



Bleeding Canker Disease of Silver Maple Trees A Guideline for Nursery/Landscape Professionals and Homeowners

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March, 2008

Plant Disease 003

Background

In 1999, a canker disease showing bleeding and oozing black sap, symptomatically similar to sudden oak death, was first noticed on a mature silver maple tree in Reno, Nevada by Leslie Lyles. Since then, she has kept records of all the reported new cases of this disease. By 2002, more than 20 mature silver maple trees had been reported with the disease, and most of them died and were removed without a formal investigation. It is believed that more infected trees remain unreported. Since 2002, an investigation has been conducted to identify the cause of the disease. Two species of *Phytophthora* have been isolated from the infected trees. One was identified as *P. cactorum*, and another as an undetermined *P. citricola*-related species. It is believed that they are pathogens that cause bleeding canker either alone or together on mature silver maples. This information sheet is intended to help nursery and landscape professionals and homeowners to be aware of and manage this disease.

Symptoms

The typical symptom of silver maple bleeding canker is the presence of dark brown bleeding sap dripping down on the

surface of the lower trunk (Fig.1). The bleeding area is the location where bark is cankered. Cankers can be found up to 8 feet above the soil line. Permanent dark staining is seen when the bleeding sap dries.



Figure 1. Dark brown bleeding sap seen dripping down the trunk surface of a silver maple tree. The tree was infected by *Phytophthora cactorum*. Green arrow indicates the dark brown sap (© Nevada Department of Agriculture)

When the outer bark tissue is removed, clear lesions can be seen in the inner bark (Fig. 3). In an old canker area, bark may crack. Infected trees decline gradually with dieback of some branches. Trees with girdled canker will eventually die.

Pathogens

Silver maple bleeding canker can be caused by several species of *Phytophthora*. The most prominent species is *P. cactorum*. Our recent investigation confirmed that *P. cactorum* and one *P. citricola*-related species are responsible for silver maple bleeding canker in northern Nevada. It is possible that both pathogens infect the same tree causing severe damage.

Phytophthora cactorum is a species that parasitizes more than 200 plant species in 150 genera of 60 plant families. In a Petri dish, a purified growing colony of a *P. cactorum* is generally white to gray (Fig. 2, upper), depending on the type of growth media. Under proper nutrient conditions, the fungus produces sporangia (Fig.2, lower); each of them contains numerous zoospores. Released zoospores have two flagella and can swim in water for hours, and then develop a cell wall within minutes to form a cyst which is called encysted zoospores. Encysted zoospores germinate and infect plants.

Unlike other canker diseases, *Phytophthora* bleeding canker is very progressive. Predisposition of trees by other factors may not be necessary for its infection. Also, when a tree is infected by *Phytophthora* species, no visible fruiting body or structure can be seen with naked eyes, which makes diagnosis difficult.

The pathogens can survive in the infected bark in the form of mycelium. During the growing season, it can be transmitted by rain and water. If the fungal spores contaminate the water, the fungus can go wherever the water goes. Pruning can transmit the disease if tools are not sterilized after each pruning cut.

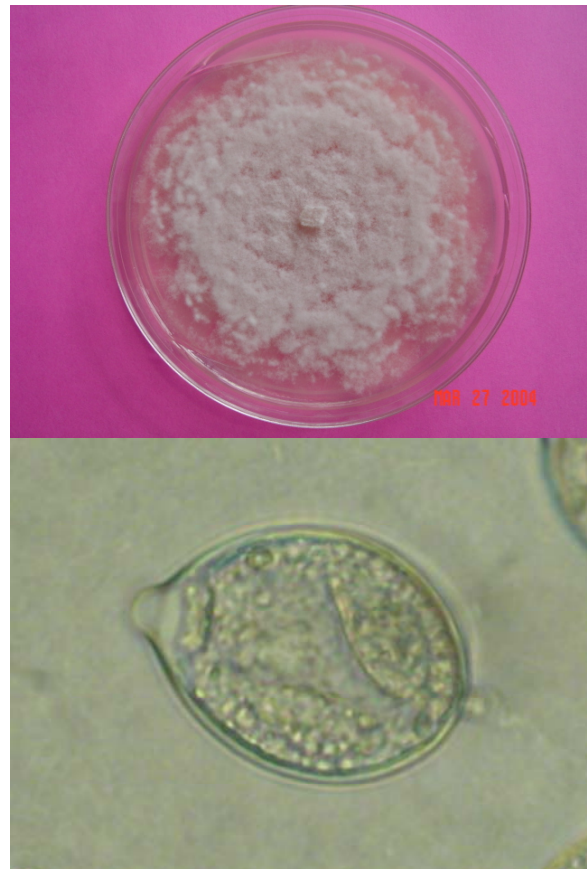


Fig.2. Characteristics of *Phytophthora cactorum* isolated from infected trees. Upper picture shows growth pattern on potato dextrose agar medium and bottom one shows papillate sporangia with short pedicels (© Nevada Department of Agriculture).

Sampling and Submission

A tree with the disease can be saved if it is detected early. The detection of silver maple bleeding canker disease is based on the observation of symptoms and identification of the fungus. Twig and branch dieback, discolored, cracked, sunken or raised bark could suggest the presence of this disease. The most diagnostic symptom is the presence of dark brown bleeding sap dripping down on the surface of trunk (Fig. 1). A hatchet can be used to scrape off outer bark tissue to reveal clear margins of lesions inside the bark (Fig.3). The tissue around the margin of the area is useful for isolation of *Phytophthora* in a plant pathology laboratory. A correct sample from each suspected maple tree should include pieces of inner bark tissue taken from the marginal area of lesions. A minimum of three pieces

of tissue should be taken from each lesion, and if possible, more lesions should be sampled. Pack samples in a new sealable plastic bag and place them on ice immediately. Ship samples on ice on the same day it is collected. A plant diagnostic form should be attached. Indicate on the form that the sample is to be tested for silver maple bleeding canker so that samples can be processed immediately. Plant disease diagnostic form can be downloaded from the Nevada Department of Agriculture website (http://agri.nv.gov/PLANT_PATHOLOGY/SPECIMENS_FOR_DIAGNOSIS_OF_PLANT_DISEASES_DISORDER_RS.pdf). To assist diagnosis, photographs of suspected maple trees can be attached or directly emailed to shwang@agri.state.nv.us.

To prevent spread of this and other diseases, tools used for sampling, such as hatchet, loppers, saws and corer, etc, must be disinfected by submerging them in the solution of 70% alcohol or household bleach containing approximately 5.25% sodium hypochlorite, or an equivalent disinfectant for at least five minutes.

Samples can be carried to or mailed overnight to:

Attn: Dr. Shouhua Wang
Plant Pathology Laboratory
Nevada Department of Agriculture
350 Capitol Hill Avenue
Reno, NV 89502
Phone (775) 688-1180 x 275

Laboratory Analysis

The Plant Pathology Laboratory will use standard procedures to isolate *Phytophthora* species from samples. The identity of a *Phytophthora* isolate will be determined by the morphology and then confirmed by their DNA sequences.

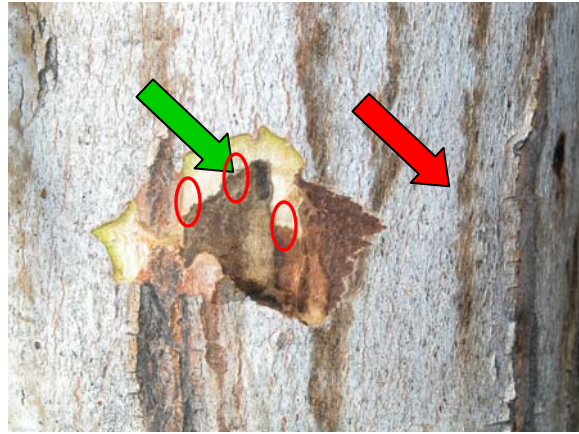


Figure 3. Superficial discoloration of bark (red arrow) indicates the presence of bark canker. Outer bark was removed to show a lesion inside that has a clear margin (green arrow) between healthy tissue and the lesion. Sample tissue should be taken from the marginal area (red circle) that has the best chance to obtain a pathogenic organism.

Management

Management of silver maple canker disease should be based on integrated pest management (IPM) principles. Plant a healthy tree on well-drained soil and prevent irrigation water from contacting the trunk. Use drip system if possible. Keep the tree vigorous by sufficiently watering and fertilizing in a regular basis. Avoid mechanical injuries to lower trunk and severe or improper pruning.

Early detection and treatment can save a tree. It is necessary to check the tree once every month to find any abnormality on the trunk or branches. When trunk starts to discolor and/or ooze sap, remove cankers and treat the surface with a disinfectant immediately to prevent further expansion of a canker area. If a tree is dying due to a girdling canker, replace the tree with other plant species. Cankered tissue and dead trunk should be disposed properly to prevent spread of the pathogen.