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report on
PLANT
DISEASE

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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.

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

The *Botryosphaeria* fungus attacks a wide range of woody plants, including blackberry, birch, blueberry, gooseberry, pear, and quince.

Duchess, Golden Delicious, Grimes Golden, Gallia Beauty, Rome, and Yellow Transparent apple trees are all very susceptible to bot rot. Jonathan and Red Delicious are less affected by this disease than are other varieties.

Figure 2. Botryosphaeria canker on a limb. Note the rings of black, spore-producing bodies (pycnidia and perithecia).

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.

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Fruit. Infections start as small, reddish brown spots around the lenticels (Figure 3). The enlarging, circular spots become slightly depressed; on yellow-skinned varieties, these spots may be bordered by one or more red "halo" rings (Figure 4). Spots on red-skinned apples often become bleached, giving rise to the common name of "white rot." Infected flesh under the spots is soft and egg-shaped, with the long axis parallel to that of the apple core (Figure 5). Several spots commonly merge to involve all or much of the fruit. As the rot progresses, the skin color becomes dark brown and superficially resembles black rot, except that with black rot the decayed tissue is firm, instead of soft and mushy.

Figure 3. Young botryosphaeria rot infections around the lenticels.

Syrupy beads of exudate appear on the surface of fruit completely rotted by the *Botryosphaeria* fungus. Small, black fruiting bodies (pycnidia) that are filled with conidia may develop on the surface of rotted fruits during warm (above 75°F or 24°C), moist conditions. Mature fruits are the most susceptible.

Apple fruit often become infected from mid-summer on without showing external symptoms. Thus, fruit may be infected without symptoms appearing in the orchard and placed in cold storage. The internal rot starts to develop again after the fruit is removed from cold storage. Such apples deteriorate rapidly when left at room temperature for several days.

Figure 4. Botryosphaeria rot spot on a yellow-skinned apple. Note red "halo" rings.

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.

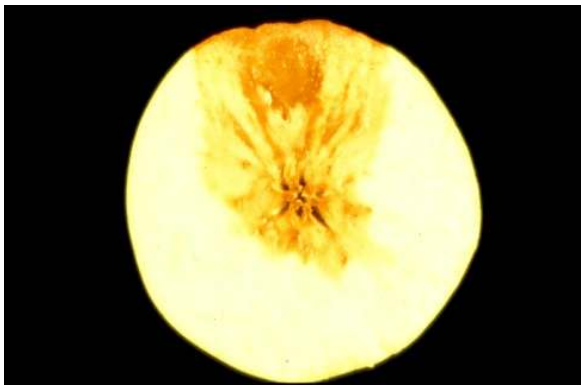

Figure 5. Internal fruit symptoms of white rot, with decay extending in a cylindrical manner to the core. (Courtesy T.B. Sutton)

Botryosphaeria canker and fruit rot infection is favored by any condition that reduces tree vigor.

CONTROL

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

1. Maintain trees in a healthy vigorous condition. Cankers generally develop only on stressed or weakened trees. Prune trees annually and maintain a balanced fertility program based on soil and foliar nutrient analysis. Cankers generally develop rapidly on winter-injured trees.

2. 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.

3. The use of fungicides combined with good sanitation is beneficial for controlling the fruit rot phase of the disease. Fungicides are not effective for controlling the canker phase of the disease on weakened trees. For the most current fungicide recommendations, consult the "*Commercial Tree Fruit Spray Guide"** (http://www.extension.iastate.edu/Publications/PM1282.pdf). Home fruit growers should follow recommendations provided in the "Home, Yard, and Garden Pest Guide" (University of Illinois Extension Bulletin C139)*

**These publications are available from the University of Illinois Ag Services, P345, 1917 South Wright St., Champaign, IL 61820 (1-800-345-6087).*