Species susceptible to fire blight: Apple, pear, quince, serviceberry, mountain ash, pyracantha, cotoneaster

The models work by identifying the periods conducive for epiphytic bacterial growth of on blossoms before infection occur. Blossom blight risk models accumulate degree units above a threshold temperature of 60°F (Caugarblight) or 64°F (MaryBlyt)

Infection occurs when all four (BHWT) of the conditions are met.
B – Open blossoms
H – EIP = or >100
W – Wetting event (rain, dew, fog or spray)
T – Daily temperature of at least 60 F, or above
Erwinia amylovora overwinters mainly in older cankers but, in a smaller percentage in the annual cankers formed on shoots and branches in previous season. As temperature starts to rise, these cankers become active, they become “wet” and “spongy” and the pathogen becomes active in the canker margins. Bacterial cells migrate onto the surface and cankers start to ooze releasing bacteria that is disseminated by insects, wind, rain, tools, etc.

Blossom epiphytic phase

Stigmas are the principal site of epiphytic colonization and growth by E. amylovora. The bacterial population size and colonization is directly related to the temperature and by the number of blossoms infected which depends on the number of honey bees and other pollinators. Stigmas of each flower can support about 100,000 bacteria under ideal conditions.

Primary infection in flowers

Blossom blight is initiated when cells of E. amylovora get from stigma surface inside the flower. Throughout the bloom period, there is significant potential for infection and blossom blight development. Pears are notorious for developing late, secondary or “rattail” bloom making blossom blight extremely difficult to manage.

Secondary infection

Secondary infection includes shoot, fruit, and rootstock blight. Because of the primary, blossom blight infections, the inoculum is already present in the tissue and is moving from the primary infection sites, blossoms, through xylem or open wounds into the rapidly growing shoots and small fruitlets. Plant bugs, scale, psylla, pruning close to or during bloom, hale, strong wind and potential for sand-blasting in areas with sandy soils, create wounds in a tissue that become entry points for pathogen to move in and cause secondary infection. Infection events induced by severe weather are referred to as “trauma blight.” Rootstock blight can happen due to bacterial translocation from the infected scion to the rootstock. Watersprouts and sucker growth are most susceptible to infection that is further translocated into the rootstock. M9 and M26 are particularly susceptible.

Canker expansion

Both primary and secondary infections can expand throughout the summer, with the ultimate severity of an infection being dependent on the host species, cultivar, environment, and age and nutritional status of the host tissues. Vigorously
growing tissues are more susceptible to fire blight. One of the recommendations in fire blight management is to reduce rate of nitrogen fertilizer or to skip it all together, particularly after heavy pruning. In case of heavy rains, soil saturation due to poor drainage and access tissue hydration within the tree, will increase rate of bacterial translocation and canker expansion. As temperatures start to cool down towards late summer, the canker expansion slows down as well.

The most critical period for primary infections

Canker margins are the primary source of inoculum

Mummified fruit – inoculum source

Blossom blight and bacterial translocation onto leaves

Bacterial translocation through xylem tissue into spur and branch below
Secondary infection – bacterial ooze infecting young, actively expanding shoots. Notice typical curving at the top and infiltration into the leaves – browning along the mid-rib.

Secondary infection – fruit and shoot infection

Fire blight strikes expansion – Rod Island Greening cultivar, Hart, Michigan – 2006

Bacterial Movement

What to Do About it?

- Prevention:
  - Plant resistant varieties: Red delicious, Enterprise, Gold Rush, Wolf River
  - Avoid: Honeycrisp, Golden delicious, McIntosh, Gala, Fuji
- Sanitation:
  - Prune out infected shoots and limbs, remove cankers
- Cultural management:
  - Cut down on nitrogen fertilizers
Apogee (prohexadione calcium) inhibits gibberellin biosynthesis, which stops terminal growth early. Apogee can decrease the length of shoots by 30 to 60 percent. Apogee does not affect blossom blight occurrence, but when used effectively, reduces the occurrence of shoot blight. Shoots with inhibited growth are less susceptible to fire blight. The decrease in blight susceptibility does not occur until about 10 to 14 days after application. Note that apple varieties differ in their susceptibility to damage from Apogee. Do not apply Apogee to Empire or Winesap varieties, because it causes cracking on these varieties.
Duchess of Oldenburg

- Origin: Russia, early 19th Century
- Very hardy tree, very heavy producer
- Flowers in early mid season
- Ripens early in a season
- Fruit is medium to large, very good flavor, aromatic, tart.
- Show good tolerance to general diseases.
- Most famous offspring: Northern Spy and Pina

Grimes Golden

Origin: Brooke County, West Virginia, 1790. Introduced in 1830s.
“Super sweet with high sugar content and blasts of banana and anise flavors, it became the favorite of moonshiners and children alike. The first ‘Golden Delicious’ tree sprang from a ‘Grimes Golden’ seed.”

Grimes Golden

- Tree is moderately vigorous, winter-hardy, precocious, regular and abundant cropper
- Blooms in mid-season, early May
- Ripens in mid-late season
- Fruit is medium sized, oblong with a flat base
- Green to yellow skin, bright golden yellow when ripe. Fresh is crisp, creamy colored with a spicy aromatic flavor, refreshing.
- Superior dessert quality, especially pies.
- Excellent for juice and cider
- Moderately tolerant to major apple diseases

Gold Rush

- One of the latest ripening cultivars/November
- Very high quality apple that looks like Golden delicious but has more complex taste, slightly tart, spicy, very crisp...improves with storage
- It stores well up to 7 months in a cold storage
- It is disease resistant
- Good for fresh, baking and cider
**List of fireblight-resistant apple varieties**

Here is a list of apple varieties that are resistant to fireblight. It's crucial to note that while these varieties may be more resistant, no apple is completely immune to fireblight. Regular monitoring and management practices are still necessary to control the disease.

### Apple Tree Categories

<table>
<thead>
<tr>
<th>Variety</th>
<th>Description</th>
<th>Resistant to Fireblight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chabanais</strong></td>
<td>An improved, disease-resistant apple from France.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Gala</strong></td>
<td>A hardy, disease-resistant apple from New Zealand.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Golden Delicious</strong></td>
<td>A popular apple from the United States.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Liberty</strong></td>
<td>An improved form of Northern Spy, with better flavor.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Red Delicious</strong></td>
<td>A hardy, disease-resistant apple from New Zealand.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Sunset</strong></td>
<td>A new variety of apple from the United States.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Source:** [https://www Strikes.com](https://www Strikes.com)
**Jonagold/Indian Summer**
- Edible, small sweet fruit good for picking and preserving
- Ripens in August-early September

**Whitney Crab Apple**
- Edible, small sweet fruit good for picking and preserving
- Ripens in August-early September

**Chestnut Crab Apple – Edible fruit**
- Very long bloom period covers all early, mid-season and early-late season bloomers.
- Excellent disease tolerance

**Dolgo Crab Apple**
- Edible, 1 inch-size fruit, sweet
- Aromatic white-pinkish flowers, blooms early
- Scab and fire blight resistant

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**Useful links**

2020 Spray Bulletin for Commercial Tree Fruit Growers:
https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt.edu/456/456-419/ENTO-341w.pdf

Pest Management Guide: Home Grounds and Animals, 2020:

2019-2020 Midwest Fruit Management Guide:

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