TREE FRUIT CROPS

CORNELL COOPERATIVE EXTENSION

IPM Integrated Pest Management

Disease Identification Sheet No. 10 1993

Brown Rot of Stone Fruits

Monilinia fructicola (Wint.) Honey

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Brown rot is the most consistently destructive disease of stone fruits in the Northeast. When left uncontrolled, this disease can cause nearly complete crop loss in wet years.

Symptoms

Brown rot can kill blossoms, spurs, and twigs, but it causes the greatest losses and is most apparent when it attacks and rots fruit. When infected blossoms become blighted, they wilt, turn brown, and remain attached to the tree. Following rainfall or long periods of high humidity, blighted blossoms may be covered with a mass of light brown powdery spores. Infection may also move partway into the flower stem (pedicel), turning it brown or black (fig. 1).

Fruit most often become rotten as they mature, particularly during the last 1 to 3 weeks before harvest. Typically, one or more small, brown, circular spots (lesions) begin to form on infected fruit, sometimes around the site of a puncture injury caused by insects or hail. These lesions expand rapidly, turn soft, and become covered with characteristic tufts or pustules of gray to tan fungus spores (figs. 2 and 3). On sweet cherries, similar lesions also are common around the splits caused by rain cracking. Some infected fruit fall to the ground, whereas others remain attached to the tree and eventually shrivel or mummify. If the postbloom period is particularly wet, green fruit may also become diseased. When young fruit rot, the entire flesh usually turns dark brown but remains relatively firm (fig. 4) and often becomes covered with the same tufts of spores as the mature fruit (fig. 5).

Infections of the flowers and fruit sometimes progress into the spurs or twigs, causing a gummy canker to form. As the canker expands, growth above it withers and dies. Such cankers are particularly common on the twigs of peach trees.

Disease Cycle and Causal Organism

In the Northeast brown rot is caused primarily by the fungus *Monilinia fructicola*. A closely related species, *M. laxa* (the "European" brown rot organism), is a common cause of the disease in the Pacific Coast region but occurs only rarely east of the Rocky Mountains.

The brown rot fungus overwinters in mummified fruit on the ground and in the trees (fig. 6) and in spur and twig cankers. In the spring, fungus spores (conidia) are produced on the surface of cankers and mummies in the trees and are blown to open blossoms, which they can infect under suitably wet conditions. The optimal temperature for blossom blight development is 68–77° F (20–25° C). At lower temperatures, progressively more pressures (longer wetting periods and higher inoculum levels) are required to cause infection, particularly at temperatures below 61° F (16° C); however, infection can occur at temperatures as low as 41° F (5° C) during very long rainy periods. The precise wetting requirement for infection at any temperature depends on the amount of inoculum available; shorter periods of wetness are required when higher numbers of conidia are available. Just a few hours of wetness at optimal temperatures or one or more days at temperatures below 50° F (10° C) are needed. Blossom blight is much more likely to develop when the relative humidity remains high after a rainy period than if the humidity drops below 60 percent for extended periods during the first few days after a rain.

Blossom blight also can be caused by a different fungal spore (ascospore), which is produced on small mushroomlike fruiting bodies (apothecia) that sometimes develop from mummies on the ground. Ascospores are ejected into the air during the blossom period and infect under conditions presumably similar to those required for infection by conidia. In most years ascospores are a far less important source of inoculum for initiating blossom blight than are conidia.

Fig. 1.

Fig. 2.

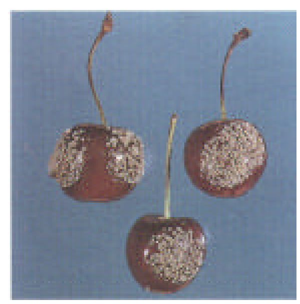


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fruit are infected only by conidia, which can originate from overwintering mummies and cankers, blighted blossoms, or other fruit infected during the current season. Conidia are spread by insects and wind currents and infect through wounds into which they have been deposited or directly through the skin of the fruit following a rain. Only a few hours of wetness are required for infection of ripening fruit at the optimal temperature of 68–77° F (20–25° C).

Fruit of all stone fruit species except sour cherry appear to have two main periods of susceptibility—from petal fall until pit hardening and again during the last few weeks before harvest (sour cherry fruit are significantly susceptible only during the preharvest period). Young fruitlets that become infected may rot immediately (fig. 4), or the infections may remain latent until just before harvest, when lesions covered with conidia seem to appear suddenly. The entire fruit rot cycle, from infection by conidia to lesion development and production of a new generation of conidia, can occur within a few days under favorable temperature and moisture conditions. Thus the fruit rot phase of the disease has the potential for explosive spread, particularly during the preharvest period.

Control

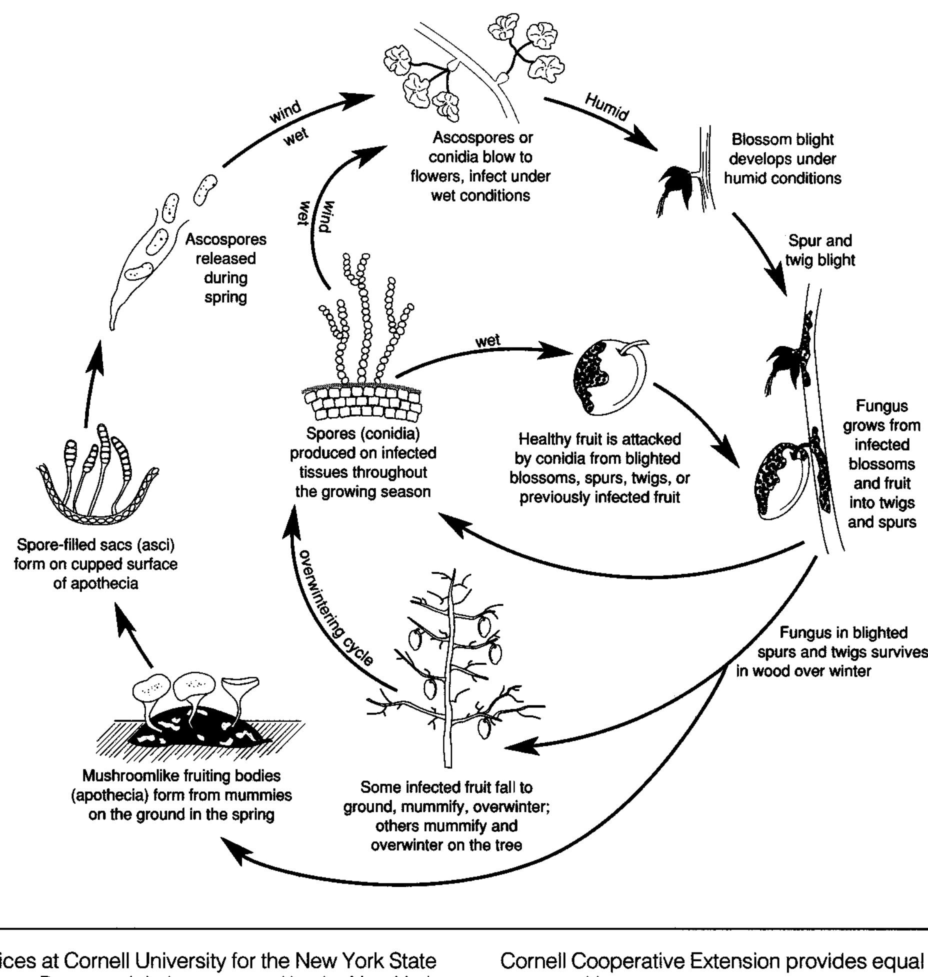
In most years, fungicide sprays are necessary to achieve commercially acceptable levels of brown rot control. Fungicide applications can be minimized and made most efficient by integrating them into a program that includes reduction of inoculum levels, recognition of host infection factors, adjustments for weather, and attention to specific fungicide characteristics.

Overwintering sources of inoculum can be reduced by removing mummies and pruning cankers from trees, preferably before bloom. Good weed control within the drip line of the tree canopies greatly reduces the risk of significant numbers of apothecia and ascospores forming from mummies on the ground. Destruction to the extent possible of wild or volunteer stone fruit trees in hedgerows and woods within one-quarter mile (400 m) of the orchard will reduce another potential source of brown rot spores. Peach fruitlets thinned after pit hardening commonly become infected and form numerous conidia while lying on the orchard floor; in contrast, fruitlets thinned before pit hardening usually decay before they have a chance to form a significant number of these spores. Early infections in wounds caused by plum curculio, oriental fruit moth, and tarnished plant bug can be an important source of conidia for starting fruit rot epidemics; good control of these insects will minimize the risk of this inoculum source.

Fungicide protection is most necessary during the major periods of susceptibility—during bloom, from the shuck split to pit hardening stages, and especially during the preharvest period. The intensity of fungicide programs during these periods should be influenced by both the amount of inoculum available and the weather; warm and wet conditions will require higher rates and more frequent intervals than cool and dry conditions. Stone fruit species and variety also will influence the spray program; apricot and sweet cherry are highly susceptible to blossom blight, followed by peach, then by sour cherry. Similarly, sour cherry fruit appear less susceptible to infection than those of the other stone fruit species and therefore require a less intensive fungicide program to obtain equivalent levels of control.

Fungicides registered for brown rot control belong to several chemical families, each with different strengths and weaknesses. Some materials are most effective against fruit infections, others against blossom infections, and some have limited postinfection (curative) or antisporulant activities. Recognizing these differences allows selection of the most efficient fungicide when a spray is needed and promotes strategies to minimize the risk of developing fungicide resistance. Such information is available through Cornell Cooperative Extension programs.

BROWN ROT DISEASE CYCLE



Produced by Media Services at Cornell University for the New York State Integrated Pest Management Program, jointly sponsored by the New York State Department of Agriculture and Markets and Cornell University.

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102GFSTR-D10 46/100 11/93 3M ML PVC30259