

Deep Bark Canker of Walnut, Cultivar Hartley *Brenneria rubrifaciens*

Host: English walnut (*Juglans regia*).

Disease common name: Deep bark canker.

Pathogen: *Brenneria rubrifaciens*; syn.: *Erwinia rubrifaciens*.

Disease Cycle

Inoculum: Infected trees are the only known source of inoculum. The bacterium may have an epiphytic phase, or it may be a low-grade pathogen on some cultivars and not noticed. Inoculum is readily available for dissemination from oozing cankers once a tree becomes infected.

Transmission: Mechanical harvesters transmit the pathogen from diseased trees to healthy trees. Insects and birds may also transmit the bacterium.

Infection: Bacteria enter trees through deep breaks in the outer bark, such as wounds made by mechanical tree shakers. It has been suspected, but not proven, that infection can occur when the pathogen enters growth cracks, which occur frequently in the trunk and on major scaffold branches of 'Hartley'. It also is suspected that the bacteria invade through holes made by woodpeckers.

Symptoms and signs: Infected trees vary greatly in severity of symptoms. Typically, there is an exudation of dark, saplike substances, usually seen first from cracks in the trunk (Fig. 1) and then on the upper trunk and major branches as the disease progresses over the years (Fig. 2). The dark exudate is highly visible running down the trunk and limbs. Dark brown to black necrotic streaks form along the inner bark (Fig. 3) and outer sapwood. The necrosis develops outward to the periderm, which cracks, causing the resultant flow of exudates during the summer and fall. Vascular tissue has a pitted appearance (Fig. 4) that is seen when the bark is removed. In later years, limbs and major portions of a tree may die (Fig. 5). Diseased trees may survive for years but yield is reduced depending upon disease severity.

Survival: Little is known about survival of the bacterium outside of the host.

Disease Management

Management of soil moisture and nutrition may reduce the damage from deep bark canker.

Thorough cleansing of harvester shaker pads with disinfectants is recommended before the machinery is used in healthy orchards. Disease development is favored when trees are stressed by lack of water and when grown in poor soil. 'Hartley' is by far the most susceptible of the walnut cultivars and relatively resistant cultivars are being planted, such as 'Howard' and 'Chandler'.

References

Bradbury, J. F. 1986. Guide to Plant Pathogenic Bacteria. CAB International, Slough, U.K.

Teviotdale, B. L., Michailides, T. J., and Pscheidt, J. W., eds. 2002. Compendium of Nut Crop Diseases in Temperate Zones. American Phytopathological Society, St. Paul, MN.



Figure 1. Exudate flowing from longitudinal cracks in trunk. (Courtesy B. Teviotdale)



Figure 2. Symptoms of systemic infection exhibiting reddish brown exudate from cracks in trunk and limbs. (Courtesy B. Teviotdale)



Figure 3. Typical pits in the wood and black streaks in inner bark. (Courtesy N. Schaad/ M. Schroth)



Figure 4. Bark removed to show pitted vascular tissue. (Courtesy N. Schaad)



Figure 5. Diseased tree with dead limbs. (Courtesy N. Schaad)