

White Rot and Botryosphaeria Canker of Apple

Michael A. Ellis

Department of Plant Pathology

White rot of apple fruits is also referred to as “Bot Rot” or Botryosphaeria rot. The fungus that causes fruit rot can also cause a canker on limbs and other above-ground woody portions of the tree. The canker phase of the disease is most severe in trees weakened by drought, winter injury, sunscald, poor pruning, low or unbalanced nutrition, and other plant diseases. The fruit rot phase can be sporadic in appearance, being serious one season and difficult to find in the following season. The *Botryosphaeria* fungus attacks a wide range of woody plants that are common in Ohio.

Dutchess, Golden Delicious, Grimes Golden, Gallia Beauty, Rome, and Yellow Transparent apple varieties are all very susceptible to fruit rot. Jonathan and Red Delicious are less likely to be affected than other varieties.

Symptoms

Fruit

At first, small, reddish-brown spots appear around the lenticels. The spots enlarge and become slightly depressed. On yellow-skinned varieties, these spots may be bordered by one or more red “halo” rings. Spots on red-skinned apples often become bleached. The tissue under the spots is soft and egg shaped, with the long axis parallel to that of the core. Several spots may 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.

Beads of exudate appear on the surface of fruits completely rotted by white rot. Small, black fruiting bodies

(pycnidia) that are filled with spores (conidia) develop on the surface of rotted fruits during warm, moist conditions. Mature fruits are most susceptible to the disease.

Apple fruits often become infected from mid-summer on without showing external symptoms. Thus, fruit may be infected without symptoms appearing in the orchard. Disease development is checked when these apples are placed in cold storage.

However, when they are removed from cold storage an internal rot develops and the fruit may deteriorate very rapidly at room temperature.

Twigs and Limbs

Small, circular spots or “blisters” appear on the twigs in June and July. The spots enlarge, become somewhat sunken, and fill with a watery fluid. The fungus may grow rapidly through the tissues to form slightly sunken, dark-colored cankers that may extend to the cambium on very susceptible apple varieties. Under favorable conditions,



Figure 1. Early stages of White rot on Golden Delicious apple fruit. The dark center of the lesion is surrounded by a red halo.

several cankers may fuse to girdle and kill large limbs. On older cankers, the outer bark becomes tan to orange and papery, and the margins of the canker crack and fissure. The outer bark sloughs off and the underlying tissue appears slimy.

In the fall, twig and limb cankers stop growing and may split along the edges. Rings of small, black, spore-producing bodies (pycnidia and perithecia) are formed on the surface of the cankers or under the papery outer bark. The following spring, a canker may resume growth or be corked off and become inactive.



Figure 2. Botryosphaeria canker on apple limb.

Causal Organism and Disease Cycle

Botryosphaeria canker and fruit rot (white rot) is caused by the fungus *Botryosphaeria dothidea*. The fungus overwinters as black pycnidia and perithecia in a wart-like stroma on living and dead cankered limbs and in rotted fruits. The fungus is also commonly found on fire-blighted twigs or cankers. Wounds or breaks in the epidermis are necessary for the fungus to penetrate. Spores (ascospores) are forcibly discharged from perithecia during spring rains. Another type of spore (conidia) is produced within pycnidia and ooze out in tremendous numbers. They are then washed and rain-splashed to other parts of the tree throughout the summer. Apple fruits may become infected fairly early in the season, but rotting does not develop much until the fruit is almost mature. At temperatures above 75 degrees F (24 degrees C), mature fruit may rot completely within a few days after infection. The development of Botryosphaeria canker and fruit rot is favored by any condition that reduces tree vigor.

Control

Control of white rot is best achieved through an integrated program of cultural practices and chemical control measures.

1. 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.
2. Any practice that helps to maintain trees in a healthy, vigorous condition is critical for controlling the canker phase of the disease. 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.
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, commercial growers are referred to Bulletin 506-A2, *Midwest Commercial Tree Fruit Spray Guide*; backyard growers are referred to Bulletin 780, *Controlling Diseases and Insects in Home Fruit Plantings*. Homeowners are encouraged to practice the previously described cultural recommendations to reduce or eliminate the need for fungicide use. These bulletins can be obtained from your county Extension educator or the Extension Publications Office; The Ohio State University; 216 Kottman Hall; 2021 Coffey Road; Columbus, OH 43210-1044.

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Keith L. Smith, Ph.D., Associate Vice President for Agricultural Administration and Director, Ohio State University Extension
TDD No. 800-589-8292 (Ohio only) or 614-292-1868