THE OHIO STATE UNIVERSITY EXTENSION

FACT SHEET

Agriculture and Natural Resources

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Fire Blight of Apples and Pears

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Fire blight is a common and very destructive bacterial disease of apples and pears. The disease is so named because infected leaves on very susceptible trees will suddenly turn brown, appearing as though they had been scorched by fire. As a result of this disease, blight susceptible pear cultivars are no longer grown in many parts in the Midwest.

Damage and losses from fire blight on apple result from: death or severe damage to trees in the nursery; death of young trees in the orchard; delay of bearing in young trees due to frequent blighting of shoots and limbs; loss of limbs or entire trees in older plantings as the result of girdling by fire blight cankers; and direct loss of fruit due to blighting of blossoms and young fruit.

Fire blight may cause severe damage to many other members of the Rosaceae family. Quince, crabapple, mountain ash, spirea, hawthorn, pyracantha, and cotoneaster are all susceptible. Cultivars within some of these species are resistant.

Symptoms

Blossom and twig blight symptoms appear in the spring. Diseased blossoms become water-soaked and turn brown. The bacteria may then grow down into the blossom bearing twigs (spurs). Leaves on the spur become blighted, turning brown on apple and black on pear. Droplets of milky tan-colored bacterial ooze may be visible on the surface of diseased tissue. These droplets contain millions of bacteria which can cause new infections.

Twig blight starts at the growing tips of shoots and moves down into older portions of the twig. Blighted twigs first appear water-soaked, then turn dark brown or black. Blighted leaves remain attached to the dead branches through the summer. The end of the branch may bend over, resembling a shepherd's crook or an upside down "J". As the fire blight bacteria move through blighted twigs into main branches, the bark sometimes cracks along the margin of the infected area on the main branch causing a distinct canker.

Figure 1. Fire blight damage.

Both apple and pear fruit may be blighted. Rotted areas turn brown to black and become covered with droplets of ooze. The fruit remains firm but later dries out and shrivels into mummies.

Causal Organism

Fire blight is caused by the bacterium, *Erwinia amylovora*. The fire blight bacteria overwinter in living tissue at the margins of cankers on the trunk and main branches. The bacteria become active in the spring when temperatures get above 65 degrees F. Their growth is favored by rain, heavy dews, and high humidity. By the time trees are blossoming, droplets of ooze containing the bacteria are present on the surface of cankers. Relatively few overwintering cankers become active and produce bacteria in the spring, but a single active canker may produce millions of

Figure 2. Fire blight on apple twigs. Note the curved "Shepherd's Crook" at the tip of infected twigs.

Figure 3. Fire blight canker on apple trunk.

bacteria, enough to infect an entire orchard. The bacteria in droplets of ooze are spread by splashing rain or insects (mostly bees, flies, and ants) to open blossoms. The bacteria multiply rapidly in the blossom nectar, and invade the blossom tissue through natural openings called nectaries. The optimum temperature range for blossom blight infection is 65 to 86 degrees F. The bacteria are spread from blossom to blossom by rain or pollinating insects.

Actively growing shoot tips are infected by bacteria that have been spread by rain or insects from both cankers and infected blossoms. Invasion can occur directly through natural openings, such as lenticels and stomata, under conditions of prolonged rain and high humidity. However, shoot infection more commonly occurs through wounds created by sucking insects, such as aphids, leafhoppers, and tarnished plant bugs; by freeze or frost damage; by wind whipping; or by hail. Fire blight bacteria multiply rapidly within an infected shoot. Droplets of ooze can form on the shoots within 3 days. Shoots remain highly susceptible to infection until vegetative growth ceases and the terminal bud is formed.

Control

Fire blight is one of the most difficult diseases of apple to control, and there is no one procedure that will give complete control. Though control is not an easy task, the use of several practices in an integrated manner should result in minimal damage from fire blight.

1. **Select and plant apple and pear varieties and rootstocks that are less susceptible to fire blight.** Table 1 gives a listing of the relative susceptibility of some of the more common apple and pear varieties.

   Apple rootstocks vary greatly in their degree of susceptibility to fire blight. The following are relative resistance ratings of some common rootstocks:

   RESISTANT: Geneva 11, Geneva 16, M.7

   MODERATELY RESISTANT: MM 106, MM 111, Bud.118

   SUSCEPTIBLE: M.26, M.9, Bud.9 (Although Bud.9 is susceptible, several observations in Ohio indicate that Bud.9 is less susceptible to rootstock infection by fire blight than M.9).

2. Prune out fire blight cankers and blighted twigs. To decrease the inoculum level for the following season, prune out blighted twigs and cankers during the dormant season. During the dormant season (winter) there is much less chance of spreading bacteria. Branches that are more than half-girdled by cankers should be removed. Cut off blighted twigs by making cuts at least 4 inches below the visible dead wood. Cankers can be cut out of trunks or large branches by removing dead tissue down to wood that appears healthy. If blighted twigs are pruned out during summer, cuts should be made 12 to 15 inches below diseased wood and pruning tools should be disinfested by dipping in a 2:10 solution of household bleach in water after each cut. We recommend that commercial growers do a thorough job of pruning out blighted wood in the dormant season and not in summer.

3. Follow proper pruning and fertilization practices. Excessive nitrogen fertilizer and heavy pruning will promote vigorous growth of succulent tissue which is more susceptible to fire blight. Adjust management practices on susceptible varieties to promote moderate growth. Make fertilizer applications in early spring or late fall after growth has ceased.
4. Sucking insects create wounds through which fire blight bacteria can enter. These pests should be controlled throughout the growing season. To protect bees, do not apply insecticides during bloom.
5. Commercial growers should consider following a recommended spray program for fire blight. Sprays for fire blight control are generally not recommended for backyard growers. Instead, backyard growers are encouraged to plant less susceptible varieties and use other nonchemical control measures. For the most current spray recommendations, commercial growers are referred to Bulletin 506-A2, *Midwest Commercial Tree Fruit Spray Guide*, and backyard growers are referred to Bulletin 780, *Controlling Diseases and Insects in Home Fruit Plantings*. These publications can be obtained from your county Extension educator or the Extension Publications Office, The Ohio State University, 216 Kottman Hall, 2021 Coffey Road, Columbus, Ohio 43210-1044.

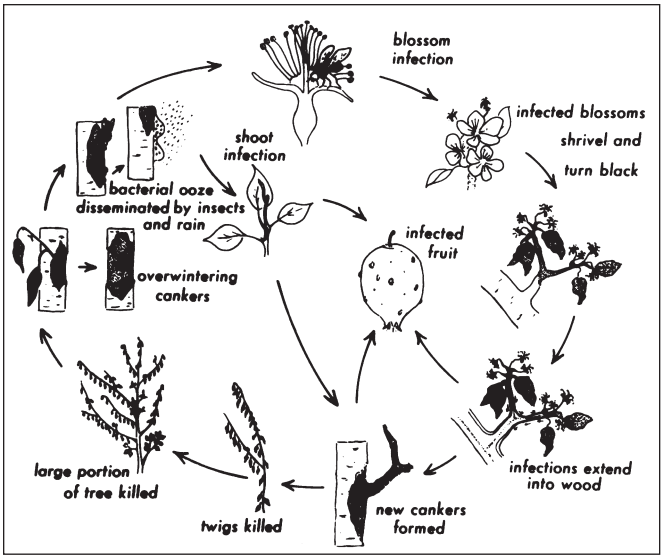

Figure 4. Disease cycle of fire blight. We want to thank the New York Agricultual Experiment Station for use of this figure. Taken from Tree Fruit IPM Disease Identification Sheet No. 3.

Table 1. Relative susceptibility of common apple and pear cultivars to fire blight.

Apple			Pear		
Highly susceptible	**Moderately susceptible**	**Moderately resistant**	**Highly susceptible**	**Moderately susceptible**	**Moderately resistant**
Beacon	Dutchess	Jonafree	Aurora	Maxine	Kieffer
Cortland	Empire	Melrose	Bartlett	Seckel	Magness
Fuji	Golden Delicious	Northwestern Greening	Bosc	Beurre D'Anjou	Moonglow
Gala	Haralson	Nova Easygro	Clapp's Favorite		Harrow Delight
Granny Smith	Jonagold	Prima	Red Bartlett		Honeysweet
Idared	Jonamac	Priscilla	Reimer Red		Blake's Pride
Jonathan	Jerseymac	Quinte	Starkrimson		
Lodi	Liberty	Red Delicious			
Monroe	McIntosh	Red Free			
Mutsu (Crispin)	Minjon	Sir Prize			
Paulared	Northern Spy	Pristine			
Rome Beauty	Novamac	Liberty			
Wayne	Spartan	Goldrush			
Wealthy	Honeycrisp	Enterprize			
Yellow Transparent	Braeburn	Sundance			
Ginger gold	Winsap/Staymen strains	Williams Pride			