



Cytospora Canker Disease In Idaho Orchards

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Cytospora canker affects more than 70 different fruit, ornamental, shade and forest tree species and has caused economic damage in Idaho orchards for more than 30 years. The disease is recognized as an economic problem on 'French prune' and 'President plum' in California, and peach trees have been severely affected in Colorado, Michigan, Ohio, Illinois, Washington and Ontario, Canada. Losses in Idaho orchards have ranged from slight to destruction of entire orchards.

The disease is the limiting factor in President plum production, and growers are increasingly reluctant to replant that cultivar. *Cytospora* canker often is associated with woodrot fungi (principally the genera *Fomes* and *Polyporus*) that rapidly destroy the structural strength of the tree, thus greatly increasing the severity of orchard tree decline associated with *Cytospora* invasion.

Varieties Affected

Stone fruits are more seriously damaged than pome fruits. The stone fruits most severely affected are peach, cherry, apricot, nectarine and some cultivars of the plum/prune group (especially 'President,' 'Empress' and 'Italian'). Although some cultivars are less affected than others, immunity has not been observed either among stone fruits or pome fruits.

Cause of the Disease

Cytospora canker is caused by various *Cytospora* fungi but particularly by numerous strains of *Cytospora cincta*. *Cytospora* fungi are wound invaders, and any break in the stem surface can serve as a point-of-entry. Pruning, low temperature (i.e. freeze cracks, sunscald and frozen buds), insects, ladders, tractors, mechanical shakers and overhead mowers all produce excellent ports of entry. The fungus can infect the tree at anytime during the year, but most infections seem to occur during spring and early summer when temperatures are mild and moisture is high. The fungus is spread by pruning tools, orchard equipment, splashing water, wind, insects and probably any other agent that moves through the orchard.



Fig. 1. Typical *Cytospora* flagging in a nectarine tree caused by a large stem canker below.

Cytospora invasion is especially vigorous in weakened or unthrifty trees. Trees which suffer from moisture stress, nutrient deficiency, insect attack, winter injury and rodent damage are excellent candidates for infection. High moisture conditions favor infection and disease development whether the moisture is supplied in the form of rain or by sprinkler irrigation. Open center pruning invites both winter and summer sunscald that creates suitable wounds for invasion.

The fungus survives from year to year in infected stems, pruning debris and in dead trees or parts of dead trees allowed to remain in or near the orchard. During cool, moist weather, spores are produced from these deadwood sites and can easily find their way to healthy trees in the vicinity.

Symptoms and Signs

The most obvious evidence of infection is yellowing, wilting and browning of leaves, followed by death of the twig or branch. This condition is called "flagging" and is the result of stem cankers located directly below the flag. Such a canker girdles the stem and prevents the flow of water into the upper portions of the branch.

A few weeks after fungal invasion, the canker surface appears slightly sunken in comparison with ad-

jacent live tissue. The bark within the canker is brown and dead. The bark on cankers 2 or more years old often is cracked and/or shredded. Pinhead size pimples often develop within the canker surface, depending on host species or cultivar. These may appear immediately or much later, depending on the cultivar. Pimpling is sparse on peach and cherry but profuse on plums and prunes. In cool, moist weather, amber colored hair-like tendrils are produced from the tops of the pimples. These are composed of innumerable small spores of the fungus. In the following year, only a tiny white spot remains at the top of the pimple.

Cytospora canker may develop anywhere on the woody portion of the tree including trunk and scaffold branches as well as small twigs. The canker may expand rapidly up and down the stem without immediate girdling. When cankers are actively expanding, gumming occurs on many varieties, notably peach, President and Empress plums and cherry.

The gumming on cherry may be confused with another disease called bacterial canker (*Pseudomonas syringae*) in early stages of its development because of the reluctance of *Cytospora* to form pycnidial pimples on cherry. Usually, however, the two diseases can easily be distinguished because of the single advancing margin that typifies *Cytospora* infection, whereas irregular small cankers and gum globules scattered along the stem are more typical of bacterial canker.

During the late summer, *Cytospora* canker development slows, allowing the tree to form callus tissue along the canker margin. In the fall or the following spring, the fungal activity may resume and thus result in further canker expansion. Ultimately, the entire tree will die.

Disease Control

Removal and destruction of infected parts are important. Contaminated stem parts left in the vicinity of the orchard can serve as havens for the fungus and thus allow it to multiply and spread to healthy trees even after infected trees or parts of trees have been removed.

Cutting out infected branches can be helpful, but if the cutting is done improperly, it can result in further spread of the disease. The cut should be made at least a foot below the visible canker margin. Pruning tools should be disinfested between cuts to prevent spreading the fungus to new locations. The cut should always be made flush with the main stem to facilitate prompt healing. The wound also should be protected with a



Fig. 2. Stem dieback and bark cracking associated with an aggressive scaffold/trunk *Cytospora* canker. The main stem has been shaved at the advancing canker margin.

fungicidal wound paint. Treetop mowers are very effective in spreading infection both within the orchard and among orchards. Regular pruning should be done in mid-January to February, well ahead of bud swell. A pruning system using a central leader or a modified central leader will reduce scaffold sunscald. Trees already trained to an open center system can be protected from sunscald with a whitewash paint. Badly infested orchards should be removed.

Surface irrigation seems to be less conducive to disease spread than is sprinkler irrigation. New orchards should not be established near severely infested orchards. Maintenance of good tree vigor will slow the advance of *Cytospora* canker. An effective spray program has not been developed.

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