

# Powdery Mildew

[*Blumeria graminis*]

## SYMPTOMS

The symptoms of powdery mildew are typically most severe in heavily shaded areas. In the initial stages of disease development, a white or gray, powdery growth is evident on infected leaves. Heavily infected leaves turn yellow or red and die slowly. If left uncontrolled for several weeks, powdery mildew will cause significant thinning of the turf and may also increase its susceptibility to environmental stresses or other pests.



Characteristic	Description
Host Grass Species	Kentucky bluegrass, fine fescue, perennial ryegrass
Month(s) with symptoms	April to September
Stand Symptoms	irregular distribution across turf stand
Foliar Symptoms - Location/Shape	dieback from leaf tip, blighting of entire leaves, or no distinct leaf symptoms
Foliar Symptoms - Color	white
Root/Crown Symptoms	none
Fungal Signs	powdery spore masses

**Note:** Still not sure if this is the right disease? The [Turfgrass Disease Identification](#) program may be helpful. Or consult the experts at the [Turf Diagnostics Lab](#). Check the TurfFiles [glossary](#) for definitions of unfamiliar terms.

## FACTORS AFFECTING DISEASE DEVELOPMENT

The fungus survives the winter in living plant tissue. Spores are produced in the spring and are spread to healthy tissue by wind. The spores germinate and infect leaves during cool, humid conditions in the spring and fall. Because sunlight inhibits growth of the powdery mildew fungus, turf that is growing in dense shade is most prone to the disease. Unlike most foliar diseases, leaf wetness is not required for development of powdery mildew, but high humidity is necessary.

## CULTURAL CONTROL

Planting shade-tolerant grasses, such as the fine fescues (hard fescue, chewings fescue, or red fescue), is one of the best means of preventing severe problems with powdery mildew. A mixture of Kentucky bluegrass in combination with tall fescue and a fine fescue is preferred.

Turf growing in shade uses less nitrogen, requires less water, and is less tolerant of low mowing. Management practices should be adjusted accordingly for shaded areas. Apply no more than 1 pound of nitrogen per 1,000 square feet at any one time. Maintain mowing height at approximately 3 inches to increase rooting and provide greater leaf surface for photosynthesis. Water deeply and infrequently to a depth of 6 to 8 inches to enhance rooting and reduce leaf wetness. Avoid light, frequent watering and do not irrigate just before or after sunrise. Pruning, removal, or careful placement of trees and shrubs to increase light intensity and air movement will help control powdery mildew.

## CHEMICAL CONTROL

Through the use of proper cultural practices, powdery mildew can be managed to acceptable levels without fungicides in most cases. Fungicides can be applied on a curative basis if an unacceptable amount of disease develops. Mapping affected areas for treatment will help to minimize fungicide use.

Fungicide	Efficacy <sup>(1)</sup>	Resistance Risk <sup>(2)</sup>	Class <sup>(3)</sup>	Products <sup>(4)</sup>
mancozeb + myclobutanil**	++++	6	dithiocarbamate + DMI	Manhandle
myclobutanil	++++	6	DMI	Eagle, Myclobutanil
propiconazole	++++	6	DMI	Banner MAXX, Kestrel, Kestrel MEX, ProPensity, Propiconazole, Propiconazole G-Pro, Propiconazole Pro, Savvi, Spectator, Strider
tebuconazole**	++++	6	DMI	Torque
triadimefon	++++	6	DMI	Bayleton, Granular Turf Fungicide, Systemic Fungicide
triticonazole	++++	6	DMI	Trinity, Triton
chlorothalonil + propiconazole**	++++	6	DMI + nitrile	Concert
chlorothalonil + propiconazole + fludioxonil**	++++	6	DMI + nitrile + phenylpyrolle	Instrata
azoxystrobin + propiconazole	++++	9	DMI + Qol	Headway
triadimefon + trifloxystrobin	++++	6	DMI + Qol	Armada, Tartan
mancozeb + copper hydroxide**	?	3	dithiocarbamate + inorganic	Junction
fenarimol**	?	6	DMI	Rubigan
azoxystrobin	?	9	Qol	Heritage
pyraclostrobin	?	9	Qol	Insignia

\*\* Not for application to residential lawns.

### Footnotes:

#### (1) Efficacy Codes:

++++	excellent control when conditions are highly favorable for disease development
+++	good control when disease pressure is high, or excellent control when disease pressure is moderate
++	good control when disease pressure is moderate, excellent control when disease pressure is low
+	good control when disease pressure is low
0	does not provide adequate control under any conditions
?	cannot be rated due to insufficient data

#### (2) Resistance Risk:

- Rotating and tank-mixing not necessary, but recommended to avoid potential side effects from continuous use of same chemical class.
- Rotate to different chemical class after 3-4 applications; tank-mixing not necessary.

- 3 Rotate to different chemical class after 2-3 applications; tank-mixing not necessary.
  - 4 Rotate to different chemical class after 1-2 applications; tank-mixing not necessary.
  - 6 Rotate to different chemical class after 1-2 applications; tank-mixing with low or moderate risk product recommended.
  - 9 Rotate to different chemical class after EVERY application; tank-mix with low or moderate risk product for EVERY application.
- (3) Continual use of fungicides with similar control mechanisms (modes of action) can result in fungi that are resistant to some chemicals. Poor or ineffective disease control can be expected when this occurs. Managers can reduce the chances of this happening by mixing or alternating fungicides belonging to different chemical classes.
- (4) Recommendations of specific chemicals are based upon information on the manufacturer's label and performance in a limited number of trials. Because environmental conditions and methods of application may vary widely, performance of the chemical will not always conform to the safety and pest control standards indicated by experimental data. When more than one brand name exists for an agricultural chemical, the name of brand that first came onto the market is listed first. Otherwise, brand names are listed in alphabetical order. The order in which brand names are given is not an indication of a recommendation or criticism.

Recommendations for the use of agricultural chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention or listing of commercial products or services does not imply endorsement by North Carolina State University or discrimination against similar products or services not mentioned. Other brand names may be labeled for use on turfgrasses. Individuals who use agricultural chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage regulations and examine a current product label before applying any chemical. For assistance, contact your county's Cooperative Extension agent.

**Useful links:**

Glossary: <http://www.turffiles.ncsu.edu/Glossary.aspx>

Turf Diagnostics Lab: <http://ncstateturfdiagnostics.com/TDL/Home.html>

Turfgrass Disease Identification Program: <http://www.turffiles.ncsu.edu/diseaseID/>

Turfgrass Disease Management Program: <http://www.turffiles.ncsu.edu/diseasemgmt/>

Turf Irrigation Management System: <http://www.turffiles.ncsu.edu/tims/>

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