



Bacterial Canker & Perennial Canker of Stone Fruit

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IMPORTANCE

Bacterial canker and perennial canker are the most common branch and trunk diseases occurring on stone fruit in Kentucky. Perennial canker is also referred to as *Cytospora* canker, *Leucostoma* canker, *Valsa* canker, and peach canker. Both diseases are stress-related,

targeting injured or unhealthy trees. Dieback and decline, followed by tree death, commonly occur. Differentiating between bacterial canker and perennial canker based on symptoms alone can be difficult since they can appear nearly identical.

BACTERIAL CANKER

Hosts

All stone fruit may be affected by bacterial canker, but it occurs more commonly on sweet cherry and less frequently on peach. Various strains of the bacterial canker pathogen can cause disease in a wide range of crops, including vegetables and ornamentals, as well as other fruit. These strains, however, often have host preferences. Ongoing research is needed to determine whether strains from other hosts can infect stone fruit.

Symptoms

Lesions (cankers) developing on twigs, branches, and trunks begin as areas that appear darker than healthy bark and become sunken. As infection spreads, cankers elongate and may extend several inches before widening and girdling infected branches or trunks. Girdled branches die beyond the infection point, and girdled trunks result in tree death. Cankered tissue under the bark appears reddish brown (FIGURE 1).

A gummy, resinous sap (FIGURE 2) exudes from cankers (gummosis), which is the tree's wound response. As gummosis becomes more severe, a distinctive sour odor (sour sap) may be evident. A callus layer may form at canker margins in response to infection. Infections do not extend to roots, and surviving root systems may produce suckers around the tree base.

This disease may also affect buds in spring (blossom blast), leaves, and fruit.



FIGURE 1. REDDISH BROWN DISCOLORATION OF CAMBIUM TISSUE CAUSED BY THE BACTERIAL CANKER PATHOGEN.



FIGURE 2. ADVANCED BACTERIAL CANKER AND RESULTING GUMMOSIS.

Cause & Disease Development

Bacterial canker is caused by *Pseudomonas syringae* pv *syringae*, which overwinters in old cankers and buds, or as systemic infections within trees. The bacterium may also survive on plant surfaces as epiphytic populations. Bacterial cells ooze from cankers in early spring (2 to 3 weeks after bud break) or when weather is cool

(55°F to 75°F) and wet. The bacterium is spread by rain splash, wind, insects, and pruning tools. Bacteria can infect buds, natural openings, or injured bark tissue. As temperatures rise, disease progress ceases. Trees may then respond by forming callus tissue around cankers. Pathogen activity and disease progression resumes with cooler temperatures and wet weather.

Bacterial canker is primarily a disease of weakened or stressed trees. Healthy, vigorous trees are less prone to infection and/or significant canker damage. Infection usually occurs on young trees (2 to 8 years old). The following predispose trees to bacterial canker:

- Improper pruning
- Physical injury
- Poor fertility
- Sunscald
- Unsuitable growing site
- Winter/freeze injury.

Secondary fungal diseases may develop at canker sites (such as perennial canker). Bacterial canker and freeze injury cause peach tree death associated with peach tree short life (PTSL) syndrome.

PERENNIAL CANKER

Hosts

All stone fruit and ornamental *Prunus* species can be affected by perennial canker. Pome fruit (apple and pear), as well as ornamental woody shrubs and trees in the Rosaceae family, are also susceptible.

Cankers gradually enlarge, girdling and killing infected branches; trunk cankers can kill trees. Perennial canker damage is limited to cambium tissue, but wood decay fungi often enter through canker sites, resulting in structural damage to trees.

Symptoms

Perennial canker is characterized by oval or linear cankers accompanied by exuding sap (gummosis, FIGURE 3) that darkens with age. Bark initially remains intact, and the tissue beneath becomes discolored (FIGURE 4). Eventually, cankers become sunken and covered with fungal fruiting bodies (pycnidia) that appear as tiny, raised black specks. Tendrils of orange-colored spore masses may exude from pycnidia during wet or humid weather (Figure 5).

A roll of callus tissue develops around canker edges during late summer in response to infection. As decay resumes each spring, cankers expand, and again the tree responds with new callus tissue. This cycle can repeat for several years, causing a series of callus ridges appearing as rings around the initial infection site, giving cankers a target-like appearance (FIGURE 6).

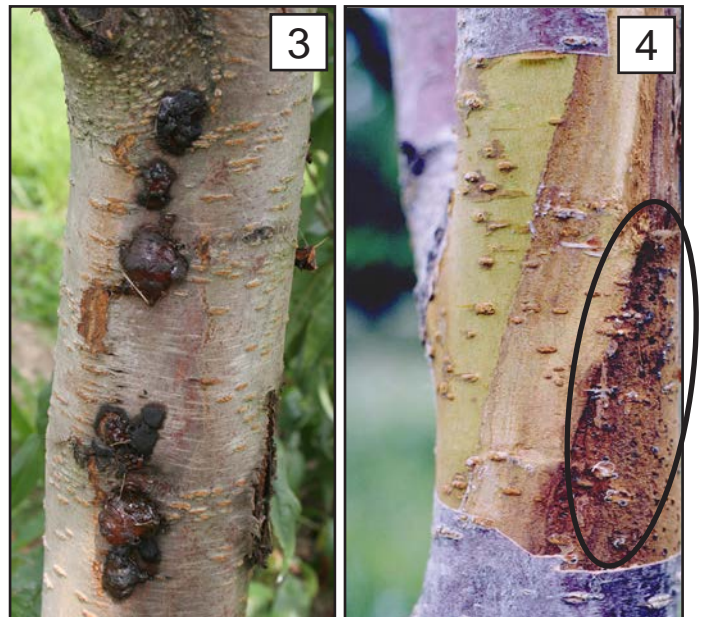


FIGURE 3. DARK OZZING SAP COMMON WITH PERENNIAL CANKER. **FIGURE 4.** DISCOLORATION AND DEVELOPMENT OF PYCNIDIA (WITHIN ELLIPSE) RESULTING FROM PERENNIAL CANKER INFECTIONS.



FIGURE 5. EMERGENCE OF ORANGE-COLORED *LEUCOSTOMA* SPORE MASSES DURING WET CONDITIONS. **FIGURE 6.** TARGET-LIKE ANNUAL RINGS OF CALLUS TISSUE TYPICAL OF PERENNIAL CANKER.

Cause & Disease Development

Perennial canker is caused by various species of *Leucostoma* (formerly *Cytospora* spp. and *Valsa* spp.). These fungi over-winter in cankers and dead wood in the tree or cuttings left on the ground. The fungus becomes active in spring when temperatures reach 55°F, but canker expansion slows with warming temperatures and tree growth. Fungal activity resumes in autumn as temperatures drop. Spores disseminated via rain splash, wind, insects, birds, and pruning tools initiate new infections in early spring and late autumn.

The perennial canker fungus is a weak pathogen that targets wounded and stressed trees. It must first become established in dead or dying tissue before spreading to healthy tissues. Wounds from the following injuries can provide entry points for infection:

- Insects, especially borers
- Other diseases, such as bacterial canker
- Physical damage
- Pruning cuts
- Sunscald
- Weak crotch angles
- Winter injury.

MANAGEMENT

Reducing or eliminating bacterial canker and perennial canker from a commercial or home orchard is extremely important in maintaining an orchard's productivity and longevity. Once either disease becomes established, it becomes increasingly difficult to manage. Disease management requires an integrated approach; no single practice is sufficient. The following measures are directed toward prevention and management of both diseases indirectly by reducing ports of entry for the

pathogens, by moderating tree stress, and by reducing inoculum levels (fungal spores and bacterial cells). Fungicides and bactericides are ineffective against either disease.

Site & Cultivar Selection

- Plant trees in well-drained soil.
- Avoid sites prone to frost or have poor air drainage.
- Select cold-hardy cultivars.

Pruning

- Delay pruning until late winter or early spring for more rapid callus formation. Autumn pruning can severely weaken and stress trees, setting them up for winter injury and subsequent infections.
- Proper pruning entails making cuts up to the swollen collar at the base of branches (branch collar); avoid a flush cut that may remove the branch collar; never leave branch stubs.
- When training young trees, eliminate weak, narrow-angled branch crotches.
- Prune branches at least 12 inches below the canker.
- Sanitize pruning tools between cuts to prevent spread of pathogens, especially bacterial cells.
- Dispose of cuttings and debris away from the orchard. Never leave cuttings on the ground.

Other Cultural Practices

- Protect trees from wounds (freeze, insect, improper pruning, nematodes, sunscald, winter injury, rodents, workers, etc.)
- Maintain tree vigor with cultural practices that promote tree health and minimize stress (e.g. proper fertility and soil pH, irrigation, weed management). Avoid fertilizing in late summer and in autumn, as this can reduce winter hardiness.
- Drought stress increases susceptibility to bacterial canker infections. Water during drought conditions, particularly young trees.
- Practice proper sanitation (remove diseased wood before spring growth begins; discard debris away from orchard).

ADDITIONAL RESOURCES

- Fruit, Orchard, and Vineyard Sanitation (PPFS-GEN-05)
<https://plantpathology.ca.uky.edu/files/ppfs-gen-05.pdf>
- IPM Scouting Guide for Common Problems of Peach in Kentucky (ID-260)
<http://www2.ca.uky.edu/agcomm/pubs/ID/ID260/ID260.pdf>
- Scouting Guide for Problems of Peach (mobile website)
<https://peachscout.ca.uky.edu/>

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