

TREE FRUIT CROPS



CORNELL COOPERATIVE EXTENSION

Perennial Canker

Leucostoma cincta (Fr. ex Fr.) Höhn
[=*Valsa cincta* (Fr. ex Fr.) Fr.]

Leucostoma personii Höhn
[=*Valsa leucostoma* (Pers. ex Fr.) Fr.]

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Perennial canker (also called Valsa canker, Cytospora canker, Leucostoma canker, and peach canker) is one of the most common and debilitating diseases of peach trees in the Northeast. It also occurs regularly on sweet cherry, apricot, and plum trees, but is not generally as damaging on these crops. Successful long-term production of peaches is seldom possible if the disease is not controlled.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

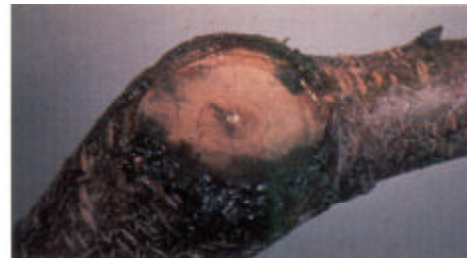


Fig. 5.



Fig. 6.



Fig. 7.

Symptoms

Symptoms are somewhat variable depending on which part of the tree is attacked. The most conspicuous and pronounced symptoms usually appear on major scaffold limbs and older branches. Dark, sunken cankers expand along the limbs, producing large amounts of amber-colored or dark brown gum at their edges; often, dead twigs (Fig. 1) or pruning stubs (Fig. 2) can be seen at the center of such cankers. As the cankers enlarge with age, infected tissues crack, dry out, and appear blackened; affected limbs become progressively more girdled, lose their vigor, and eventually die.

Gumming cankers can also be seen at other common sites of infection, including narrow-angled branch crotches (Fig. 3), trunks injured by machinery, rodents, or insect pests (Fig. 4), poorly healed pruning wounds (Fig. 5), and leaf scars or winter-killed buds on young shoots (Fig. 6).

Disease Cycle and Causal Organisms

The two closely related fungi that cause perennial canker have been given several different names, which in turn have been applied to the different names given the disease. When forming one of the two spore types in their life cycles, the fungi are now called *Leucostoma cincta* (formerly *Valsa cincta*) and *L. persoonii* (formerly *V. leucostoma*). When the other spore type is formed, they are now called *Leucocytospora cincta* (formerly *Cytospora cincta*) and *L. leucostoma* (formerly *C. leucostoma*). Both fungi occur in the Northeast, although *L. cincta* predominates in cooler regions (e.g., the Lake Ontario zone) and *L. persoonii* is more predominant in warmer regions (e.g., the lower Hudson Valley).

The fungi overwinter in active cankers or in dead wood that they have previously colonized. When conditions are cool and moist in the early spring, spores (conidia) are exuded in a sticky mass from fruiting structures (pycnidia) embedded in the wood. These are then spread by splashing and windblown rain to new infection sites, where the conidia germinate and the fungi begin to colonize under wet conditions. Both fungi are considered weak pathogens; that is, they are unable to invade healthy bark and must initially gain entry into the tree through injured, dying, or dead tissues. The most common sites of entry are (a) weak, winter-killed twigs in the center of the tree (especially common for *L. cincta*), (b) winter-injured wood on major limbs and trunks, (c) short, dead pruning stubs, (d) leaf scars and winter-killed buds on small twigs, and (e) poorly healed pruning cuts (especially common for *L. persoonii*). Broken limbs, injuries caused by farm equipment, and wounds caused by rodents, insects, and other disease organisms provide additional sites of entry.

Once the fungi have a foothold in these sites, they continue growth and are able to expand into adjacent healthy tissue. Although growth is slow, the fungi are able to continue this expansion, even at temperatures just above freezing, when tree defense responses are not active. As temperatures rise above 50°F (10°C), tree growth becomes progressively more active and a ring of callus tissue is normally formed around the canker. This defensive ring is then breached in the fall and subsequent early spring, as the dormant tree is once again unable to resist fungal advancement. Renewed tree growth eventually causes a new ring of callus to be formed, and this annual cycle of callus formation and canker expansion leads to the production of concentric callus rings around the initial infection site (Fig. 7). Where normal tree growth is restricted because of environmental stresses such as drought, callus production may be limited and cankers will appear more spread out.

New pycnidia are formed in colonized tissues throughout the growing season, and the conidia produced within them are available whenever weather conditions become humid, including portions of the winter that are above freezing. Thus, susceptible tissues are subject to initial invasion during most parts of the year, although early spring (pruning cuts, winter injury) and autumn (leaf scars) are probably most important.

Fungal fruiting bodies of a second type (perithecia) sometimes are also formed in dead tissue after a couple of years, but the spores produced within them (ascospores) are considered to be of minor importance in the disease cycle.

Control

Adequate control of perennial canker is possible if a thorough integrated pest and crop management strategy is followed throughout the life of the orchard. Individual elements of the program are designed to (a) reduce exposure to fungal inoculum; (b) minimize the availability of injured or dead tissues that serve as initial infection sites; and (c) promote general tree health and rapid wound healing. Protectant fungicide sprays play a minor role at most in control of this disease.

1. New plantings. Because perennial canker generally limits the profitability and longevity of northeastern peach orchards, new plantings should always be established with the idea of minimizing disease risk and delaying its introduction. Thus, it is important that new orchards not be established next to old cankered blocks of peaches (or other stone fruit trees, if they are infected); experience shows that this is the best way to exclude the disease from new orchards. Similarly, any wild stone fruit trees with cankers should be removed from nearby hedgerows prior to planting. Choose planting sites with good air drainage and maximum protection against excessively cold temperatures, and plant only the hardier varieties recommended for local conditions.

Nursery stock should be canker free and not excessively large, i.e., no greater than 5/8-inch (16 mm) caliper. Trees should be protected against peach tree borer before planting and headed back once growth begins, to promote wide-angle branching. Heading cuts made on excessively large new trees (such as 2-year old nursery stock) or before new trees start active growth often fail to heal properly, providing a fatal entry point for the canker fungi. At the time of heading, small trees should be pruned to whips, or the retained side branches on larger trees should be pruned back to two or three nodes; do not leave pruning stubs, and remove any dead branches.

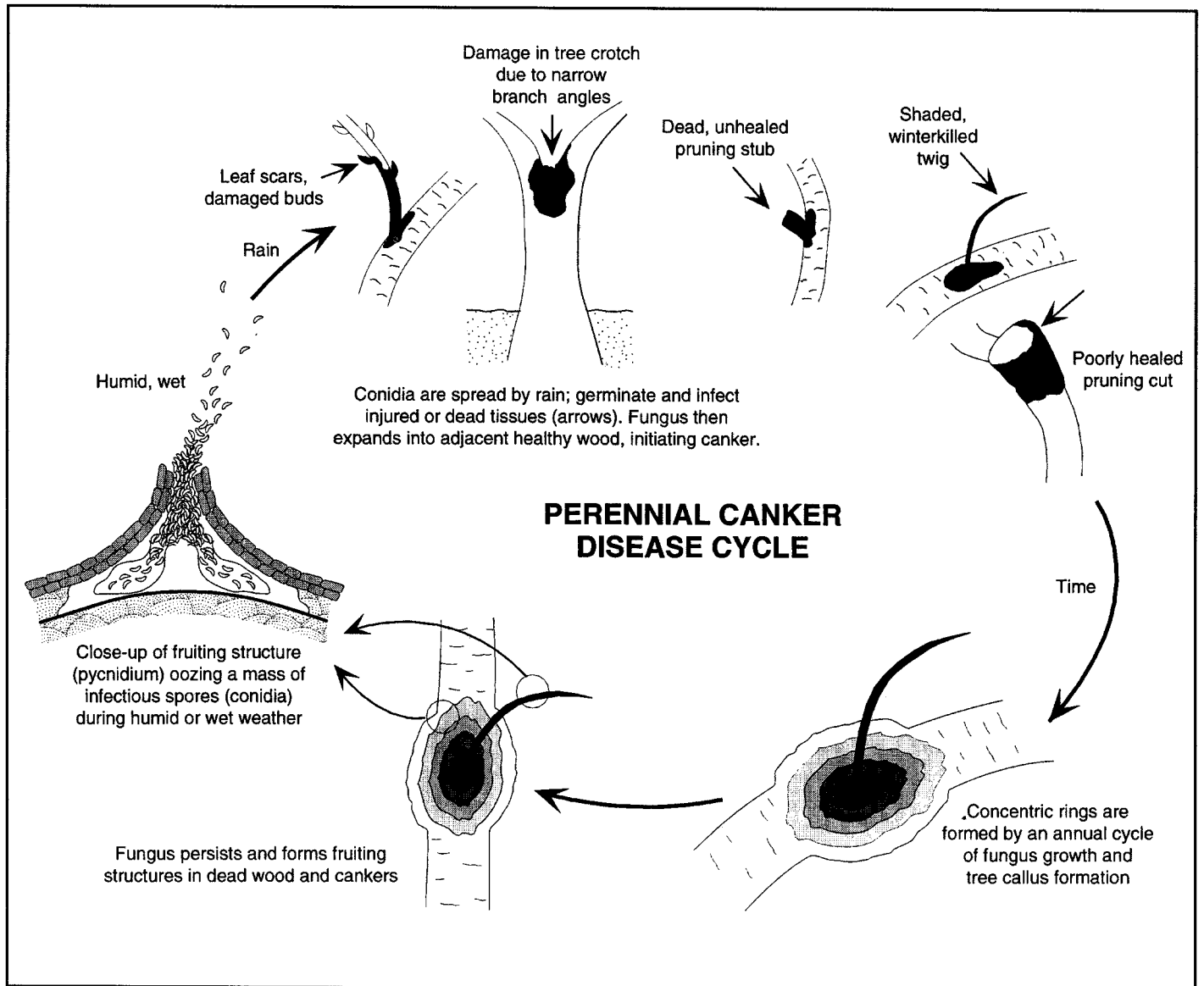
2. Pruning and training. As the orchard grows, it is critical to continue to prune and train in a manner that maintains wide branch angles and an open center to the tree. Two of the most common sites of canker initiation are narrow-angled branch crotches (subject to winter injury and breakage) and the weak twigs that develop within tree centers. Pruning cuts should not be made until bloom or afterwards, when cuts are able to heal quickly and are much less likely to become infected. Certain fungicides applied at this time for brown rot control may help to further protect pruning cuts if sprayed immediately after pruning and before the next rain occurs. Do not leave short pruning stubs; this wood will die, and provides an ideal point for the canker fungi to enter and move into healthy limbs. Rather, try to cut just beyond the collar of thickened bark where the smaller branch joins the larger limb (this collar is where the most rapid wound healing occurs, and should not be removed). Remove all dead, broken, or injured wood during the pruning operation.

3. *Winter hardiness.* Horticultural practices should be designed to promote hardening off in the fall and prevent winter injury. If clean cultivation is practiced, cultivation should stop by early summer to encourage early cessation of growth. Properly balanced fertilizer programs should be developed on the basis of leaf analyses; weak, nutrient-poor trees are unable to resist canker infections, and those that are excessively fertilized (particularly with too much nitrogen) are slow to harden off. Do not apply fertilizers beyond mid-spring, to avoid late cold-tender growth. White interior (water-based) latex paint can be applied to trunks and lower scaffold limbs to reflect sunlight and protect against "southwest injury" during the winter; this injury can occur when tissues are warmed considerably by absorbed sunlight during the day (usually on the south and west sides of the tree), then cool drastically during the night.

4. *Pest control.* Brown rot, oriental fruit moth, peach tree borers, and rodents all cause cankers or injuries that can subsequently be invaded by the perennial canker fungi; maintain adequate control programs for these pests.

5. *Canker eradication.* During the pruning operation, remove all cankers on small branches or limbs, making a thinning cut at least 4 inches (10 cm) beneath the edge of the cankered zone. On large scaffold limbs or the trunk, it is possible to surgically remove cankers during the late spring or early summer, when the wounds will heal most rapidly. Although this is a time-consuming procedure, it is particularly useful for eradicating canker from young orchards in the early stages of disease development, before it has a chance to spread. It should not be practiced when cankers affect more than half of the branch diameter.

Surgery should be performed during dry weather, preferably when no rain is forecast for at least 3 days. Using a sharp knife, remove all diseased bark around each canker, plus a 3/4- to 1-inch (2-2.5 cm) margin of healthy tissue around the edges; it is not necessary to dig into the hardwood, but there should be no brown inner bark that remains. To heal properly, the finished cut should have a smooth margin and be slightly rounded at the top and bottom ends. It is not necessary or helpful to cover these cuts with a wound dressing.



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