

Pythium Root Rot

[*Pythium spp.*]



SYMPTOMS

Pythium root rot is a persistent problem in areas that are poorly drained or over-irrigated. The disease can also occur in well-drained areas following extended periods of rainfall. *Pythium* root rot can occur at any time of the year as long as the soil remains saturated for several days or weeks. From a distance, symptoms are orange or yellow and usually appear in irregular patterns, but occasionally develop in spots or distinct patches. Symptoms of *Pythium* root rot may spread in drainage patterns during periods of heavy rainfall. On individual plants, the crowns, roots, rhizomes, and/or stolons will appear dark and greasy. The depth and density of roots will be drastically reduced in affected areas.



pythium root rot on bentgrass

Characteristic	Description
Host Grass Species	all
Month(s) with symptoms	all
Stand Symptoms	irregular distribution across turf stand
Foliar Symptoms - Location/Shape	dieback from leaf tip, blighting of entire leaves
Foliar Symptoms - Color	tan, yellow, orange
Root/Crown Symptoms	roots, stolons, rhizomes, and/or crowns dark brown or black
Fungal Signs	none

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

There are many species of *Pythium* that have the ability to cause root rot of turfgrasses. As a result, *Pythium* root rot can develop at any time during the growing season if the soil remains saturated for prolonged periods. Poor surface or subsurface drainage, over-irrigation, heavy rainfalls, and excessive thatch and organic matter accumulation are the most common factors that lead to a *Pythium* root rot outbreak.

CULTURAL CONTROL

Avoid establishing turfgrasses in poorly drained areas that remain saturated for extended periods. Golf course putting greens must be aerified and topdressed regularly to control thatch and reduce organic matter accumulation. In general, 15% to 20% of the putting green surface area should be impacted by hollow-tine aerification annually, and 5000 lbs of topdressing should be applied per 1000 ft² each year. Pruning or removal of trees surrounding putting greens to increase sunlight penetration and air movement will reduce *Pythium* root rot activity. Installation of high-powered fans will also help to alleviate the problem where air movement is restricted. For golf course putting greens with poor internal drainage, reconstruction is the only practical long-term solution for *Pythium* root rot.

CHEMICAL CONTROL

Little is known about the relative efficacy of fungicides for *Pythium* root rot control. Where this disease has been a persistent problem, apply cyazofamid, mefenoxam, or propamocarb every 14 to 21 days during the growing season or when rainfall occurs for 2 to 3 consecutive days. For curative applications, first apply ethazole then follow with an application of cyazofamid, mefenoxam, or propamocarb 2 to 3 days later. To minimize the potential for foliar burn, ethazole must be watered-in immediately after application with at least 1/8" of water. Other fungicides should also be watered-in to drive the active ingredient into the root zone where the *Pythium* root rot pathogens are most active.

Fungicide	Efficacy ⁽¹⁾	Resistance Risk ⁽²⁾	Class ⁽³⁾	Products ⁽⁴⁾
ethazole**	+++	2	aromatic hydrocarbon	Koban, Terrazole
propamocarb + fluopicolide**	+++	4	benzamide + carbamate	Stellar
propamocarb	+++	4	carbamate	Proplant, Banol
mefenoxam	+++	6	phenylamide	Subdue, Fenox, Mefenoxam 2, Mefenoxam 2 AQ, Quell
metalaxyl	+++	6	phenylamide	Vireo
cyazofamid**	+++	6	Qil	Segway
fosetyl-Al**	+	2	phosphonate	Autograph, Fosetyl-Al, Prodigy Signature, Signature
phosphorous acid**	+	2	phosphonate	Alude, Magellan, Resyst, Vital, Vital Sign
azoxystrobin + propiconazole	?	6	DMI + Qol	Headway
fluoxastrobin + myclobutanil	?	6	DMI + Qol	Disarm M
chlorothalonil + fluoxastrobin**	?	6	nitrile + Qol	Disarm C
azoxystrobin	?	6	Qol	Heritage
fluoxastrobin	?	6	Qol	Disarm, Disarm G

** 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:

- 1 Rotating and tank-mixing not necessary, but recommended to avoid potential side effects from continuous use of same chemical class.
- 2 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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