temperature is a major factor. Each pathogen has its range of optimal temperatures for development, which may or may not coincide with the optimal temperatures for growth and hardiness of the plant host. Dr. Beard, in his book "Turfgrass Science and Culture," notes that "the optimum temperature for development of a turf disease can range from as low as 35 to 40 degrees Fahrenheit to as high as 95 degrees."

Free water is needed to begin germination of most fungal spores. Also, water stresses or excesses can weaken the turfgrass plant and cause it to be more susceptible to the disease pathogen. Since watering turf in the late afternoon or early evening allows fungi to germinate, grow and infect all night, the best time to water is just before sunrise, according to Dr. Vargas.

"Good drainage is just as important as proper watering," Dr. Vargas continues. "Diseases made worse by poor drainage are pythium blight, rhizoctonia brown patch and gray leaf spot."

Cultural controls—According to Dr. Noel Jackson of the University of Rhode Island, cultural factors which may contribute to reducing the incidence of disease are:

- ✓ judicious changes in irrigation and fertilizer practice;

PROPER MOWING HEIGHTS

SPECIES	MIN. HEIGHT	PREFERRED HT.
Annual bluegrass	1/8"	1/4"-1"
Creeping bentgrass	1/8"	1/4"-1"
Fine fescue	1/2"	2"-3"
Kentucky bluegrass	3/4"	2"-3"
Tall fescue		2 1/2"-3 1/2"
Zoysiagrass	3/4"	2"-3"

Source: Dr. J.M. Vargas Jr.

- ✓ modification of soil pH;
- ✓ improvement of soil aeration and drainage;
- ✓ removal of thatch and clippings;
- ✓ adjustments in mowing height and mowing frequency;
- ✓ dew dispersal and improved air drainage;
- ✓ restraints on the amount of wear;
- ✓ incorporation of organic amendments;
- ✓ weed control;
- ✓ insect control;
- ✓ nematode control; and
- ✓ using resistant varieties of grass.

"But even the most skilled turf manager cannot rely entirely on cultural tactics to eliminate the risk of disease in high quality turf," Dr. Jackson admits.

Chemical controls—Turfgrass fungicides are either contact or systemic.

Contact fungicides are generally applied to the leaf and stem surfaces of turfgrasses, according to Dr. Peter Landschoot of Penn State University. Because they don't move appreciably within the plants, they may be washed or mowed off the plant surfaces and so are generally effective for only 7 to 14 days.

Contact fungicides are usually used to control foliar diseases and not root/crown diseases, Dr. Landschoot notes.

Systemic fungicides are absorbed and translocated within the plant, he adds. Systemics may protect the plants for a period of two to four weeks. "Most systemics will control both foliar and root/crown pathogens," he says, "but do not have as broad of a spectrum of control as contact fungicides."

There are many approaches to minimizing resistance of fungi to fungicides. Though some plant pathologists recommend mixing contact with systemic fungicides, Landschoot does not. "A more logical approach is to combine two or more systemic fungicides with different modes of action. Unfortunately, mixtures of systemics at full label rates are costly and may result in turf injury.

"Turf managers should take the threat of resistance seriously and avoid continuous and repeated use of fungicides with narrow modes of action."

Turf experts agree that the best way to control diseases of turfgrass is to use the proper cultural techniques as a preventive means, supplemented with the proper chemical controls to assist the management of a disease.

SOME TRADE NAMES OF TURF FUNGICIDES*

COMMON NAME	TRADE NAME	COMPANY
anilazine	Dyrene	Miles
benomyl	Tersan 1991	DuPont
chloroneb	Teremec	PBI-Gordon
	Terraneb	Kincaid
	Fungicide V	O.M. Scott
chloroneb/thiophan.-methyl	Fungicide IX	O.M. Scott
chlorothalonil	Daconil 2787	ISK Bio
	Thalonil	Terra
ethoprop	Mocap	Rhone-Poulenc
etridiazole	Terrazole	Uniroyal
fenamiphos	Nemacur	Miles
fenarimol	Rubigan	DowElanco
fenarimol/chlorothalonil	Broadway	DowElanco
iprodione	Chipco 26019	Rhone-Poulenc
	Fungicide X	O.M. Scott
maneb	Dithane	Rhone & Haas
mancozeb	Tersan LSR	DuPont
metalaxyl	Subdue	Ciba-Geigy
	Pythium Control	O.M. Scott
metalaxyl/mancozeb	Pace	Ciba-Geigy
pentachloronitrobenzene	Turficide	Uniroyal
propamocarb	Banol	Nor-Am
propiconazole	Banner	Ciba-Geigy
thiophanate-methyl	Cleary 3336	W.A. Cleary
	Fungo 50	Grace-Sierra
	Fungo 85	Grace-Sierra
	Systemic Fung.	O.M. Scott
thiophan.-methyl/iprodione	Fluid Fung.	O.M. Scott
triadimefon	Bayleton	Miles
	Fungicide VII	O.M. Scott
triadimefon/metalaxyl	Fluid Fung. II	O.M. Scott
thiram	Spotrete	W.A. Cleary
thiram/triadimefon	Fluid Fung. III	O.M. Scott
vinclozolin	Vorlan	Grace-Sierra
	Curalan	BASF
	Touché	Lesco

*Many fungicides are sold under trade names other than the ones listed. Check with your pesticide dealer for alternative products.

Sources: LM Buyer's Guide 1993;
Farm Chemicals Handbook, 1992

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COOL-SEASON TURF DISEASES

(Before using any pesticide, read and follow all label directions.)

DISEASE	SUSCEPTIBLE TURFGRASS	CULTURAL CONTROLS	CHEMICAL CONTROLS
algae	all turfgrasses	reduce shade avoid excessive fertilization improve soil drainage	mancozeb
anthracnose (<i>Colletotrichum graminicola</i>)	annual bluegrass bentgrasses fine fescue	fertilize and water syringing may help minimize free water on leaves	benomyl ⁽¹⁾ , triadimefon, thiophanate-methyl ⁽¹⁾ , propiconazole, fenarimol, chlorothalonil
brown patch	(see rhizoctonia blight entry)		
dollar spot (<i>Lanzia and Moellerodiscus</i>)	all cool-season grasses	avoid N deficiency remove dew from greens choose resistant grasses	chlorothalonil, mancozeb, benomyl ⁽¹⁾ , anilazine ⁽¹⁾ , iprodione ⁽¹⁾ , spp.) propiconazole, thiophanate- methyl ⁽¹⁾ , thiram, tria- dimefon, vinclozolin ⁽¹⁾
fairy rings (<i>Basidiomycete</i> soil fungi)	all turfgrasses	replace infested sod & soil improve water penetration increase N fertilization	methyl bromide or for- maldehyde fumigation
fusarium blight (<i>Fusarium poae</i> , <i>F. vulmorum</i> , <i>F. crookwellense</i>)	bluegrasses bentgrasses fescues	light, infrequent watering do not cut blues or fescues under 2 inches reduce excessive thatch	triadimefon, fenarimol, benomyl ⁽¹⁾ , iprodione, thiophanate-methyl ⁽¹⁾
fusarium patch (pink snow mold) (<i>Fusarium nivale</i>)	bluegrasses bentgrasses fescues	avoid late fall fertilization rake leaves and cut short control drifting snow	triadimefon, benomyl ⁽¹⁾ , fenarimol, iprodione ⁽¹⁾ , mancozeb, mercury chlorides, pentachloro- nitrobenzene, thiram, thiophanate-methyl ⁽¹⁾ , vinclozolin
gray snow mold	(see typhula blight entry)		
leafspot/blight/ melting out (<i>Drechslera & Bipolaris</i> spp.)	Kentucky blue bentgrasses fine fescue ryegrasses	use resistant varieties raise cutting height avoid excessive N avoid light frequent watering	iprodione, anilazine, chlorothalonil, maneb, mancozeb, vinclozolin
nematodes	all turfgrasses	maintain growth with fer- tilization and irrigation	fenamiphos, ethoprop
necrotic ring spot (<i>Leptosphaeria korrae</i>)	Kentucky blue annual bluegrass ryegrasses fine fescue	avoid low mowing heights reduce excessive thatch use Kentucky blue, ry- grass mixtures maintain even soil moisture	fenarimol, propiconazole, vinclozolin, benomyl
pink patch (<i>Limonomyces roseipellis</i>)	bentgrass fine fescue perennial rye	balanced fertilization	vinclozolin, mancozeb,
pink snow mold	(see fusarium patch entry)		
powdery mildew (<i>Erysiphe graminis</i>)	Kentucky blue fine fescue	reduce shade increase air circulation by removing surround- ing vegetation use resistant varieties	triadimefon, fenarimol, propiconazole
pythium blight (<i>Pythium aphanidermatum</i> , <i>P. graminicola</i>)	bentgrasses annual bluegrass perennial rye Kentucky blue	improve soil drainage increase air circulation avoid mowing wet grass avoid excess watering	chloroneb, etridiazole, propamocarb, mancozeb, metalaxyl
red leaf spot (<i>Drechslera erythrospila</i>)	bentgrasses	remove clippings fertilize to maintain vigor	iprodione, anilazine
red thread (<i>Laetisaria luciformis</i>)	perennial rye fine fescue bentgrass annual bluegrass Kentucky blue	balanced fertility program	vinclozolin, cadmium, chlorothalonil, mancozeb, thiophanate-methyl, tria- dimefon, propiconazole
rhizoctonia blight (brown patch) (<i>Rhizoctonia solani</i> , <i>Thana- tophorus cucu- meris</i>)	bentgrass annual bluegrass tall fescue Kentucky blue fine fescue ryegrasses	avoid excessive nitrogen increase air circulation avoid excessive watering improve soil drainage	anilazine, chlorothalonil, mancozeb, benomyl ⁽¹⁾ , maneb, propiconazole, pentachloronitrobenzene, triadimefon, thiophan- ate-methyl ⁽¹⁾ , anilazine, iprodione, benomyl, vinclozolin
rust (<i>Puccinia</i> spp.)	perennial rye Kentucky blue	avoid nitrogen deficiency use resistant varieties promote growth with fer- tilization and irrigation	mancozeb, propiconazole, chlorothalonil, fenarimol, triadimefon
slime molds (<i>Myxomycete</i>)	all turfgrasses	remove by mowing, raking	zineb, mancozeb
snow mold	(see fusarium patch and typhula blight entries)		
stripe smut (<i>Ustilago striiformis</i>)	Kentucky blue bentgrasses	avoid drought stress avoid excessive nitrogen use resistant varieties	propiconazole, triadi- mefon, benomyl
summer patch (<i>Magnaporthe</i> spp.)	Kentucky blue	annual bluegrass reduce excessive thatch fine fescue	avoid low mowing height vinclozolin, propiconazole, light, frequent watering use slow-release nitrogen improve drainage
take-all patch (<i>Gaeumannomyces graminis</i> var. <i>avenae</i>)	bentgrass	avoid topdressing with pH greater than 6.0 avoid lime use ammonium chloride or ammonium sulfate fert.	PMA (not labelled)
typhula blight (gray snow mold) (<i>Typhula</i> spp.)	bentgrass annual bluegrass Kentucky blue tall fescue perennial rye	avoid heavy fall nitrogen rake leaves and cut short control drifting snow	triadimefon, cadmium, chloroneb, anilazine, pentachloronitrobenzene, mercury chlorides, thiram
yellow patch (<i>Rhizoctonia cerealis</i>)	bentgrasses bluegrasses	reduce excessive thatch avoid excessive watering	none
yellow tuft (<i>Scierophthora</i> spp.)	bentgrass	improve drainage maintain adequate fertility	metalaxyl

(1) Continued or sole use of these materials may favor build-up of resistant fungal population.