

Phytophthora Canker

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Many *Phytophthora* species attack shade trees and landscape ornamentals causing root and root collar disease, stem cankers, and foliage lesions. Several species of *Phytophthora* are capable of causing stem cankers on various tree species, including common combinations like *P. cactorum* on beech, maple, and various fruit trees, and *P. ramorum* on oaks. Sometimes, *Phytophthora* lesions on trunks are actually an advanced root infection that has moved into the trunks as is often the case when *Phytophthora cinnamomi* causes 'bleeding' lesions in oak species.

Pathogen

Phytophthora belongs to a group of fungus-like organisms known as oomycetes, or in older literature, 'water molds.' These fungi thrive in areas of high moisture content, particularly saturated soils. *Phytophthora* is primarily soil-borne and moves

Figure 1: Typical *Phytophthora* canker on lower trunk of white oak



through saturated soils as motile (swimming) zoospores. The oomycete also has other spore forms that support long-term survival of the organism. When any of these spores come in contact with wounds or succulent plant tissue, germination occurs and the fungus invades the plant tissue. Plants in poor health are more susceptible to invasion from *Phytophthora*. Trunk infections may be the result of advanced root infection, spore splash from soil, or spore splash from infected foliage of other plants.

Hosts

P. cactorum attacks plants in over 80 genera. Trees that display bleeding canker symptoms include American and European beech; sweet birch; flowering and Pacific dogwoods; sweet gum (*Liquidambar*); horse-chestnut; linden; madrone; black, Norway, red, silver, sugar, and sycamore maples; California live, southern, live, pin, and red oaks; tulip tree; weeping willow; avocado; apple; citrus and other fruit trees. Several other lesion-causing *Phytophthora* species have narrower host ranges, but the disease cycle is similar.

Symptoms

Leaf number and size will be decreased in older trees that become infected with this pathogen. Chlorosis

will usually accompany these symptoms along with branch dieback. A furrowed appearance on the trunk and fluid exudation from a darkened canker will usually be present (Figure 1). Bacterial cankers produce similar symptoms on the trunk, but also produce a fermented, fruity odor. Infected trees are more susceptible to attack by secondary pests such as ambrosia beetles or bark beetles.

Diagnosis

Early detection of symptoms should lead to further inspection of the trunk and collar area. Cankers are generally elongate, with the phloem and sapwood stained reddish-brown, which is evident upon removal of the bark. There is often a distinct black line between healthy and dead tissues at the margin of *Phytophthora* infections. Cankers produce characteristic oozing of darkened sap on bark surface (Figure 2). This organism produces no fruiting bodies such as mushrooms, so an accurate and thorough investigation of symptoms is necessary. If *Phytophthora* is suspected, a sample of infected wood and bark should be collected and submitted to a diagnostic lab for testing and confirmation. A hole saw or wood chisel should be used to collect infected cambial tissue below the bark surface (Figure 3).

Figure 2: Sap exudation



Disease Management

Irrigate as needed to maintain soil moisture, but not to excess. Use tensiometers to monitor soil moisture. Avoid direct irrigation contact with the trunk by using a soaker hose instead of sprinkler irrigation. Mildly affected trees are known to recover, but if the root flare is not visible, removal of soil, mulch and ground covers is recommended. In addition to these practices, soil or bark applications of systemic fungicides help arrest further development of the disease, and in some cases, bark “shaving” to expose the canker margin can help arrest disease development.

Figure 3: Collecting a sample of infected tissue

