Fire Blight

Fire blight is destructive to apples and quince and is the most serious pear disease in the eastern United States. Caused by the bacterium Erwinia amylovora, the disease can attack some 75 species of plants of the rose family. A characteristic symptom of shoot blight is the bending of terminal growth into the shape of a shepherd’s crook. Photo by K. Peter.

Fire blight also occurs frequently on pyracantha, spirea, hawthorn, and mountain ash. In fruit trees, the disease can kill blossoms, fruit, shoots, limbs, and tree trunks. Certain varieties of apples are more susceptible than others. Susceptible varieties include Braeburn, Fuji, Gala, Granny Smith, Jonathan, Rome, Yellow Transparent, and Idared.

Symptoms

The disease gains entry to the tree through two main points, blossoms and new shoots, and often appears first in spring as blossom, fruit spur, and new shoot blight. Infected blossoms wilt rapidly and turn light to dark brown. Bacteria may move through the pedicel to the fruit spur and out into the leaves. Here they follow the midrib and main veins, which soon darken. The leaves wilt, turning brown on apples and quince and dark brown to black on pear. The blighted flowers and leaves remain attached for much, if not all, of the growing season. Some remain even after normal leaf fall.

Fire blight’s two main symptoms are shoot blight and cankers on limbs.

Shoot blight begins with the infection of the young, succulent growing tip. It may occur any time during the season while the shoots are still growing and when environmental conditions are most favorable for the disease. The leaves wilt rapidly, turn dark, and remain attached as in the case of spur blight. A characteristic symptom of shoot blight is the bending of terminal growth into the shape of a shepherd’s crook. Pearly or amber-colored droplets of bacterial ooze are often present on diseased blossoms, fruit, and leaf stems, on succulent shoot stems, and on the exterior of infected fruits. Inside these droplets are millions of bacteria, which may cause new infections.

Fire blight bacteria can move from blighted spurs and shoots through the vascular system into larger limbs and tree trunks. Infected branches may be girdled, resulting in loss of the entire branch. Suckers at the base of trees are often invaded and may blight back to the trunk or rootstock, causing the loss of the entire tree in one season. This is true of susceptible pears, especially Bartlett, Bosc, and Clapp’s Favorite, and certain clonal apple rootstocks, especially M.26 and M.9.

Cankers, slightly sunken areas of various sizes surrounded by irregular cracks, occur on small to large limbs, trunks, and even roots. They often begin at the bases of blighted spurs, shoots, and suckers. Active blight cankers are characterized by an amber or brown exudate on their surfaces or on the bark below.

The bacteria may also invade fruit, which becomes water-soaked. Droplets of bacterial ooze appear on the surface. Later the fruit becomes leathery, turns brown (apples) and black (pears and quince), shrivels, and usually remains attached to the fruit spur.
Disease cycle

Bacteria overwinter in the margins of cankers on branches and trunks. Once the temperature reaches about 65°F, bacteria begin to multiply and appear on the outsides of the cankers in drops of clear to amber-colored ooze. The bacteria are spread to blossoms primarily by rain with some transmission by flies and ants. Blossom-to-blossom transmission is carried out mainly by bees and other insects that visit the flowers. Insects also transmit bacteria to growing shoots. If the temperature is 65°F or above and relative humidity is 60 percent or more, or there is rain, new infections can occur. At 75°F, blossom blight and shoot blight will be evident in 4 to 5 days. Bacterial ooze appears on the new infections soon after the symptoms, providing additional sources of bacteria for new infections. In early to midsummer, during prolonged periods of muggy weather, blighted shoots and spurs, infected fruit, and new branch cankers all may have droplets of ooze on them.

The bacteria usually enter the flowers through natural openings such as stomates. Wounds are also important entry points to leaves, shoots, and fruit. Aphids, leafhoppers, lygus bugs, and other insects with piercing mouthparts may transfer fire blight bacteria directly into susceptible tissues. Wounds from hail often lead to a severe outbreak of fire blight. Any fresh wound can serve as an entry point.

Disease management

Temperatures just before and during bloom will determine if fire blight becomes serious in early spring. Daily temperatures must average 65°F or above during pink through petal fall for bacterial populations to grow enough to cause severe disease. The disease also occurs later in the season when bacteria enter late opening blossoms or growing tips of new shoots.

Where this disease was present the previous year, we suggest the following management program:

- Prune out all cankers. Cut apple limbs at least 8-12 inches below external evidence of the canker. Pruning tools do not need to be disinfected.
- At green tip, apply a copper spray aiming to have 2 lb/A metallic copper equivalent to kill bacteria on tree surfaces.
- When daily temperatures average 65°F or higher during bloom through petal fall, make at least two applications of a streptomycin formulation. Apply the first streptomycin spray anytime after first blossoms open when daily temperatures are above 65°F and a wetting event is anticipated within 24 hours. Repeat sprays at 5- to 7-day intervals through late bloom if disease conditions persist. A minimum of two applications is necessary to provide control.
- When it comes to pruning decisions when fire blight occurs, use the following guidelines to prioritize: Young orchards 3 – 8 years old with just a few strikes (highest priority). Young orchards 3 – 8 years old with severe strikes. Older orchards with a few strikes. The “ugly stub” method by cutting branches between nodes and several inches away from the central leader or other branch union:
  - 2-year-old wood (and older) is more resistant to fire blight and can stop infection movement into the tree. Since the bacteria can travel inside the tree well ahead of the visible infection (up to several feet), make cuts 8 – 12 inches below the last signs of browning, leaving 4 – 6 inch naked stub in 2-year-old or older wood. A canker will form in the stub, which can be cut off with the canker during the next winter.
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- A canker will form in the stub, which can be cut off with the canker during the next winter.
- Disinfecting pruning tools is ineffective for minimizing spread of the disease since the bacteria often are present internally in mature bark well in advance of symptom margins.
- When terminal growth stops, the spread of fire blight should also stop. The most important thing to do to control fire blight during the summer is to control sucking insects like aphids and leafhoppers. Applying streptomycin sprays within 24 hours after hail or a storm with severe winds to prevent new infections is also a good practice.
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  - Young orchards 3 – 8 years old with severe strikes.
  - Older orchards with a few strikes.
  - The “walk away” group: orchards with so many strikes that most of the tree would need to be removed; severe pruning can stimulate new growth that can become infected (lowest priority).
- If fire blight is to be pruned, use the “ugly stub” method by cutting branches between nodes and several inches away from the central leader or other branch union:
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