

Pythium spp.

Dr John Semple

Pythium spp. is closely related to *Phytophthora* spp. and attacks the roots and stems of virtually any plant. There are more than one hundred different species of *Pythium*, but not all of these are plant pathogens. Whilst *Pythium* can be less damaging than *Phytophthora* spp. It can nonetheless be troublesome on seedlings, cuttings, bedding plants, pot plants and turfgrass. The larger shrubs and trees can usually tolerate an infection without any adverse effects.

Symptoms

Pythium is a pathogen that attacks the roots. Symptoms above the soil line appear after the roots have become infected.

Pythium (together with *Rhizoctonia*) is a common cause of damping-off of seedlings. The term is used to describe underground, soil line, or crown rots of seedlings. When severe, the lower portion of the stem can become slimy and black. Usually, the soft to slimy rotted outer portion of the root can be easily separated from the inner core. Damping-off may occur pre-emergence (results in gaps where the germinating seed has decayed) or post-emergence (the seedling has rotted away shortly after reaching above soil level).

Pythium root rot is difficult to control once rot has begun. While root rot can be caused by several different species of *Pythium*, the three most commonly encountered species are *P. irregulare*, *P. aphanidermatum* and *P. ultimum*. *Pythium* root rot may lead to the development of foliar symptoms, because the plant cannot take up enough water or nutrients through its damaged root system. The severity of these symptoms will depend on the extent of the

root damage. This may range from a slight stunting and leaf yellowing to wilting and complete collapse of the plant. *Pythium* may also cause a soft decay of the stem base.

Pythium blight is another form of the disease that can be especially damaging to turfgrasses, including creeping bentgrass, *Poa annua*, rough bluegrass and perennial ryegrass. It spreads very quickly, affects leaves and crowns and kills plants, resulting in extensive loss of the turf stand. *Pythium* blight occurs when dew periods are long and evening temperatures are 20°C or higher. Late afternoon rain or irrigation further favours disease development and may be responsible for rapid spread of pathogen. Initial symptoms include small, circular patches of collapsed, water soaked leaves and stems on close-mown turf. Infected turf may also show cottony white mycelium but infected turf quickly dies and becomes matted.

As the fungus overwinters in soil and plant debris its spread is associated with water movement. Modifying the environment may help reduce the severity of *Pythium* blight but accurate identification and conformation is required to allow the most effective fungicides to be applied.

Microscopic examination is usually required to see *Pythium*, but the organism is occasionally visible to the eye when humidity levels are high. It can appear as a fine white/silver growth over seedlings in a severe case of damping-off.

Biology

Pythium species produce tiny swimming

zoospores and the disease is therefore more damaging when the growing medium is overwet. *Pythium* also produces long-lived resting spores (oospores and chlamydospores). These are released from the decaying plant tissue and can contaminate machinery or that. Workers footwear may also become contaminated as may re-circulated irrigation water.

Where plants are in close contact, *Pythium* can also spread from plant to plant as vegetative growth or mycelium. Rapid damping-off normally occurs due to this type of spread.

Diagnosis

Various tests exist for the detection of *Pythium*. These may include microscopic examination to look for characteristic fungal structures or floating plat material in mineral solution to encourage sporulation. A more recent method includes the use of rapid serological based field tests that identify *Pythium*.

Prevention

Ensure that soils, growing media and standing areas are well drained.

Ensure that water used for irrigation is free from *Pythium*.

For nurseries inspect bought in plants and if possible have a quarantine area where stock can be held and monitored for disease.

In the case of nurseries dispose of *Pythium* infected plants immediately and carry out rigorous hygiene measures to prevent further spread.

Endophyte in Grasses

An Endophyte is a fungus which lives within the tissues of a grass plant, obtaining its nutrition from the plant in return. The major benefit the grass plant receives is insect resistance from chemicals the fungus produces. These endophytic fungi are only found in a limited number of turf grass varieties, within the fescue and perennial ryegrass species.

The plant becomes infected with the fungus only if its parent plant was infected. The seed produced by an endophyte infected plant will result in an infected plant which produces infected seed. The fungus cannot be spread from plant to plant in an existing lawn.

With high levels of endophytes, grasses will show resistance to Argentine Stem Weevil, Sod Webworms, armyworms, billbugs, nematodes. This resistance occurs through the production of chemicals, called alkaloids, by the fungus, which are harmless to the plant, but toxic to the insects.

An endophyte enhanced turf also tolerates stress, such as heat or drought, much

better than a common turf. Key factors in surviving periods of stress are reducing water loss through the plant and maintaining water uptake into the plant. As most insects damage directly affects these plant functions, a turf with less insect damage will better tolerate drought and stress. Endophytes have also been shown to directly affect the water relations, increase root growth and increase competitiveness even without insect effects.

Percent Infection

Level 1.	85-100%	High
Level 2.	70-84%	Medium
Level 3.	0-69%	Low

Levels of Endophyte vary among varieties of the same species of grass plants, and are not considered significant unless greater than 70%. More than 70% of seeds contain the endophyte fungus.

Over a period of time the endophyte infection level in a turf will actually increase, as the weaker plants without endophyte will be out

competed by the stronger endophytic plants. Thus a turf can improve as it ages.

There are now many varieties of ryegrasses and fescues which contain some level of endophyte. Bentgrasses have yet to show endophyte enhancement, and Kentucky bluegrass has done so only minimally. Both species could potentially be developed to offer high levels of the fungus.

Forage grasses high in endophyte have been shown to cause illness in some grazing animals, so endophyte grasses should not be used where they will be grazed on.

The viability, or effectiveness, of the endophyte fungus will decrease over time. Seed should be stored in a cool, dry location, and one should purchase fresh seed to minimise this decrease. Buying seed less than a year and half old is advisable.

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