MSU Ag Facts

Extension Bulletin E-841, April 1983

Fire Blight of Trees and Shrubs

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Introduction

Fire blight, caused by the bacterium **Erwinia amylovora,** is a serious disease of apples, pears, crab apples, cotoneaster, quince, pyracantha and mountain ash. It also may affect other members of the Rosaceae family such as serviceberry, hawthorn, spirea and rose.

The bacteria kill new leaves, fruit and flowers and also cause stem cankers to develop. In more advanced stages, these cankers may expand to girdle and kill branches or entire trees.

The bacteria are most active during warm, humid weather. Actively growing plant tissue is the most susceptible to infection since the bacteria penetrate young, fleshy tissue through wounds, blossoms and natural openings.

Figure 1. Bacterial ooze on a young shoot.

Symptoms and Disease Cycle

Fire blight bacteria ooze from cracks and margins of host cankers in the spring when temperatures exceed 65°F and relative humidity is greater than 65%. Insects (especially bees, aphids and leaf hoppers) are very effective in carrying this gummy ooze to blossoms or young fruits and shoots (Fig. 1). Wind and splashing rain also spread the bacterial ooze.

Bacteria enter the plant through blossoms, fresh wounds or natural openings, where they multiply and spread intercellularly. Blossoms and young fruit are often attacked (Fig. 2). At first, infected tissues appear dark green and water-soaked, but they soon shrivel or wilt, turning brown to black. Newly infected shoots wilt from the tip back towards the trunk, forming a "shepherd's crook" or bend at the tip (Fig. 3, page 4). The resulting shriveled leaves and fruit may remain on the tree long after normal defoliation has occurred. (For a complete illustration of the fire blight life cycle, see figure 4.)

Figure 2. Spur blight stage of fire blight.

After the initial infection, the bacteria can multiply rapidly and move long distances through woody tissues. When the bark of newly infected branches is peeled away, the wood appears water-soaked with reddish streaks, which later turn brown. The disease may kill an entire tree in one season.

Areas on the host where the bacteria are actively multiplying will often exude a white to orange, sticky ooze which contains the bacteria. When the ooze dries and hardens, the host tissue takes on a lacquered appearance.

When the terminal buds are set, or when new shoot growth stops, spread of the disease ceases and canker margins develop. Cells of infected stem or branch tissues then collapse, giving a sunken appearance, and blighted bark usually becomes cracked and reddened. The new canker may enlarge and girdle the stem above it (Fig. 5, page 4).

If the canker does not kill the stem, it serves as an overwintering site and exudes the primary bacterial inoculum the following spring. Bacteria are most likely to survive in cankers with indefinite margins on large branches and after a mild winter.

Control

For most host species, cultivars resistant to fire blight are available which possess the desired fruit bearing or ornamental traits (Table 1). Costly and time consuming chemical sprays can be avoided when resistant cultivars are used. Request resistant cultivars when purchasing ornamentals.

High nitrogen fertilizers are not recommended for susceptible hosts, since they promote young succulent growth which is vulnerable to attack by the fire blight pathogen. Avoid heavy watering and fertilizing after midsummer. Both practices favor disease development. Production of new growth will be inhibited, therefore, shortening the time when the host can become infected.

Removal of diseased tissue can help control fire blight. Diseased tissue is best removed by breaking out twigs and branches. It is very important, when attempting to break or prune out blight during the growing season, to remove wood at least 10-15 inches below infections since bacteria may be found well beyond the last visible symptoms. If it is not possible to break out wood by hand, use pruning tools. Because the bacteria are easily transmitted on pruning tools during warm, wet weather, sterilize tools between cuts in a solution of 10 parts of water to one part bleach, especially if pruning during the growing season. Prune all overwintering cankers during the dormant season. Remove all diseased wood and burn or bury it immediately. Sucker shoots and water sprouts should also be removed.

When blight is severe or if infected trees are valuable, chemical sprays of streptomycin sulfate (60-100 ppm) or Bordeaux mixture (2-6-100 or 2 lbs. sulfur and 6 lbs. lime in 100 gal. water) may be necessary. Spraying should start during bloom and be repeated every 3-5 days or when temperature and moisture conditions (65°F and 65% relative humidity) are favorable for bacterial growth. These bactericides are not useful after terminal growth stops since the bacteria infect fleshy, actively growing new tissue. Do not use Streptomycin soon after spraying Bordeaux since the pH of Bordeaux inactivates streptomycin. You may spray streptomycin **before** spraying Bordeaux.

Insecticides can be used to control aphids, leafhoppers or other sucking insects which create wounds and transmit the bacteria. However, bees and other flower visiting insects which pollinate blossoms can be killed by insecticides. It is important not to use insecticides during bloom when bees are visiting flowers. Always check for compatibility of chemicals before combining controls. Follow directions on labels carefully.

Table 1 Ornamental Species Resistant to Fire Blight*

Malus (Crabapple)	Cotoneaster	Pyracantha
M. adams		
M. cv. 'Ames White'	C. adpressa	P. cenulata
M. cv. 'Candied Apple'	C. apiculata	P. crenata
M. cv. 'Centurion'	C. dielsiana	P. coccinea cv. 'Lalandii'
M. cv. 'Coral Burst'	C. faveolata	P. fortuneana
M. cv. 'Harvest Gold'	C. frachenttii	P. koidzumii
M. cv. 'Liset'	C. intergerrina	
M. cv. 'Mount Arbor Special'	C. nitens	
M. cv. 'Professor Sprenger'	C. zabelli	
M. cv. 'Profusion'		
M. sargentii cv. 'Tina'		
M. cv. 'White Cascade'		

*See Extension Bulletin E-154 for information on apple and pear varieties.

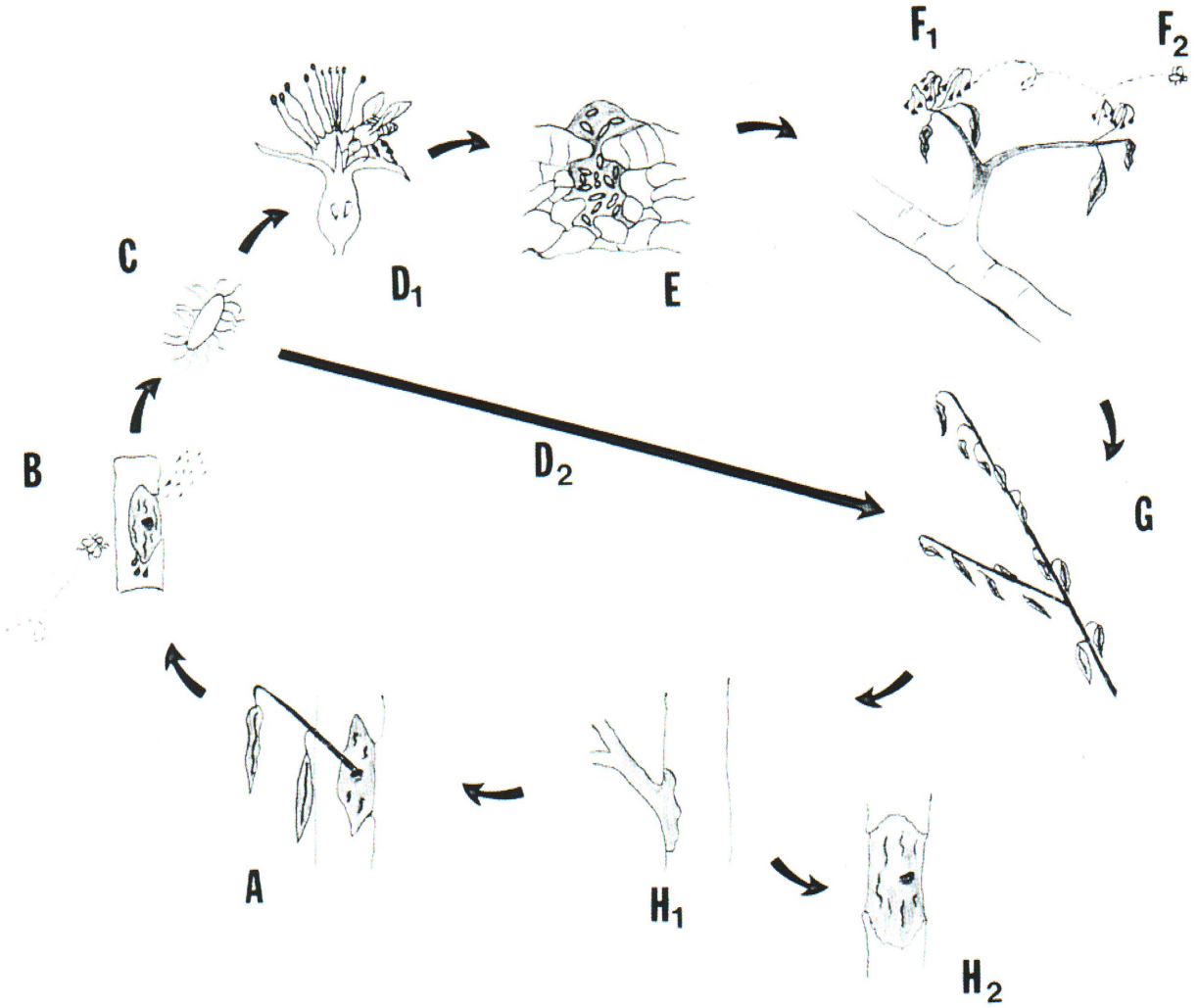

Figure 4. Disease Cycle of Fire Blight: (A) Bacteria overwinter in margins of canker. (B) Bacterial ooze, spread by insects and rain. (C) The fire blight bacterium. (D_1) Bacteria are carried to flowers. (D_2) Bacteria are carried to young twigs, direct infection. (E) Bacteria enter, multiply and spread intercellularly. (F_1) Tissues wilt and darken. (F_2) Infection spreads to other twigs, stems and flowers. (G) Twig killed, dead leaves cling to twig. (H_1) New canker forms on branches and stems. (H_2) Canker enlarges, girdles stems.

Figure 3. Wilting branches form a "shepherd's crook."

Figure 5. Fire blight canker on branch, note discolored bark and sunken margins.

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COOPERATIVE EXTENSION SERVICE

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8, and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Gordon E. Guyer, Director, Cooperative Extension Service, Michigan State University, E. Lansing, MI 48824.

2P-2R-4:83-10M-JP. Price 35 cents.

File 27.34