



BOTRYOSPHAERIA CANKER AND WHITE ROT OF APPLES

Botryosphaeria canker and fruit rot, commonly called white rot or “bot rot”, is caused by the fungus *Botryosphaeria dothidea*. The disease is most severe in trees weakened by drought, winter injury, sunscald, poor pruning, low or unbalanced nutrition, fire blight, and black rot. Bot rot can be sporadic in appearance, being serious one season and difficult to find in succeeding years. The *Botryosphaeria* fungus attacks a wide range of woody plants, including blackberry, birch, blueberry, gooseberry, pear, and quince.

Symptoms

Twigs and Limbs. Small circular spots or “blisters” usually appear on the twigs in late June or July (Figure 1). The spots enlarge, become somewhat sunken, and are filled with a watery fluid. The watery blisters rupture, allowing the sticky liquid to ooze over the bark. The fungus may grow rapidly through the tissues to form somewhat sunken, dark-colored lesions that extend to the cambium on very susceptible apple varieties. Under favorable conditions, several cankers may fuse to girdle and kill large limbs. On older cankers, the papery outer bark sloughs off with the underlying tissue, often appearing slimy. The twig and limb cankers stop growing in the fall and may split along the edges. Rings of minute, black, spore-producing bodies (pycnidia and perithecia) are formed on the surface of the lesions or under the papery outer bark (Figure 2). The following spring, the canker may be corked off and become inactive, or it may resume growth and produce spores (conidia) periodically throughout the summer. The conidia serve as the principal source of infection for twigs, limbs, and fruit.



Figure 1. Young *Botryosphaeria* cankers on an apple twig. Note the stain on the bark where a watery blister has ruptured.



Figure 2. *Botryosphaeria* canker on a limb with pycnidia and perithecia.

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Fruit. Infections start as small, reddish brown spots (Figure 3). The enlarging, circular spots become slightly depressed. On yellow-skinned varieties, these spots may be bordered by red halos (Figure 4). Spots on red-skinned apples often become bleached, giving rise to the common name of “white rot.” As lesions expand, the rotten area extends inward toward the core, forming a cylinder of the rotten flesh. In more advanced stages, the core becomes rotten and the rotten area advances from the core region into the flesh until the entire fruit is rotten. Under warm condition (80°F), rotten areas are usually soft, watery and white to tan. If rotten areas develop under cooler conditions, they are usually firmer and a deeper tan and resemble black rot. Scattered clumps of tiny, dark pycnidia develop on the surface of affected fruit. Rotten fruit usually drop, but a few may shrivel and remain attached to the tree.



Figure 3. White rot of apples, caused by *Botryosphaeria dothidea*.

Disease Cycle

The *Botryosphaeria* fungus survives the winter as black pycnidia and perithecia in wart-like stromata on living and dead cankered limbs and in rotted fruit. The fungus is commonly found on fire blighted twigs or cankers. Wounds or breaks in the cuticle are necessary for infection. The perithecia forcibly discharge ascospores during spring rains, while the conidia produced within the pycnidia ooze out in tremendous numbers and are washed and rain-splashed to other parts of the tree. The spread of the conidia may continue throughout the summer. Apple fruit may become infected fairly early in the season, but the rotting does not develop much until the fruit is almost mature. At temperatures above 75°F (24°C), mature fruit may rot completely within a few days after infection. *Botryosphaeria* canker and fruit rot infection is favored by any condition that reduces tree vigor.

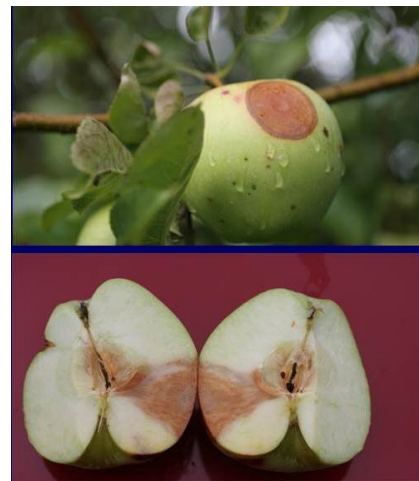


Figure 4. A fruit lesion (top) and internal fruit symptoms of white rot (bottom) of apple.

Disease Management

Management of this disease is best achieved through an integrated program of cultural practices and chemical control practices.

Tree vigor. Maintain trees in a healthy vigorous condition. Cankers generally develop on stressed or weakened trees. Trees should be irrigated during hot, dry weather to minimize drought stress and the likelihood of twig and branch infections. Prune trees annually and maintain a balanced fertility program based on soil and foliar nutrient analysis. Cankers generally develop rapidly on winter-injured trees.

Sanitation. Sanitation is critical for effective control. Piles of prunings are an important source of inoculum and should be removed from the perimeter of the orchard or burned. Prunings can be left on the orchard floor if they are chopped with a flail mower, which removes much of the bark and allows them to decompose faster. Removal of mummified apples and pruning out dead wood in the tree are important for reducing the inoculum within the tree. Pruning out current-season shoots infected with fire blight is also important, because they can be colonized and serve as an inoculum source during the same growing season.

Fungicide application. The use of fungicides combined with good sanitation is beneficial for controlling the fruit rot phase of the disease. A fungicide spray program from bloom until harvest is important to assure white rot control. Fungicides are not effective for controlling the canker phase of the disease on weakened trees. For the most current fungicide recommendations, consult the “Midwest Fruit Pest Management Guide” (<https://ag.purdue.edu/hla/Hort/Documents/ID-465.pdf>). Home fruit growers should follow the recommendation in the “Pest Management for the Home Landscape (C1391)” published by the University of Illinois.