

35. Fire Blight of Pear, Apple, Cotoneaster, and Other Ornamental Shrubs and Trees

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Fire blight, caused by *Erwinia amylovora*, is the first plant disease shown to be caused by a bacterium. It is apparently indigenous to North America; it was first observed in 1780 in the Hudson River Valley in New York State. It is a major threat to susceptible pear, apple, crabapple, and cotoneaster cultivars.

Hosts and Distribution

Fire blight occurs on most species of Pomoideae and some species in the sub-families of the Rosaceae. Of the genera reported susceptible to fire blight, *Malus* (apple), *Pyrus* (pear), *Cotoneaster* (cotoneaster), *Crataegus* (hawthorn), *Cydonia* (quince), *Pyracantha* (pyracantha), and *Sorbus* (mountain ash), are the most important economically and show the most severe blight. Resistant species and/or cultivars of most hosts are available. Some clonal selections and cultivars of *Pyrus communis* are highly resistant. Nearly all selections of the callery pear (*P. calleryana*), including the Bradford cultivars, show good resistance. Several cultivars of the cultivated species of apple and crabapple are resistant.

Fire blight is native to North America. Since its first observation in New York, it has been found throughout the United States.

Symptoms and Signs

The bacterium infects blossoms and leaves near the growing tips. Leaves quickly wilt and turn black, but remain attached to infected twigs (fig. 35-1). The scorched appearance of affected branches is the most obvious symptom. The affected parts first appear water-soaked, then wilt, shrivel, and turn brownish to black. The bacterium may advance down a small branch to older branches, causing dark, sunken stem cankers (fig. 35-2). Those cankers at ground level are sometimes referred to as collar blight. Infection may spread into the roots, where the bark is killed in a manner similar to that on the trunk. Fruit blight generally is found in immature fruit.

With few exceptions, symptoms on pyracantha, hawthorn, and cotoneaster (fig. 35-3) are generally similar to those on pear, apple, or crabapple.

Disease Cycle

During spring the pathogen begins to multiply. A milky to amber-colored exudate containing millions of bacterial cells oozes from the peduncle, the lenticels in the skin of fruits, and from the margins of cankers (fig. 35-4). This sticky exudate attracts insects that carry the bacteria to blossoms and leaves. The bacteria enter the host through

natural openings in blossoms and leaves or through wounds. Colonization proceeds intercellularly after the primary infection. The bacteria spread through the tissues, and secondary infection may continue throughout the growing season. Bacterial ooze or strands produced on blossoms, shoots, leaves, fruits, or larger branches are the sources of secondary inoculum, which can be spread by rain, wind, insects, or birds.

The bacterium overwinters in tissue adjacent to the margins of cankers. The pathogen is more likely to overwinter successfully in cankers with smooth margins and healthy tissue on all sides. The bacteria again multiply in spring and invade healthy tissue. In addition to producing primary inoculum, extending cankers can significantly injure trees.



Figure 35-1. Scorched appearance of blighted foliage on apple.



Figure 35-2. Localized fire blight canker.

Weather affects the development of fire blight. Temperatures between 81° and 84°F are optimal for multiplication of the pathogen but it can develop over the range 59° to 90°F. The disease develops most rapidly when the relative humidity exceeds 60 percent. In general, the higher the temperature and humidity the shorter the incubation period, which is usually between 1 and 3 weeks.

Damage

Accurate estimates of losses from fire blight are difficult to obtain, but no doubt range in the millions of dollars annually. Fire blight is considered the most damaging disease of pome fruit in North America. Unlike many other plant diseases, fire blight is destructive to the current year's crops, and will cause permanent damage to the orchard. It is extremely dangerous to the pear or apple industry in a fruit growing region.

In the 1970's, fire blight became prevalent on many woody ornamentals, especially cotoneaster. Restrictions on the export of these plants to other countries caused a tremendous loss to the nursery industry. The loss of an established crabapple tree or cotoneaster hedge in the

home landscape can be significant in terms of esthetic value, time, labor, and replacement costs.

Control

A blight prevention program involving dormant pruning, removal of diseased branches, and spraying with an EPA-labeled antibiotic or fungicide during flowering may reduce losses. Unfortunately, no one measure will control fire blight. When selecting orchard or landscape plants, try to exclude fire blight by selecting blight-resistant species or cultivars.

1. Sanitation and Quarantine – In areas where fire blight is severe, avoid planting apple and pear trees in the same orchard. This practice has reduced blight damage to apples.

2. Pruning – Remove and discard all twigs and branches with cankers. Branches should be cut at least 1 foot beyond the infected area. To surgically excise a canker, completely remove the bark in small sections over the canker surface, as well as healthy tissue 1 foot above and below the canker and 3 inches on either side. Pruning and surgical tools must be sterilized after each cut by dipping them into a disinfectant such as a 70 percent alcohol solution, or a household bleach solution of 1 part bleach to 9 parts water.

3. Tree Nutrition and Soil Management – Avoid stimulation of succulent growth in highly susceptible cultivars. Avoid heavy applications of nitrogen fertilizer or barnyard manure. Split nitrogen applications. Apply half the required amount to the soil one month before growth starts and the other half as a foliar or ground spray after petal fall. Strive to maintain a soil pH of 5.5 – 6.5 by liming.

4. Chemical Control – Copper compounds and antibiotics are effective in controlling fire blight. Apply all chemicals in compliance with Environmental Protection Agency regulations. Make an early season application at the green tip stage, and then repeat every 5 to 7 days beginning at the pink tip stage and continuing into postbloom.

5. Eradication – Susceptible plants should be examined 10 – 14 days after bloom for infected new blossoms. All infected spurs should be removed by cutting at least 6 inches below the farthest evidence of infection.

6. Biological Control – Control of fire blight by antagonistic organisms offers some potential; however, this measure presently is not effective enough to replace chemical treatments.

Selected References

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- Blanchard, Robert O.; Tattar, Terry A. Bacterial diseases. In: Field and laboratory guide to tree pathology. New York: Academic Press; 1981: 181–191.
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Figure 35-3. Symptoms of fire blight on cotoneaster.

Figure 35-4. Amber-colored bacterial exudate oozing from fire blight canker.

