

Phytophthora Root and Collar Disease

Drew Zwart, PhD, Plant Physiology

Phytophthora root disease is a widespread but often overlooked disease of landscape plants. There are many species in this genus that attack woody ornamentals. These fungus-like organisms grow in the fine roots, cambium, and sapwood causing death of the tissue. Loss of water and nutrient absorbing capacity and stored carbohydrate reserves in the root cause a gradual, or sometimes rapid decline of the above ground portion of the plant.

Phytophthora diseases are most common on soils that are poorly drained or receive excessive irrigation and also in nurseries. Decline and death of new plantings may result from planting diseased stock. *Phytophthora* is a soil-borne organism which does not survive well in dead tissue, but forms resting spores that can survive long periods without a host. When soil moisture and temperature conditions favor disease development, *Phytophthora* can increase rapidly from undetectable levels to infestations.

Hosts

There are thousands of plant species that are susceptible to various *Phytophthora* species, and root and root collar diseases are typically most severe on plant species that are intolerant of poor soil drainage. The following species commonly suffer from *Phytophthora* root disease: azalea, rhododendron, Japanese holly, boxwood, hemlock, mountain laurel, dogwood, andromeda, fir (*Abies*), camellia, white pine, and *Taxus*. *Phytophthora* also causes root disease and collar rots of woody ornamentals. Oaks, beech, fruit trees (*Prunus*, *Malus*, citrus, avocado), dogwood, sugar and red maple and *Zelkova* are particularly prone to collar rot.

Symptoms

Symptoms of root disease vary depending on the susceptibility of the plant species, the virulence of the specific *Phytophthora* species and site (environmental) conditions. A chronic form of the disease causes a slow, progressive decline with a reduction in shoot growth, small leaves, thinning of the crown, chlorosis,

twig and branch dieback and eventually death (Figure 1). Diseased roots are discolored, lack fine roots, and are pulled apart easily (Figure 2). Rapid wilting (Figure 3) and death of the entire plant characterize the acute form of the disease. *Phytophthora* lesions may extend into the root collar, which causes girdling of the stem and rapid collapse of the crown.

Figure 1: Fine root death caused by *Phytophthora* may lead to symptoms of nutrient deficiency due to reduced uptake capability



Diagnosis/Confirmation

Infection can occur months or years ahead of first visible symptoms. On some plant species, symptoms do not appear until root or collar rot is advanced. When *Phytophthora* is found on a declining plant, it is likely to be the agent causing the problem, or at least, a significant contributing factor.

Disease Management/Prevention

Where soils are poorly drained and prone to inundation/flooding, use species that are tolerant to these soil conditions. Ensure that the root collar is exposed and free of soil and mulch. Species planted on sites subject to saturated soils may require periodic treatment (annual to biannual) with fungicides to minimize new infections. Organic matter amendments and mulching with woodchips will improve the overall soil conditions including drainage and microbial community and will help suppress the pathogen.

Figure 2: *Phytophthora* infected roots will be discolored, lack fine roots, break or pull apart easily, and often have sloughing root bark



Remedial Treatments: Plants exhibiting chronic disease symptoms should be treated with an approved product for managing *Phytophthora*. Treating surrounding susceptible plants on a preventative basis also is recommended. Improve soil drainage as needed; proper mulching, irrigation and root collar excavation as outlined under preventative treatments are recommended to reduce the incidence and severity of the root rot.

Figure 3: Fine root death caused by *Phytophthora* can lead to wilting or water-stress symptoms even when ample soil moisture is present



Founded in 1926, The Bartlett Tree Research Laboratories is the research wing of Bartlett Tree Experts. Scientists here develop guidelines for all of the Company's services. The Lab also houses a state-of-the-art plant diagnostic clinic and provides vital technical support to Bartlett arborists and field staff for the benefit of our clients.