
FIRE BLIGHT

Integrated Pest Management for Home Gardeners

Fire blight, caused by the bacterium *Erwinia amylovora*, is a common and frequently destructive bacterial disease of pome fruit trees and other related plants. Pear and quince trees are extremely susceptible. Apple, crabapple, and *Pyracantha* species are also frequently damaged. Fire blight occasionally attacks hawthorn (*Crataegus* species), *Spiraea*, Cotoneaster, toyon (*Photinia* species), junberry or serviceberry (*Amelanchier* species), loquat, mountain ash (*Sorbus* species), and other related plants. Fire blight infections can destroy limbs and even entire shrubs or trees.

IDENTIFICATION

In spring, disease symptoms can appear as soon as trees begin active growth. The first sign is a watery, light tan bacterial ooze that exudes from branch, twig, or trunk cankers (small to large areas of bark killed by the pathogen during previous seasons). The ooze turns dark after exposure to air, leaving dark streaks on branches or trunks. However, cankers may be inconspicuous and infections may not be noticed until later in spring when flowers, shoots, and/or young fruit shrivel and blacken.

Flowers are usually infected first. Infected flowers and flower stems wilt and turn black on pear trees, whereas on apple trees they turn brown. Blight infections often move into twigs and branches from infected blossom clusters, causing small shoots to wilt, forming a crook at the end of each infected shoot. Eventually the infected portion of the shoot turns black (Fig. 1). Dead, blackened leaves and fruit cling to branches throughout the season, giving the tree a scorched appearance, hence the name "fire blight."

When the pathogen spreads from blossoms into wood, the newly infected wood underneath the bark has pink to orange-red streaks. Fire blight may also spread into wood surrounding an overwintering canker. If the bark is cut away from the edge of an active canker, reddish flecking can be seen in the wood adjacent to the canker margin. This flecking represents new infections caused by bacteria as they move out to infect healthy wood. As the canker expands, the infected wood dies, turns brown, and dries out; areas of dead tissue become sunken, and cracks often develop in the bark at the edges of the canker. The pathogen tends to move in trees from the infection site toward the roots. In fall, leaves on infected pear shoots often turn red and then black.

DAMAGE

Fire blight most commonly attacks blossoms, but it can also infect succulent tissues of shoots and water sprouts (root suckers). Infections may extend into scaffold limbs, trunks, or root systems, and may kill highly susceptible hosts. Less susceptible varieties may be severely disfigured.

LIFE CYCLE

Fire blight bacteria overwinter in cankers, which may be inconspicuous, on twigs, branches, or trunks of host trees. In spring when the weather is sufficiently warm and moist and trees resume growth, bacteria multiply in diseased tissues and ooze from branch or twig surfaces in a light tan liquid (Fig. 2). The bacteria can be transmitted to nearby blossoms or succulent growing shoots by splashing rain or insects, especially honey bees. Injuries caused by wind, hail, or insect feeding to succulent tissues are easily invaded by fire blight bacteria. Ideal conditions for



Figure 1. Fire blight infection. Blossoms infected with fire blight shrivel and turn black.

infection, disease development, and spread of the pathogen are rainy or humid weather with daytime temperatures in the range of 75° to 85°F, especially when night temperatures stay above 55°F.

Once fire blight bacteria enter the blossoms, they may cause only a localized infection and eventually die, or they may move into the twigs and branches. Fire blight bacteria that survive generally do not move through the bark uniformly but invade healthy wood by moving in narrow paths up to 1½ inches wide in the outer bark ahead of the main infection. These long, narrow infections may extend 2 to 3 feet beyond the edge of the main infection or canker. If you expose bark from an infected woody area, you will see that the diseased tissue closest to the main canker is brown. Farther out in the infection it turns red and then appears as flecking. Just beyond the infection the tissue may still appear healthy.

Tree vigor has a major influence on the extent of fire blight damage. Once

established, the distance the pathogen moves relates directly to the rate of tree growth. Vigorously growing shoots are the most severely affected; therefore, conditions that favor rapid shoot growth, such as high soil fertility and abundant soil moisture, increase the severity of damage to trees.

MANAGEMENT

Fire blight development is influenced primarily by seasonal weather. When temperatures in the range of 75° to 85°F are accompanied by intermittent rain and hail, conditions are ideal for disease development. The succulent tissue of rapidly growing trees is especially vulnerable. Thus, excess nitrogen fertilization and heavy pruning, which promote

such growth, should be avoided. Trees should not be irrigated during bloom. Monitor trees regularly, and promptly remove and destroy fire blight infections. If fire blight has been a problem in the past, apply blossom sprays. Sprays prevent new infections but will not eliminate wood infections; these must be pruned out. In years when weather conditions are very conducive to fire blight development, it may be difficult if not impossible to control the disease.

Choosing Tolerant Varieties

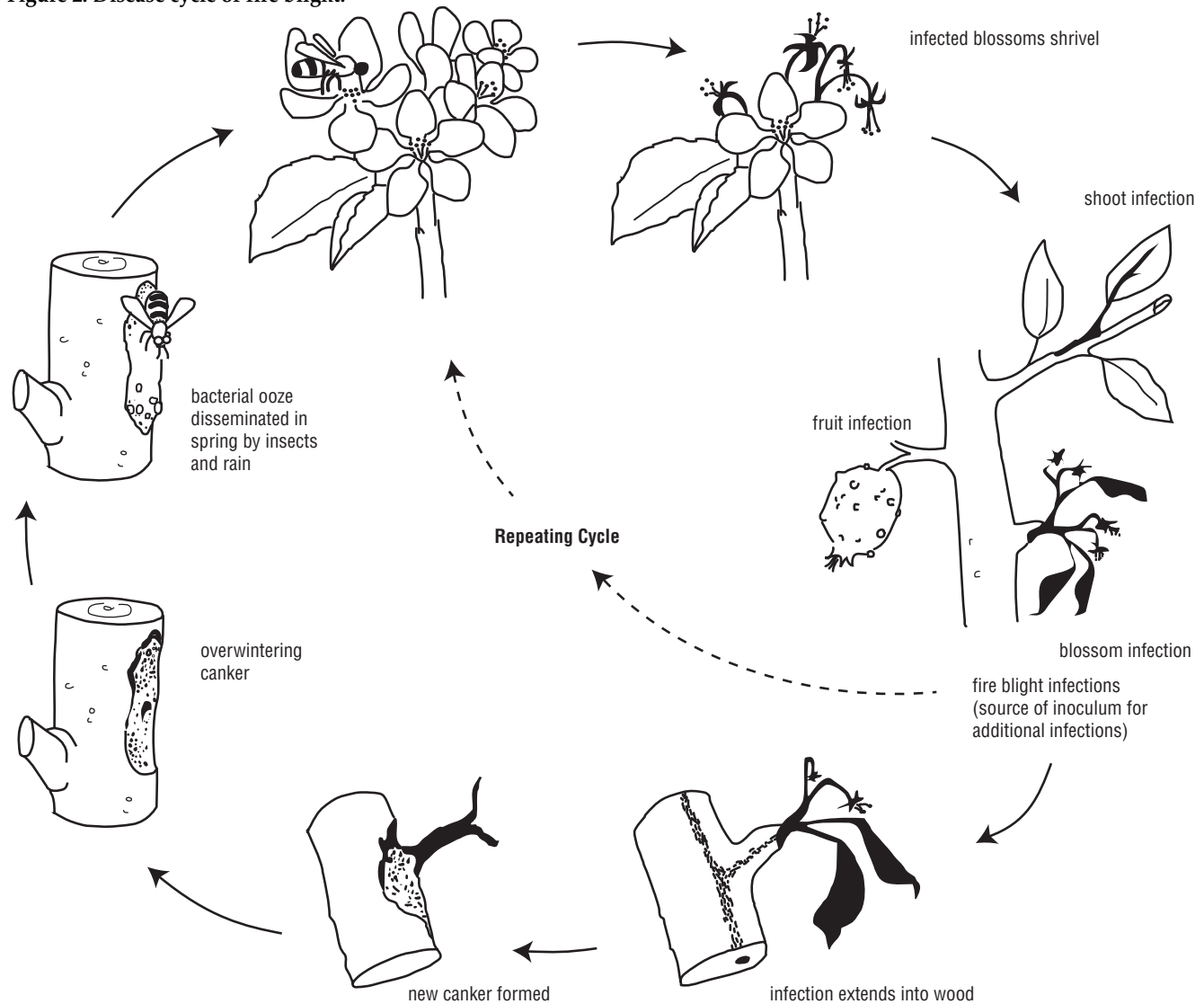
Most pear tree varieties, including Asian pears (with the exception of Shinko) and red pear varieties, are very susceptible to fire blight. Varieties of

ornamental pear trees that are less susceptible to fire blight are Bradford, Capitol, and Red Spire; Aristocrat is highly susceptible. Among the more susceptible apple varieties are Fuji, Gala, Golden Delicious, Granny Smith, Gravenstein, Jonathan, Mutsu, Pink Lady, and Yellow Newtown. Wherever possible, plant varieties less prone to fire blight damage. Because most infections originate in the flowers, trees that bloom late or throughout the season (rat-tail bloom) often have severe fire blight damage.

Removing Diseased Wood

Eliminate fire blight infections by pruning out diseased branches. Always cut an infected branch at least 8 to 12 inches

Figure 2. Disease cycle of fire blight.



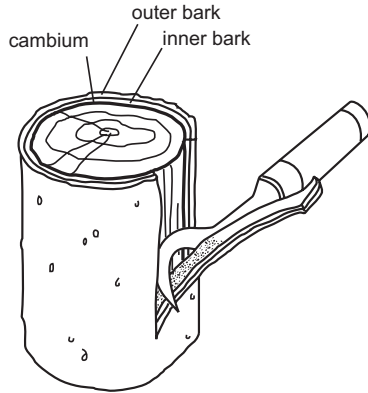


Figure 3. Scraping bark off a fire blight-infected limb.

below the visible injury or canker. A greater distance below infections may be required on major branches, scaffolds, or trunks in May or June, when blight bacteria are moving rapidly. Ideally, an infected shoot or branch should be removed at its point of attachment, without damaging the branch collar. The appearance of new

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infections below a pruning cut indicates that the cuts were not made far enough below the infection and the bacteria had already spread past the cutting point. If you cut into a canker or infected wood, disinfect your tool, as described below, to avoid spreading the pathogen.

If a fire blight infection occurs on a trunk or major limb, the wood can often be saved by scraping off the bark down to the cambium layer in infected areas (i.e., removing both the outer and inner bark) (Fig. 3). When scraping, look for long, narrow infections that may extend beyond the margin of the canker or infection site. If any are detected, remove all discolored tissue plus 6 to 8 inches more beyond the infection. If the limb has been girdled, scraping will not work and the whole limb must be removed.

To avoid spreading bacteria during pruning, dip or spray the pruning tool before each cut with a 10% solution of bleach (one part bleach to nine parts water). Dry and oil tools after use to prevent rust.

Chemical Control

A very weak (about 0.5%) Bordeaux mixture or other copper fungicide applied several times as blossoms open can reduce new infections, but will not

eliminate all new infections nor those already existing in wood. The number of applications needed depends on the blooming period. Once blossoms begin to open, make the first application when the average temperature (average of the maximum and minimum temperatures for a 24-hour period) exceeds 60°F. Apply at 4- to 5-day intervals during periods of high humidity and until late bloom is over. For pear trees, this may mean five to twelve applications per season. Copper fungicides may cause a russetting or scarring of the fruit surface. The risk of this damage begins during bloom and increases as fruits enlarge.

COMPILED FROM

Dreistadt, S. H., J. K. Clark, and M. L. Flint. 1994. *Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide*. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 3359.

Ohlendorf, B. 1999. *Integrated Pest Management for Apples and Pears*. 2nd ed. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 3340.

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UC IPM Program. Nov. 2000. *Pest Notes: Bordeaux Mixture*. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 7481.

WARNING ON THE USE OF CHEMICALS

Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash nor pour pesticides down sink or toilet. Either use the pesticide according to the label or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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