

Black rot

Ashley L. Myers

Grape Pathology Extension Specialist, Department of Plant Pathology, Physiology, and Weed Sciences,
Virginia Tech

AHS Agricultural Research and Extension Center, Winchester, VA

Introduction: Black rot is one of the most economically important diseases in the northeastern United States, Canada, Europe, and South America. Indigenous to North America, black rot was introduced into other countries by contaminated propagation material. Crop losses can range from 5 to 80%, depending on severity, which is influenced by inoculum level, weather, and cultivar susceptibility. In Virginia, black rot can result in significant fruit loss to the unsuspecting, but is comparatively easy to control in all but the wettest years. There is wide variation in susceptibility among native and hybrid varieties, but all *Vinifera* varieties should be considered highly susceptible.

Symptoms and signs: All young green tissues, including leaf blades, petioles, shoots, tendrils, and peduncles, are susceptible to infection during the growing season. Leaves are susceptible to infection for approximately one week after unfolding, while berries are susceptible from cap fall until veraison. On leaves, symptoms appear one to two weeks after infection as tan, circular lesions or leaf spots. Leaf spots vary from 2 to 10 mm in diameter, beginning as cream colored lesions, then darkening to tan and ultimately to reddish brown (Fig. 1). The lesions soon produce small, black pycnidia (spore-producing structures).



Fig. 1



Fig. 2

Lesions on petioles (Fig. 2) appear at about the same time as on the leaves. Pedicel and peduncle lesions sometimes enlarge, girdle the petiole, and cause the leaf to wilt. Elliptical black cankers develop on young shoots. Lesions vary in length from a few millimeters to 2 cm. Numerous cankers may result in blighting of tips of growing shoots and may cause breakage of shoots.

Fruit infection is the most serious stage of the disease and may result in substantial economic loss (Fig. 3). The first symptom of berry infection is the appearance of a small (1 mm diameter) whitish lesion surrounded by a reddish brown ring. The lesion can grow to

over 1 cm diameter within one day. Infected berries appear light or chocolate brown. The berries quickly turn a darker brown, and pycnidia develop on the berry surface in a “bulls-eye” pattern. Infected berries soon dry, shrivel, and wrinkle, becoming hard black to dark blue mummies. Berry infections cause direct fruit loss through drying and shriveling of the berries, which remain attached to the cluster stem (rachis).



Fig. 3

Pathogen life cycle and conditions for disease: The causal organism, *Guignardia bidwellii*, primarily overwinters in mummified berries on the soil surface or in old clusters still attached to the vine. Ascospores (sexual overwintering spores) are released after 0.3 mm or more of rain beginning shortly after budbreak. After rain, ascospores may be released for a period of 8 hours with no additional rainfall. Discharge of ascospores continues during periods of rainfall until mid-July but then lessens. Ascospores require free water and temperatures of 50 to 90°F (80°F is optimal, germination time is 6 hrs) to germinate. Ascospores cause leaf lesions and infect blossoms as well as young fruit. Pycnidia develop in overwintered mummies, newly rotted berries, and leaf lesions. Pycnidia release additional spores (conidia) during wetting periods. Conditions favorable for conidia dissemination and germination are similar to those for ascospores. Conidia infect leaves, blossoms, and young fruit. The process of infection, pycnidia formation, and spore release is repeated throughout the spring and summer during favorable weather conditions.

Young leaves are highly susceptible to infection as they unfold but become resistant at the time they finish expanding. Fruit infections occur from cap fall until veraison. Berries are highly susceptible to black rot infections for 2 to 3 weeks following cap fall, and maintain a reduced level of susceptibility until they become highly resistant 6 or 7 weeks after bloom. In warm conditions, age-related resistance develops more quickly.

Cultural control: Based on reducing leaf wetness and inoculum.

- Plant in sites with good air circulation and sun exposure.
- Use training systems that allow good air movement through the canopy and prevent excess shading.
- Remove old clusters (contains mummies) during winter pruning.
- Consider cultivation beneath the vine to bury mummies in vineyards that chronically suffer from black rot or that are being managed organically.

Chemical control: In addition to cultural practices, fungicides are necessary to avoid black rot development on most varieties (2006 VT Pest Management Guide). Most of the black rot inoculum is released prebloom and primary infections really get the ball rolling, so protectant fungicides (applied at 7- to 14-day schedule depending on weather) should be

used at this time. For effective eradicator action, the appropriate fungicides must be applied within 72 hours of the beginning of an infection period.

- Mancozeb (including Manzate, Penncozeb, Dithane, and others) formulations have a 66-day PHI during which time they may not be applied.
- Captan has a 0-day PHI but a 3-day REI with the newest formulation. Captan is rated as only having fair control for black rot and should not be used as the sole control.
- Ziram and ferbam also do well for black rot control, with 21-day and 7-day PHIs respectively. Ferbam may cause unsightly residues on light-skinned varieties.
- The sterol-inhibiting compounds (SIs) (Nova, Elite, and Bayleton) are highly effective black rot fungicides offering protectant as well as eradicator activity. The SIs offer as much as 21 days protection, but newly emerged shoot tips will be unprotected. Use the higher end of a recommended product rate per acre and do not exceed the label's recommended interval for repeat applications. Be aware of powdery mildew and downy mildew resistance issues with SIs and QoIs.
- The QoIs (e.g. Abound and Sovran) have protectant activity against black rot equivalent to mancozeb and ziram; however QoIs are more rainfast and may slow secondary spread. Use the higher end of a recommended product rate per acre and do not exceed the label's recommended interval for repeat applications. Be aware of powdery mildew and downy mildew resistance issues with QoIs.

Please refer to the 2006 VT Pest Management Guide at

<http://www.ext.vt.edu/pubs/pmg/hf3.pdf> for current information.

Notes: For more detailed information on Black rot and information on pesticides, follow the links at: <http://www.ext.vt.edu/news/periodicals/viticulture/03january/03january.html>

References: see Viticulture Notes Vol Apr 1993, Apr 1997, May 1999

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