



AGRI MAGAZINE

(International E-Magazine for Agricultural Articles)

Volume: 02, Issue: 10 (October, 2025)

Available online at <http://www.agrimagazine.in>

© Agri Magazine, ISSN: 3048-8656

Fire Blight Disease of Apple and Pear

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Fire blight, caused by *Erwinia amylovora* (a Gram-negative bacterium), is a devastating disease of apples and pears, particularly in warm, humid climates.. Fire blight has been considered the most destructive disease of pome fruit trees and a limiting factor for apple and pear production. Fire blight not only can greatly reduce crop yield and marketability in the current season by infecting blossoms and killing of fruit spurs, but also cause the loss of entire trees and orchards. Fire blight disease is indigenous to North America and has spread to more than 50 countries around world. Fire blight of apples and pear was discovered to be a bacterial disease by the American professor T.J. Burrill in 1878.

Disease Symptoms

Symptoms of fire blight can be observed on all above ground tissues including blossoms, fruits, shoots, branches and limbs and in the rootstock near the graft union on the lower trunk.

(a) Blossom Blight

- Blossom symptoms are first observed 1–2 weeks after petal fall.
- Infected flowers may ooze a sticky, bacterial exudate (milky or amber-colored).
- Infected blossoms initially become watersoaked and darker green as the bacteria invade new tissues. Within 5 to 10 days, the tissues turned brown to black.

(b) Shoot Blight

- Infected shoots turn brown to black from the tip and may wilt rapidly to form a “shepherd’s crook”.
- Leaves on diseased shoots often show blackening along the midrib and veins before becoming fully necrotic.
- Leaves turn brown to black but remain attached to the plant.
- Numerous diseased shoots give a tree a burnt, blighted appearance.
- Infected flowers and shoots, the bacteria may invade larger branches, trunk and rootstock.

(c) Canker Formation

- Sunken, dark cankers form on branches and trunks, especially near old infection sites.
- Cankers may crack or ooze bacterial slime.

(d) Fruit Infection

- Immature fruits become water-soaked, shriveled and eventually mummify.
- Infected fruits also may exude whitish ooze.

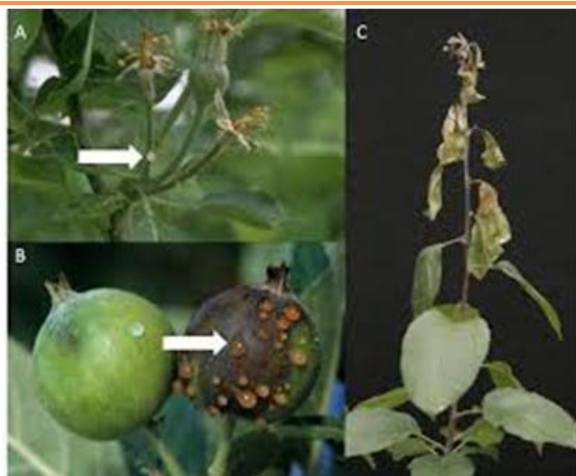
(e) Rootstock Blight

- Occurs especially in grafted trees; the rootstock becomes infected and dies rapidly.
- Trees with infected rootstocks often exhibit yellow to red foliage within a month before normal autumn coloration.

Disease Cycle

- **Infection Entry Points:** Natural openings (e.g., nectaries) and wounds.
- **Primary Source:** The bacterium overwinters in cankers on twigs and branches.

- **Dispersal:** Insects (e.g., bees, flies) and rain splash spread the bacteria to blossoms and young shoots.
- **Systemic Movement:** Bacteria move through vascular tissues, causing systemic infection in some cases.



Fire blight of apple



Fire blight of pear

Management Strategies

(a) Cultural Control

As a preventive method, selection or breeding of a resistant cultivar is another effective way for controlling fire blight.

Avoid Excessive Nitrogen.

Sanitation: Prune and destroy infected branches at least 20–30 cm below visible symptoms.

Pruning Time: Avoid pruning during wet or humid weather. Disinfect tools after each cut.

Resistant Varieties: Use resistant or tolerant apple and pear cultivars when available.

(b) Chemical Control

Dormant Sprays: Copper-based bactericides before bud break to reduce overwintering inoculum.

In case of the disease present in an orchard, sprays of antibiotics, such as streptomycin, oxytetracycline or kasugamycin, during blossom in the spring could effectively suppress blossom infection in commercial orchards.

(c) Biological Control

Use of beneficial bacteria like *Pantoea agglomerans* and *Bacillus subtilis* as antagonists to *E. amylovora*.

(d) Integrated Disease Management (IDM)

Combine pruning, resistant varieties, proper fertilization and timely bactericide applications. Monitor weather and use forecasting models (e.g., Maryblyt, Cougarblight) to time sprays.