



Fire Blight in Ornamental Trees and Shrubs

Fact Sheet 2.907-2

Gardening Series | Diseases

Alison S. O'Connor and Ralph Zentz (Revised 10/22)

Fire blight is a bacterial disease that affects certain species in the rose family (Rosaceae). It is especially destructive to apple (*Malus* spp.), pear (*Pyrus* spp.), and crabapple (*Malus* spp.). Moderately susceptible trees include hawthorn (*Crataegus* spp.) and mountain ash (*Sorbus* spp.). The disease also can occur, but tends to be less severe, on serviceberry (*Amelanchier* spp.), flowering quinces (*Chaenomeles* spp.), cotoneaster (*Cotoneaster* spp.), quince (*Cydonia* spp.), firethorn (*Pyracantha* spp.), blackberry (*Rubus* spp.), and raspberry (*Rubus* spp.). Disease incidence varies from year to year and severity is influenced by cultivar susceptibility, meteorological conditions, development of tissues, and overall tree condition. Even though all of these factors affect fire blight occurrence, the most important factor is cultivar susceptibility to the disease.

Warm rainy springs are particularly conducive to rapid development and spread of the pathogen, resulting in blossom blight. Time of flowering can be a factor in whether the tree is susceptible to fire blight. Blight of twig terminals can occur during wind-driven rain events. Hail and wind damage can create wounds that allow the pathogen to enter the tree at other times during the growing season. Hot summer weather generally slows or stops the disease.

Disease Cycle

Fire blight is caused by the bacterium *Erwinia amylovora*. Bacteria overwinter in blighted branches and at the edge of cankers (areas of bark killed by bacteria). In spring, when temperatures frequently reach 65 F and moisture is abundant, bacteria multiply rapidly. Masses of bacteria are forced through cracks and bark pores to the bark surface, where they form a sweet, gummy exudate called bacterial ooze. Insects, including pollinators, may be attracted to this ooze, where they pick up the bacteria on their bodies, and inadvertently carry it to opening blossoms. Rain and/or wind splashing the bacteria can also spread fire blight.

Once in the blossom, bacteria multiply rapidly in the nectar and enter the flower tissue (Fig. 1). From the flower, the bacteria may move into the branch. When the bacteria invade and kill the cambial tissue of the branch, all flowers, leaves and fruit above the girdled area blacken and die.

Infection also can take place through natural openings in leaves (stomata), branches (lenticels), pruning wounds, insect feeding and ovipositing, and hail. Droplets of bacterial ooze can form on twigs within three days after infection.



Quick Facts

- Fire blight is a bacterial disease that can kill branches and whole plants in the rose family, including apple, pear, and crabapple.
- Symptoms include dead branches, water-soaked blossoms, light brown to blackened leaves, discolored bark, "shepard's crook" twigs, and dried fruits.
- Fire blight bacteria can be spread by insects, splashing rain, or contaminated pruning tools.
- Management includes planting resistant varieties, cultural practices, pruning, and using preventative chemical sprays.

A.S. O'Connor, Extension professor of horticulture; and R. Zentz, forester, City of Fort Collins



Figure 1. Blighted flowers on crabapple.



Figure 2. Blighted leaves on apple.

Diagnosis

Symptoms of fire blight are first observed about the time of petal fall. Infected blossoms appear water-soaked and wilt rapidly before turning dark brown or black; this phase of the disease is referred to as blossom blight. As the disease progresses, leaves wilt, darken and remain attached to the tree (Figure 2); this gives the tree a fire-scorched appearance, thus the name "fire blight" (Figure 3).

Infected twigs darken and branch tips may bend over forming a "shepherd's crook." Infected fruit may also exude bacterial ooze. Rather than dropping from the tree, infected fruit gradually dry down and remain attached to the branch.

Fire blight cankers on branches or stems appear as dark discolored areas that are slightly sunken (Figure 4). Trees have natural defenses which will attempt to wall off the disease, where a ridge may form between canker and healthy tissue. Under the bark associated with a canker, the inner bark turns from green to brown, but the appearance varies depending on plant variety.

Disease Management

There is no cure for this disease, so prevention is the best solution for the management of fire blight.

In a landscape with many Roseaceae trees and shrubs, condemning or removing all infested trees is not practical, nor viable, as the inoculum is so abundant. Even if all infected trees were removed, it's likely that susceptible trees could still become infected by fire blight.

The most important step in managing this disease is planting resistant species. Cultivars differ in their degree of susceptibility to the bacterium, but no cultivar is totally immune to infection when the pathogen is abundant and conditions are favorable. For information specific for crabapples, refer to CSU Extension Fact Sheet #7.424.

In years with high pressures of the bacterium, even resistant cultivars may show symptoms, but are better able to compartmentalize damage. With minor infections, trees may wall off the spread of the disease and pruning could occur during the following dormant season to remove the cankered twigs.

Implement cultural practices that favor growth of the plant rather than the pathogen. Prune to remove infected plant parts and consider the use of chemical sprays for susceptible trees. Spraying should be done by tree care professionals because of chemical availability, potential phytotoxicity, and the critical timing of sprays.

General Pruning Recommendations

When pruning, each cut should be done properly to encourage quick wound closure; smaller pruning cuts will close more quickly. Cuts should be made back to a branch union or outward-facing bud and not done in the middle of branches or where the canker ends. Improper pruning can result in water sprouts (suckering) that are more likely to be infected due to succulent growth. Remove any root suckers from the base of trees, as they are prone to fire blight infection.

Dormant Pruning

Pruning woody plants susceptible to fire blight is best done in the dormant season up to one month before budbreak. Remove all blighted twigs and cankered branches back to a main branch union or junction at least eight inches below the canker—do not leave stubs. Pruning may be difficult on smaller species where there isn't enough branch material to support aggressive pruning (Fig. 5). For more detailed information on pruning cuts, refer to [CSU Extension Garden Notes #613](#).



Figure 3. Crabapple tree affected by fire blight.



Figure 4. Sunken black canker on apple branch.

It is recommended to sanitize pruning tools during dormant pruning of known fire blight infections after removing or cutting into infected wood. Dip or spray tools with isopropyl alcohol, a 10% bleach solution (1.5 cups of bleach to one gallon of water), or use household sanitizers. If the canker encompasses the entire circumference of the branch, the branch must be removed. If the infection reaches the main trunk, the disease cannot be cured and the tree and stump should be removed.

In-Season (Summer) Pruning

Summer pruning should occur on ornamental trees only if absolutely necessary due to the increased potential to spread the bacteria throughout the tree. Pruning should be done immediately after fire blight is detected in the tree. As with all pruning cuts, do not leave stubs and remove the infected branches back to a branch union or junction. After each cut, surface sterilize all tools used in pruning as referenced above.

To decrease the chance of new infections, promptly remove infested branches from the site. During pruning, take care to avoid unnecessary wounds to the tree.

Chemical Sprays

Spraying chemicals is an option, but other management and cultural approaches should be considered first. When conducting a spray program, it is essential that all directions on the product label are read and followed. When there is spring weather that is not favorable to the fire blight bacterium (dry, warm), sprays may appear to be more effective. Additional factors to consider with chemicals are availability, potential phytotoxicity, and the critical timing of sprays. There are no cures for fire blight once infection has occurred; if you see infection, it is too late to treat for that season.

Copper products are the only materials readily available to homeowners for control of fire blight and their success rate varies. A 0.5% Bordeaux mixture (copper sulfate, lime, and water) or other copper product applied multiple times during the flowering cycle may decrease new infections but won't completely eliminate infections or those already existing in the tree. Copper sprays must be applied to open blossoms, so the timing of applications will vary depending on the tree's bloom cycle. The first application will occur once flowers open and when the average temperature exceeds 60° F. Copper sprays must be applied every four to five days until bloom is over.

Depending on the flower cycle, this usually means multiple applications. Copper products may affect fruit quality, if fruit is being harvested for consumption (like in the case of crabapples). Do not mix copper sprays with oils or phytotoxicity issues can occur.

Streptomycin, oxytetracycline, and Kasugamycin (Kasumin®) are antibiotics that are used to protect trees but may be difficult for homeowners to obtain. Do not use antibiotics after symptom development since it may lead to antibiotic resistance in the bacterial population. Consult a tree care professional for applying these preventative sprays.



Figure 5. A crabapple tree pruned to remove fire blight infected limbs; this severe method pruning is not recommended.