Fire Blight

Guide A-230

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Natalie P. Goldberg, Extension Plant Pathologist

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DIAGNOSIS AT A GLANCE

Causal agent:	*Erwinia amylovora*, a bacterium.
Hosts:	Plants in the rosaceae family, notably apple, pear, pyracantha, cotoneaster, and photinia.
Key symptom:	Branch tips turn black as if scorched by fire.
Sign:	Watery ooze produced from infected plant tissue.
Conditions for disease:	• Rainy, humid weather in spring. • Day temperatures between 75° and 85°F. • Night temperatures above 55°F.
Management	• Prune out infected tissue. • Avoid heavy nitrogen fertiliza-tion. • In commercial orchards, spray with bactericide. • Good insect management.

Fire blight, caused by the bacterium *Erwinia amylovora*, is one of the oldest known bacterial diseases of plants. It affects only plants in the rose family (Rosaceae). Within this plant family, the bacterium infects at least 39 different genera. In New Mexico, the disease is most common on apple, pear, crabapple, pyracantha, photinia, and cotoneaster. Other hosts include rose, quince, hawthorn, loquat, almond, apricot, plum, cherry, chokecherry, mountain ash, raspberry, blackberry, and strawberry.

The characteristic symptom of fire blight is that affected plant parts (most notably the branch terminals) appear to have been scorched by fire (fig 1). Fire blight can infect blossoms, fruit, stems, leaves, and woody branches. During periods of high humidity, infected tissue may produce a characteristic ooze.

In spring when the bacterium becomes active, wind-blown rain or insects spread it from oozing cankers to blossoms. The bacterium enters the plant through blossoms, wounds, and natural openings (such as stomata, hydathodes, lenticels, and nectaries). The infection moves from blossoms to young fruit and then to adjacent leaves. Infected tissue turns brown to black, shrivels and droops, but remains attached to the tree. Secondary infections on young shoots are common following injury caused by hail, wind-blown dust, or insects.

One of the earliest symptoms of the disease occurs on flowers and is "blossom blight." The blossoms appear discolored (water soaked, gray-green color progressing to black). The necrotic (dead) blossoms may or may not remain attached to the tree. On apple, it is common for the affected blossoms to cling to the spurs.

On fruit, the symptoms depend on the stage at which the fruit was infected. When infected early, the fruits remain small, become discolored, shrivel, and remain attached to the tree. Fruits infected later in development do not shrivel as much or become as discolored as immature fruits. Fruits infected following injury by hail or insects develop red, brown, or black lesions. Infected fruits may exude large amounts of bacterial ooze.

Young, succulent shoots infected with fire blight often develop a characteristic "shepherd's-crook" symptom—the bending of the shoot tip to approximately 180° (fig. 2). The infected tissue turns gray-green, and eventually black.

Symptoms on mature woody tissue are somewhat difficult to discern from other types of injury, such as those caused by low- or high-temperature injury. Symptoms include sunken and discolored areas (cankers), cracks, and bark splitting or peeling. When the bacterium is active, the inner tissue (under infected bark areas) is water-soaked with reddish streaks. This reddening can help to distinguish fire blight cankers from freeze injury.

Environmental conditions favorable for fire blight are rainy or humid weather with daytime temperatures in the range of 75° to 85°F, especially when night temperatures stay above 55°F. Hot, dry weather (over 90°F) slows or stops disease development, but does not cure the disease.

In areas where fire blight is established, use a three-pronged approach to disease management. This management program is designed to reduce losses associated with the disease by reducing the amount of inoculum in the area, reducing the susceptibility of the plants with horticultural practices, and preventing new infections during favorable periods.

The primary inoculum is reduced by pruning overwintering cankers during the dormant season. An application of a copper bactericide at bud break helps to reduce additional inoculum, which may be produced in cankers missed during pruning. Removing active infection sites as they appear is important in reducing secondary inoculum. Active infections must be removed at least 12 to 15 inches below the margin of visible infection because the bacterium moves inside the plant ahead of visible symptom development. Pruning tools must be disinfected between cuts to reduce the spread of the bacterium on tools. Disinfect tools by dipping in either a 10% bleach solution or 70% alcohol (rubbing alcohol). Burn or otherwise dispose of (away from susceptible plants) all prunings. Do not compost diseased plant tissue, as compost piles generally do not reach high enough temperatures to kill the bacterium. Additionally, prune all unwanted suckers from trunks, roots, and branches as these fast-growing shoots are highly susceptible to the disease.

Fire blight is more severe on fast-growing, succulent tissue. Therefore, avoid heavy applications of nitrogen fertilizers. Additionally, applying required nitrogen in fall or spring as foliar

Fig. 1 Fire blight causes affected plant part to appear scorched.

Fig. 2 Young, succulent shoots infected with fire blight often develop “Shepherd’s crook”.

sprays after flowering helps to reduce the incidence of the disease.

In commercial apple orchards, properly timed bactericide applications are an important component of a management program. Bactericides used during bloom can be highly effective against the blossom blight phase of the disease. Reducing infection at this time also reduces the amount of disease that develops on vegetative shoots later in the season. Bordeaux mixture (lime and copper sulfate), other copper compounds, and the antibiotic streptomycin are registered materials for the control of fire blight on apples. Copper compounds are relatively inexpensive and can be effective, but great care must be used as they can cause russetting on fruit, which lowers their fresh market value. Although more expensive than copper compounds, antibiotics rarely damage fruit. Bacteria can easily develop resistance to repeated use of chemicals, so it is important to rotate the type of materials. These materials are best used as preventative sprays because they have limited curative or systemic properties. General spray recommendations include two or three sprays during the bloom period. Routine sprays during the summer have not been shown to be cost-effective, although sprays following hail storms have proven to help reduce secondary infections in orchards with a history of fire blight. To assure proper pesticide use, be sure to read and understand the product label and follow all label instructions to the letter.

Controlling insects can also be an important component of an overall fire blight management program. Controlling insects can help reduce the spread of disease on vegetative shoots. Insects reported to spread the disease include ants, aphids, flies, wasps, fruit-tree bark beetles, honey bees, tarnished plant bugs, and pear psyllids. Control of sucking insects, such as aphids, is especially important. These insects not only carry the bacterium from one location to another, but create feeding wounds, which serve as sites for entry of the bacterium into the plant. Although controlling insects can reduce the spread of the disease, take care not to harm pollinators such as honey bees. Therefore, insecticides should be used only on vegetative growth, not during pollination.

When considering new plantings, select disease-tolerant cultivars and rootstocks. Avoid M9 and M26 apple rootstocks, which are highly susceptible to fire blight. Apple cultivars to avoid include Twenty Ounce, Rhode Island Greening, Yellow Transparent, Jonathan, Idared, Rome Beauty, Lodi. Most popular pear varieties are susceptible to fire blight, as are most cultivars of crabapples.

Research on resistance and tolerance on some ornamentals has been conducted at the University of California. Results indicate that *Pyracantha angustifolia* is very susceptible, but *P. coccinea* and *P. crenulata* are somewhat tolerant. There is also quite a difference in susceptibility among species of *Cotoneaster*. For example, *C. salicifolia* is susceptible, *C. dammeri, C. pannosa,* and *C. horizontalis* are somewhat tolerant, and two species, *C. adpressa* and *C. microphylla*, are nearly resistant.

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