

# CUTT

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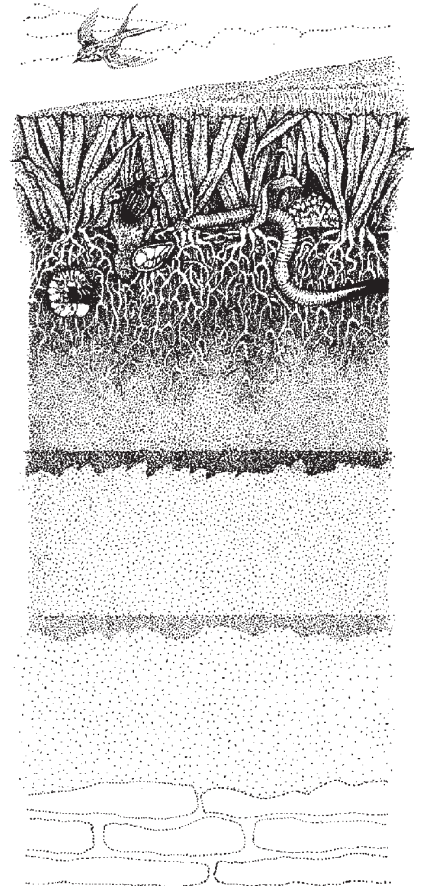
## Biology And Control Of Pythium Root And Crown Rot Diseases

Over the past few years, Pythium root and crown rots (PRR) have become more of a problem on highly managed turfgrasses nationwide. The disease complex is characterized by a root and crown decay leading to a thinning or eventual loss of an established turfgrass stand. Although the occurrence of this disease has been most frequently associated with established, highly maintained bentgrass/annual bluegrass putting greens on golf courses, it can also be a serious problem on highly managed home lawns and newly seeded areas. The disease can be quite damaging to many of the commonly planted turfgrass species, but it is particularly severe on ryegrasses, bentgrasses and bluegrasses (*Poa annua* and *P. pratensis*). ■

While Pythium species can be readily isolated from healthy as well as diseased turfgrass roots and crowns, a number of different Pythium species associated with turfgrasses have been shown to be pathogenic. Some strains of *Pythium aphanidermatum*, *P. graminicola*, *P. myriotylum*, *P. aristosporum*, *P. periplocum*, *P. vanterpoolii* and *P. arrhenomanes* have been shown to be pathogenic to turfgrass roots under warm (75-85° F) conditions, while strains of *P. graminicola*, *P. vanterpoolii*, *P. torulosum*, *P. aphanidermatum* and *P. aristosporum* have been shown to be pathogenic under cool (45-60° F) conditions. All species require prolonged wet periods to induce severe disease development.

Early symptoms of PRR may be visible in the spring immediately after snow melt, but are most common in the early spring (Mar - May). Symptoms, however, may be evident at any time throughout the growing season and disease activity may continue into late autumn. From observations of the disease in the Northeastern U.S. over the past several years, it appears that particular sites are more prone to PRR damage in early spring and late autumn, while other areas experience the problem primarily in warmer parts of the season. This is perhaps related not only to variation in the native complex of pathogenic Pythium species

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## Root & Crown Rot Diseases

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**Severity of PRR damage can apparently be avoided by maintaining an extensive and vigorous plant root system. In general, any management practices that will reduce plant stress or eliminate prolonged wet periods will help to minimize losses from PRR.**

**Pathogen inoculum levels in soil are rarely suppressed following fungicide applications.**

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associated with different sites, but also to the management practices unique to particular areas that may limit the activity of certain species and favor the activity of others.

Under the cool wet conditions typical of early spring (Mar - May) and late autumn (Oct - Nov), symptoms may first appear as small diffuse yellow or reddish brown patches of turf approximately two to three inches in diameter. Symptoms often closely resemble the early stages of pink snow mold (*Microdochium nivale*) damage. In the spring, plants may be slow to come out of dormancy and growth may be less vigorous than in uninfected plants. Under severe conditions, patches of infected turf may coalesce and large areas may appear yellow and in a general weakened condition. Commonly,

affected turf responds poorly to the application of fertilizers. As the season progresses and temperatures warm, large areas of turf may wilt, turn yellow to brown, and then die.

Under warm wet conditions of mid-summer (Jun - Aug), initial symptoms appear as small tan to brown or bronze patches of turf very similar in appearance to dollar spot patches. These patches may converge on one another and affect large areas of turf where extensive stands of plants rapidly wilt and die. With severe infections, plants may wilt rapidly under heat stress and thinning may be so extensive that large areas of turf may become devoid of plants. Recovery of these severely affected areas may take an entire season.

**Fungicides for the Control of Root-Rotting Pythium Diseases of Turfgrasses**

Fungicide	Trade Name(s)	Application Rates		
		Formulation(s)	(per 1000 ft <sup>2</sup> )*	
Chloroneb	Teremec SP <sup>®</sup>	65W	Not Recommended	
	Tersan SP <sup>®</sup>	65W	Not Recommended	
	Scott's ProTurf Fungicide II <sup>®</sup>	6.3G	Not Recommended	
Ethazole	Koban <sup>®</sup>	30W	7-9 oz	
		1.3G	8 lb	
	Terrazole <sup>®</sup>	35W	8 oz	
Mancozeb	Fore <sup>®</sup>	80W	Not Recommended	
	Lesco 4 <sup>®</sup>	80W	Not Recommended	
	Lesco Mancozeb <sup>®</sup>	DG	Not Recommended	
	Manzate 200 <sup>®</sup>	37F	Not Recommended	
		75DF	Not Recommended	
Metalaxyl	Tersan LSR <sup>®</sup>	80W	Not Recommended	
	Subdue <sup>®</sup>	2E	2 oz	
		2G	1.5 lb	
		5G	10 oz	
	Scott's Pythium Control <sup>®</sup>	1.2G	2.5 lb	
(+triadimefon)	Scott's Fluid Fungicide II <sup>®</sup>	16AS	Not Recommended	
(+mancozeb)	Pace <sup>®</sup>	7+14S	Not Recommended	
	Phosetyl-Al	Aliette <sup>®</sup>	80W	4-8 oz
	Propamocarb	Banol <sup>®</sup>	6S	2-4 oz

\* NOTE: All fungicides must be thoroughly watered-in to get effective Pythium root rot control. Only Aliette can be applied as a spray and still maintain control of PRR.

Unlike Pythium blight, no foliar mycelium is evident during periods favorable for infection and rarely can PRR be diagnosed from field symptoms alone. Only upon microscopic examination of roots and crowns can one effectively determine whether root and crown damage from Pythium species has occurred. Typically, damage is first evident in the crown with the roots largely unaffected. However, on severely infected plants, root systems are greatly reduced in volume and vigor and may be extensively discolored. Crown areas may also appear water-soaked and greatly discolored. If root systems are not well developed prior to infection by Pythium species, the level of damage that a root system can sustain and still function becomes dramatically reduced, and severe plant decline can occur. Heavily infected roots and crowns may also contain abundant oospores of the pathogen. These spores allow the fungus to survive unfavorable environmental conditions in a dormant state. As a result, the disease is insensitive to many control measures, including most fungicidal treatments. Therefore, for fungicides to be effective, the target Pythium species must be in a non-dormant, active state.

Severity of PRR damage can apparently be avoided by maintaining an extensive and vigorous plant root system. In general, any management practices that will reduce plant stress or eliminate prolonged wet periods will help to minimize losses from PRR. If conditions warrant the application of fungicides, it is recommended that a currently labelled Pythium fungicide be carefully chosen and thoroughly watered-in. Although turfgrasses affected with PRR respond to drenches with Pythium-selective fungicides, symptoms may frequently recur, particularly as temperature and precipitation change. Pathogen inoculum levels in soil are rarely suppressed following fungicide applications.

Damage from PRR has also been observed to be enhanced following continuous applications of broad-spectrum fungicides. It is therefore recommended that these types of fungicides be used sparingly on sites with a history of PRR and during periods favorable for Pythium infection.

The currently available Pythium fungicides are listed in the table on page 4. Of the systemic fungicides, Banol or Aliette have been most effective in controlling PRR in the Northeastern U.S. Subdue has been effective in some locations but has failed in others. The granular formulations of Subdue have been more effective than the liquid formulation. Koban and Terrazole are contact fungicides that have also been effective in some locations for the

control of PRR. For those sites with a history of early spring PRR problems, a fall application (mid Oct - mid Nov) of an appropriate Pythium fungicide (usually Banol) is most effective in suppressing disease development early in the spring. This should be followed-up by another application in the spring. In order for control to be effective at any time during the season, the fungicide must reach the root zone. We therefore recommend that all fungicides be thoroughly watered-in at the time of application. It is also advisable to avoid continuous application of any one fungicide on the same site since this practice may enhance the development of fungicide-resistant Pythium populations.

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## Scanning the Journals

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before tillering, but the rate had to be doubled to produce control after tillering. In MA, however, excellent control was seen on tillered crabgrass at the lower rate in plots which were irrigated and fertilized. Control with MSMA at 2.0 lb/A was equal to that obtained with fenoxaprop. Best results in NY were obtained with fenoxaprop plus DCPA applied before tillering at the 0.34 lb/A rate, or fenoxaprop alone applied after 3-5 tillers had formed. Slight and temporary turfgrass injury was seen at some sites at the higher fenoxaprop rates, but none at the lower.

Fenoxaprop efficacy was not affected by spray volume (between 37-296 gal/A) but increased with application rate (0.18 - 0.36 lb/A). Results of nozzle type tests varied by site. Fan nozzles appeared to work better in dense turf or dry conditions. Surfactant results varied but generally were without effect.

Dry conditions, which reduce crabgrass growth, also reduced fenoxaprop efficacy, but had less effect on MSMA. Dr. Neal concludes that low rates of fenoxaprop can control crabgrass in cool season turfgrass, but further research is needed to assess its performance under drought conditions.

*(From: J.C. Neal, P.C. Bhowmik, and A.F. Senesac. 1990. Factors Influencing Fenoxaprop Efficacy in Cool-Season Turfgrass. Weed Tech. 4:272-8.)*

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