

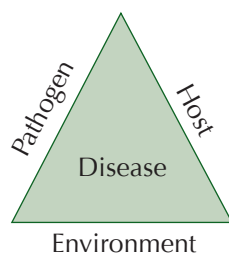
# Warm-Season Turfgrass Disease Management in Urban Landscapes

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**T**o prevent or minimize turfgrass diseases in urban areas, a homeowner or landscape manager needs to know the causes of turfgrass diseases, identify and treat the disease as early as possible in its infection cycle, and follow best management practices to keep the grass healthy.

## Causes of turfgrass disease

A plant disease occurs when a disease-causing microorganism (pathogen) infects a plant, giving all or part of the plant an abnormal appearance.



**Figure 1.** Disease triangle.

If any component of the disease triangle (Fig. 1) is absent, the disease will not occur.

To reduce the potential for disease pressure on turfgrass, implement management strategies for each component of the disease triangle.

**Host:** The most effective management strategy for turfgrass disease is to plant a disease-resistant turfgrass cultivar. However, few cultivars resist all diseases. Also, a landscape typically already has an established turfgrass, and replacing it with a disease-resistant cultivar is expensive.

For existing turfgrass, the most practical ways to promote lawn health are to use good management practices, such as mowing, irrigating, and fertilizing properly, and applying fungicides only when needed.

**Pathogen:** There is no practical method to eradicate plant pathogens from a given landscape. Because most turfgrass pathogens occur everywhere in the environment, all turfgrass areas contain some level of disease. Often the disease outbreak is so limited that it cannot be detected easily.

However, fungicides can be used to reduce diseases enough to minimize costs and keep the turfgrass quality at an acceptable level.

**Environment:** Although we cannot alter environmental conditions on a large scale, we can influence the microenvironment of the turfgrass area by implementing sound management practices. These practices include scheduling irrigation properly, removing thatch, aerating the soil, and removing or pruning trees to reduce shade and improve airflow.

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## Diagnosing turfgrass diseases

If the quality of your turfgrass is poor, the cause could be pest insects or plant diseases. But more often it is caused by poor environmental conditions such as heavy shade, soil compaction, buried construction debris, inappropriate soil fertility, and chemical damage. Poor mowing and irrigation practices also can harm the microenvironment of the lawn.

The information in Figure 2 can help you diagnose diseases and other common causes of poor turfgrass quality.

## Managing turfgrass diseases

Once you have identified the primary cause of a plant disease, determine your plan of action. Disease management requires a two-step approach: (1) promoting turfgrass recovery, and (2) preventing future disease occurrences.

### Promoting turfgrass recovery

To help turfgrass recover from disease, irrigate properly, add fertilizer according to soil test results, and apply herbicide to control weeds. However, remember that applying too much water, fertilizer, or herbicide can damage the grass.

For example, large patch (often referred to as brown patch), a disease caused by *Rhizoctonia solani*, is more severe when turfgrass is stressed by the presence of too much nitrogen and/or water in the soil. Use water and fertilizer judiciously to help the grass recover and to avoid creating conditions that favor large patch.

If fungal disease is severe, you may need to apply a fungicide to the turfgrass. Although it will not cure turfgrass that is already dead or dying, the fungicide will stop the spread of the disease and protect unaffected areas.

The timing of the application is critical: if applied too late, the fungicide may be ineffective due to the advanced stage of the infection. In many cases disease symptoms get worse immediately after a fungicide application because unseen infections begin to develop. Remember: when applying a fungicide, your primary goal is to protect uninfected plant tissue.

## Preventing future disease outbreaks

Every lawn maintenance practice can either help or hurt a lawn. In some situations, the best management option may be to replace problem turfgrass with other non-turfgrass plants that are more suitable for the environmental conditions and the level of expected maintenance.

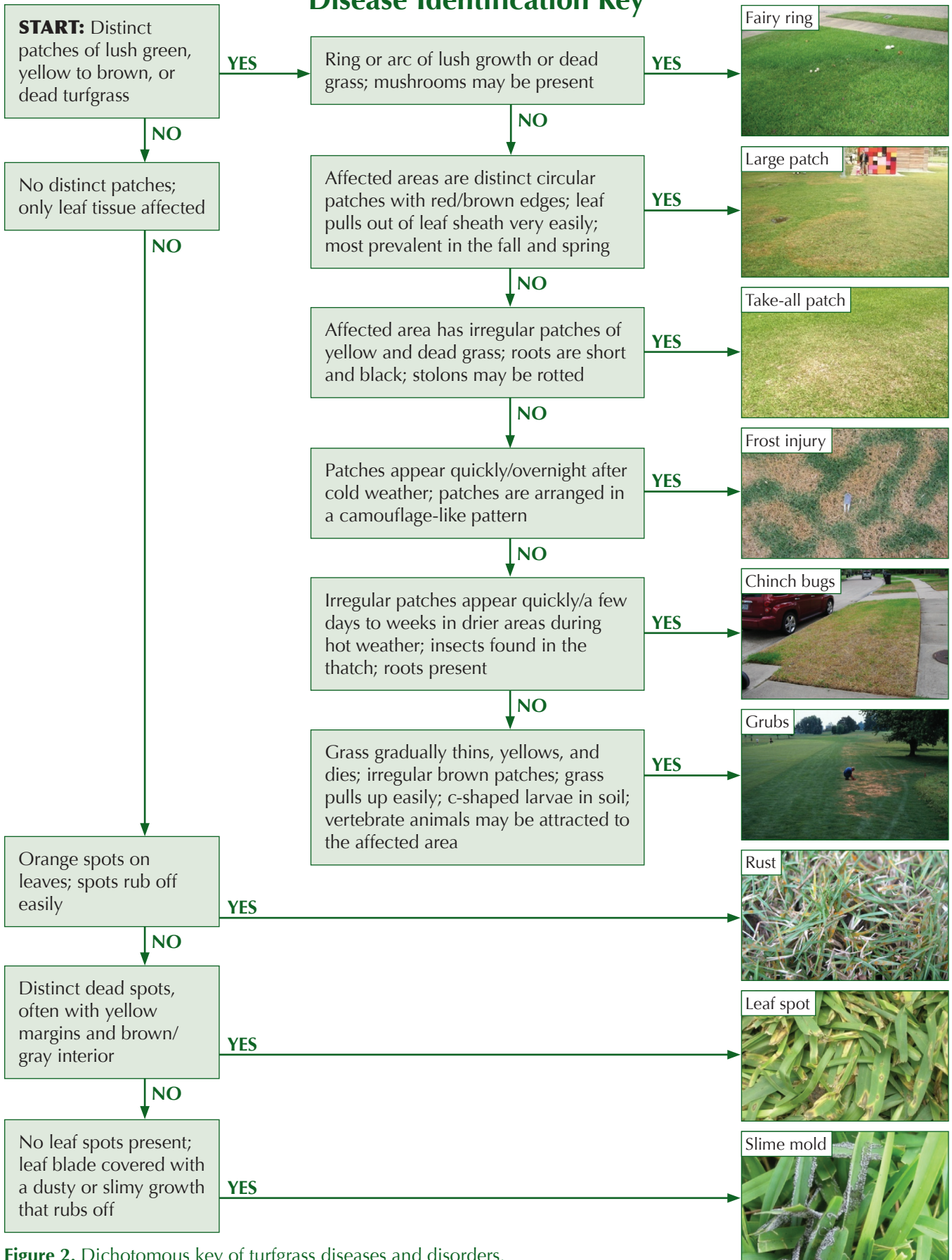
If replacing the lawn is not an option, you will need to adopt management practices that deter diseases. These practices can be divided into four major categories: cultural practices, chemical applications, use of disease-resistant turfgrass, and biological control.

**Cultural practices:** To promote healthy turfgrass and create the microenvironmental conditions that discourage disease development, adopt best management practices for mowing, watering, and fertilizing the lawn:

- Mow often enough to avoid removing more than one-third of the leaf blade during a mowing. In the summer, with adequate rainfall and consistent fertilizer applications, you likely need to mow every 5 days or possibly more often to keep your lawn healthy.
- Irrigate infrequently and with enough water to reach deep into the soil profile. The best time to irrigate is the early morning. Water the area uniformly to prevent excessively wet or dry spots. An irrigation system checkup may be needed to determine if your system irrigates uniformly. Ideally, you should water only when a large area of the lawn shows early symptoms of drought stress, such as folding of grass blades.
- Choose and apply fertilizers according to need as determined by a soil analysis. For home lawns, do not apply more than 1 pound of soluble nitrogen application per 1,000 square feet of lawn. Too much nitrogen produces excessive lush growth, which is more susceptible to insect pests and diseases. Using slow-release nitrogen source may help reduce incidence of some diseases.

**Chemical applications:** Fungicides can slow the development of a disease and prevent its spread to unaffected plants. Follow these guidelines to increase the chances of success:

## Disease Identification Key



**Figure 2.** Dichotomous key of turfgrass diseases and disorders.

- Accurately identify the primary pathogen.
- Choose the correct fungicide for the pathogen.
- Apply the fungicide according to label use directions.
- Make the application just before or very early in disease development. If an area has a history of disease, note when the disease occurs and under what environmental conditions. Fungicides are most effective if applied just before infection is likely.

Table 1 lists the fungicides approved for home-owners to treat turfgrass disease. However, regulations change often, so read the label carefully before buying and using a fungicide. Tables 2 and 3 list fungicides for professionals to use on golf courses, for sod production, and for specific diseases and conditions on turfgrass.

Follow the directions exactly, especially those listing application rates and environmental conditions. Many fungicide labels specify the turfgrass species as well as environmental conditions that may cause chemical damage. **When applying any material (pesticide, fertilizer, or other prod-**

**ucts), assume that the product will damage your lawn unless applied accurately.** If you are unsure of how to apply a product correctly, contact your local county Extension agent.

**Host resistance:** The easiest and most cost-effective method to manage turfgrass diseases is to plant species and cultivars that are resistant to diseases. Unfortunately, in most situations it is not practical or economical to replace a lawn with a resistant cultivar.

**Biological control:** The use of living microorganisms to control pathogens is called *biological control*. A few biological control products have been approved for turfgrass disease management.

However, studies need to be conducted to prove that these products can consistently reduce diseases in turfgrass across a range of environmental conditions. These products' performance is especially sensitive to environmental conditions during storage and application. Just as the pathogens infecting your lawn are influenced by environmental conditions, these products will likely be effective only under specific environmental conditions.

**Table 1.** Fungicides for homeowner use on turfgrass lawns.

Common name	Trade names for homeowner use
thiophanate-methyl	Fungo 50, Fungo Flo, Scott's Lawn Fungus Control, Southern Ag Thiomyl, Bonide Lawn and Landscape Granules Lawn and Landscape Systemic Disease Control; Bonide Infuse Lawn & Landscape Granules
myclobutanil	Spectracide Immunox Lawn Disease Control Concentrate, Spectracide Immunox Lawn Disease Control Granules, Ferti-lome F-Stop, Green Light Fung-Away Systemic Lawn Fungicide
propiconazole	Ferti-lome Liquid Systemic Fungicide; Monterey Fungi-Fighter, Bonide Fung-onil Lawn and Garden Disease Control, Bonide Infuse Concentrate Systemic Disease Control, Ortho Lawn Disease Control; Bonide Infuse concentrate; Bonide Infuse RTS; Bayer Fungus Control for Lawns Ready to Spray; Bayer Fungus Control for Lawns Ready to Spread Granules
mono- and di-potassium salts of phosphorous acid	Monterey Agri-Fos Systemic Fungicide
azoxystrobin	Maxide Disease Killer
copper octanoate	Bonide Liquid Copper Fungicide Concentrate
potassium bicarbonate	Monterey Bi-Carb Old Fashioned Fungicide

**Table 2.** Fungicides registered for use on golf courses and for sod production.

Common name	Trade name	Movement
<b>aromatic hydrocarbon</b>	<b>FRAC Code List 14<sup>1</sup></b>	
chloroneb	Terraneb SP, Teremec SP	Contact
etridiazol (ethazole)	Terrazole, Koban	Contact
PCNB	Turfcide 400, Turfcide 10G, PCNB 12.5G, Revere 10G Revere 4000, FF II, Terrachlor 400, Terrachlor 75WP	Contact
<b>benzimidazole</b>	<b>FRAC Code List 1<sup>1</sup></b>	
thiophanate-methyl	Fungo 50, Fungo Flo, 3336 WP, 3336 Flo, Caviler 2G Caviler 4.5F, Caviler 50WSB, 3336 Plus	Acropetal penetrant
<b>dithiocarbamate</b>	<b>FRAC Code List M3<sup>1</sup></b>	
maneb	Maneb Plus Zinc F4, Maneb 75DF, Pentathlon 4F, Pentathlon 75DG	Contact
thiram	Spotrete, Thiram	Contact
mancozeb	Fore, Fore Flo, Dithane T/O, Dithane WF, Pentathalon	Contact
<b>carbamate</b>	<b>FRAC Code List 28<sup>1</sup></b>	
propamocarb-hcl	Banol	Contact
<b>carboximide</b>	<b>FRAC Code List 7<sup>1</sup></b>	
flutolanil	ProStar 70WP	Acropetal penetrant <sup>2</sup>
boscalid	Emerald 70EG (WDG)	Acropetal penetrant <sup>2</sup>
<b>demethylation inhibitor</b>	<b>FRAC Code List 3<sup>1</sup></b>	
fenarimol	Rubigan A.S.	Acropetal penetrant <sup>2</sup>
myclobutanil	Eagle, Golden Eagle	Acropetal penetrant <sup>2</sup>
propiconazole	Banner, Banner MAXX, Spectator, Propiconazole Pro	Acropetal penetrant <sup>2</sup>
triadimefon <sup>3</sup>	Bayleton 25, Bayleton 50, Accost 1G	Acropetal penetrant <sup>2</sup>
<b>dicarboximide</b>	<b>FRAC Code List 2<sup>1</sup></b>	
iprodione <sup>3</sup>	Chipco 26GT, Chipco 26019, Iprodione Pro, ProTurf Fungicide X	Local penetrant
vinclozolin <sup>3</sup>	Curalan, Curalan DF, Touché, Touché Flowable, Vorlan	Local penetrant
<b>nitrile</b>	<b>FRAC Code List M5<sup>1</sup></b>	
chlorothalonil <sup>3</sup>	Daconil WeatherStik, Daconil Ultrex, Daconil 2787 Daconil Zn, Manicure 6 Flowable, Manicure Ultrex, Concorde, Thaloni 4L, Thaloni 90DF, Echo 720, Echo 75	Contact
<b>phenylamide</b>	<b>FRAC Code List 4<sup>1</sup></b>	
mefenoxam	Subdue, Subdue MAXX, Ridomil	Acropetal penetrant
<b>phenylpyrrole</b>	<b>FRAC Code List 12<sup>1</sup></b>	
fludioxonil	Medallion	Contact
<b>phosphonate</b>	<b>FRAC Code List 33<sup>1</sup></b>	
fosetyl-aluminum	Aliette, Aliette T&O, Chipco Signature, Prodigy, Autograph	Systemic
phosphite (salts)	Magellan, Fosphite, Resyst, Alude, Reliant	Systemic
<b>polyoxin</b>	<b>FRAC Code List 19<sup>1</sup></b>	
Polyoxin D Zinc	Endorse	Local penetrant
<b>strobilurin (=QoI)</b>	<b>FRAC Code List 11<sup>1</sup></b>	
azoxystrobin	Heritage	Acropetal penetrant <sup>2</sup>
fluoxastrobin	Disarm	Localized penetrant
pyraclostrobin	Insignia	Localized penetrant
trifloxystrobin	Compass	Localized Penetrant

This list is not all-inclusive.

<sup>1</sup>FRAC Code List: The Fungicide Resistance Action Committee code list that provides management guidelines to reduce fungicide resistance.

<sup>2</sup>Acropetal penetrant – a fungicide that moves upward through the plant

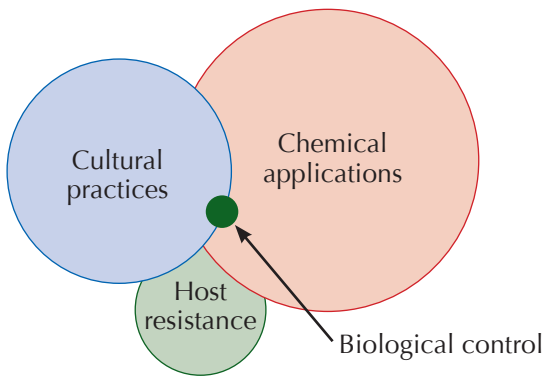
<sup>3</sup>The use for residential turf is prohibited

**Table 3.** Fungicides for treatment of diseases on turfgrass lawns.

Fungicide	azoxystrobin	boscalid	chloroneb	chlorothalonil	fluoxastrobin	ethazole	fenarimol	fludioxonil	flutolanil	fosetyl-AI	iprodione	mancozeb	mefenoxam	myclobutanil	PCNB	polyoxin D	propamocarb	propiconazole	pyraclostrobin	thiophanate-methyl	thiram	triadimefon	trifloxystrobin	vinclozolin
Algae, moss				x								x												
Anthracnose	x			x			x	x		x				x		x		x	x	x		x	x	
Ascochyta leaf blight																				x				
Bent/bermuda dead spot	x						x	x										x	x			x		
Copper spot				x			x					x												
Dollar spot		x		x			x	x			x			x	x			x	x	x		x		x
Yellow tuft	x		x			x				x		x	x				x		x					
Fairy rings	x								x											x		x		
Fusarium blight							x				x	x		x						x		x		
Gray leaf spot	x			x								x						x		x		x	x	
Leaf spots/melting out	x			x				x			x	x		x	x	x		x	x	x			x	x
Microdochium patch	x			x			x	x			x	x		x	x	x		x	x	x	x	x	x	x
Necrotic ring spot	x						x				x			x				x	x	x				
Pink patch	x								x									x	x	x			x	x
Powdery mildew	x						x							x				x	x	x		x		
Pythium blight	x		x			x				x		x					x		x					
Rapid blight												x								x				x
Pink patch	x			x			x				x	x		x		x		x	x	x		x	x	x
Red thread	x			x			x	x			x	x		x		x		x	x	x		x	x	x
Rhizoctonia brown patch	x		x	x			x	x	x		x	x		x	x	x		x	x	x	x	x	x	x
Rhizoctonia large patch	x		x	x			x	x	x		x	x		x	x	x		x	x	x	x	x	x	x
Rhizoctonia yellow patch	x			x				x	x							x		x		x				
Rust	x			x								x		x				x	x	x		x	x	
Septoria leaf spot														x										
Slime mold												x												
Smut														x				x		x		x		
Summer patch	x						x	x						x				x	x	x		x	x	x
Take-all patch/root rot	x						x							x				x	x	x		x		
Typhula blight	x		x	x			x	x	x		x				x	x		x	x		x	x		x

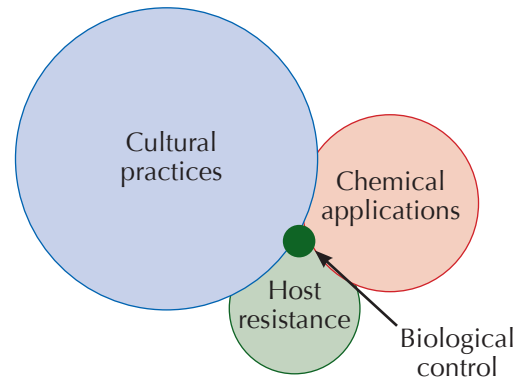
### Choosing the right tactics for your lawn

Disease management methods are greatly influenced by economics and practicality (Figs. 3 and 4). Turfgrass professionals must often use intensive maintenance practices to keep the landscape looking its best. In these situations, they rely mainly on chemical and cultural control measures. Because pest-control companies often have no control over mowing, site preparation, or fertilization, they must rely heavily on chemical control.



**Figure 3.** Relative practicality of disease management tools for professional turfgrass managers.

Conversely, homeowners who maintain their own lawns often have limited access to effective plant-protection products and tools. Their disease-management options are often limited to cultural practices such as proper mowing, irrigation management, and fertilizer applications.



**Figure 4.** Relative practicality of disease management tools for homeowners.

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