Phytophthora Canker
Identification, Biology and Management

Many *Phytophthora* species attack shade trees and landscape ornamentals causing diseases including root and root collar decay, stem cankers and foliage lesions. *Phytophthora cactorum* is the most common causal agent for bleeding canker in hardwoods, and was first reported on Maple in New Jersey in 1940. In addition to shade and ornamental trees, fruit and nut trees are susceptible to Phytophthora canker. In addition to cankers, *P. cactorum* also causes fruit and root rot and twig dieback on some plant species. This fungus occurs from California to the Northeast and throughout Canada as well. Other species of *Phytophthora* are associated with bleeding cankers including *P. ramorum* and *P. inflata*.

**PATHOGEN**

*Phytophthora* belongs to a group of primitive fungi known as the water molds. These fungi thrive in areas of high moisture content. *Phytophthora* is primarily soil-borne and moves through saturated soils as motile zoospores. The fungus 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*. It is poorly understood how infection of stem tissue occurs, but possibilities include rain-splash from soil, insect vectors and movement of infected plants and soil.

**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; 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.

**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. Bacterial cankers produce similar symptoms on the trunk, but also produce a fermented, fruity odor.

**DIAGNOSIS**
Early detection of symptoms will 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. Cankers produce characteristic oozing of darkened sap on bark surface. This fungus produces no fruiting bodies, 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 screened using a field ELISA detection kit or 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.

**DISEASE MANAGEMENT**
Irrigate as needed to maintain soil moisture, but not to excess. Use tensiometers to monitor soil moisture. Avoid excessive moisture contact with the trunk by the use of a soaker hose instead of sprinkler irrigation. Reduce practices that produce tender succulent growth such as high-nitrogen fertilizer. In some severe cases trees might
have to be removed to prevent inoculum spread to healthy plants. 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 applications of systemic fungicides may help arrest further development of the disease. In California, Copper fungicide sprays to the bark are being recommended to prevent infection by the *Phytophthora* that causes Sudden Oak Death.