



BLACK ROT OF GRAPE

Black rot, caused by the fungus *Guignardia bidwellii*, is the most serious disease of grapes in Illinois. The disease is most destructive in warm and wet seasons. The fungus attacks all green parts of the vine—the leaves, shoots, leaf and fruit stems, tendrils, and fruit. The most damaging effect is to the fruit. When warm, muggy weather in the spring and summer is prolonged, unsprayed fruit on very susceptible varieties may become almost completely rotted by harvest time.

SYMPTOMS

Leaves. Brown, circular lesions develop on the upper surface of the leaves starting in the late spring (Figure 1). Lesions vary from 2 to 10 mm in diameter. As lesions merge, they form irregular blotches that are reddish brown. The number of lesions per leaf varies from 1 to more than 100, depending on the severity of the disease. The center of the lesion turns tannish brown and is surrounded by a black margin. Within a few days, black spherical fungus fruiting bodies (pycnidia) form within the lesions. Pycnidia that are speck-sized are arranged in a definite ring just inside the margin of the lesion (Figure 2).

Fruit. Berries are susceptible to the infection from bloom until they begin to ripen (reach 5 to 8 percent sugar). Infected berry first appears light brown in color. Soon the entire berry turns dark brown, and then black pycnidia develop on its surface (Figure 3). Most of the diseased fruit 'shell' or shatter and drop early. The remaining infected berries eventually turn into shriveled, hard, black mummies (Figure 4).



Figure 1. Black rot lesions on upper surface of a grape leaf (R.C. Pearson).



Figure 2. Pycnidia of black rot fungus within a lesion (R.C. Pearson).

For further information concerning diseases of grapes, contact Dr. Mohammad Babadoost, Extension Specialist in Fruit and Vegetable Pathology, Department of Crop Sciences, University of Illinois at Urbana-Champaign. (217-333-1523; email: babadoos@uiuc.edu).

Shoots, Leaf and Fruit Stems, and Tendrils. The lesions on these parts are dark purple to black, oval to elongated, and somewhat sunken. The speck-sized black pycnidia are scattered over the surface of the lesions. As the canes grow, the bark tends to split along the length of the lesion. If the berry stem is infected early, the flow of sap is shut off, and the berry shrivels and fails to develop.

DISEASE CYCLE

The black rot fungus overwinters in mummified berries on the soil or in old clusters still hanging on the vines. During rain, microscopic spores (ascospores) are shot out of numerous, black fruiting bodies (perithecia) and are carried by air currents to young, expanding leaves. In the presence of moisture, these ascospores germinate and infect leaves, blossoms, and young fruit. The infection of leaves become visible after 9 to 11 days after infection. When the weather is moist, ascospores are produced and released throughout the entire spring and summer, providing continuous primary infection. Recent research indicates that the majority of ascospores from mummies on the ground are discharged within a time period from one inch shoot growth to 10-14 days after bloom. If mummies are allowed to hang on the vines, they can discharge ascospores and conidia throughout the growing season. The black rot fungus requires warm weather for optimal growth; cool weather slows its growth. Leaf infections occur after 6 hours of wetness at 80°F (26.5°C) but requires 12 and 24 hours of wetness at 90°F (21°C) and 50°F (10°C), respectively.

Each older leaf lesion contains a number of pycnidia, each of which produces hundreds of summer spores (conidia) that ooze out during wet weather. Pycnidia develop in over-wintered mummies and newly rotted berries. The splash of raindrops spreads conidia to other leaves and to young fruit. If water is present, the conidia germinate and infect young tissue. New black rot infections continue into late spring and summer during prolonged periods of warm, rainy weather. The conidia are capable of germinating and causing infection several months after being formed.

From August, toward the end of the season, the pycnidia are transformed into the overwintering stage which results in production of perithecia within which the spring spores (ascospores) are produced.

CONTROL

Black rot can be effectively controlled, if the cultural and chemical practices outlined below are followed.

1. **Space vines properly and choose a planting site where the vines will be exposed to full sun and good air circulation.** Keep the vines off of the ground and make sure they are properly tied. This practice reduces the time that vines remain wet from dew and rain and thus limits the amount of

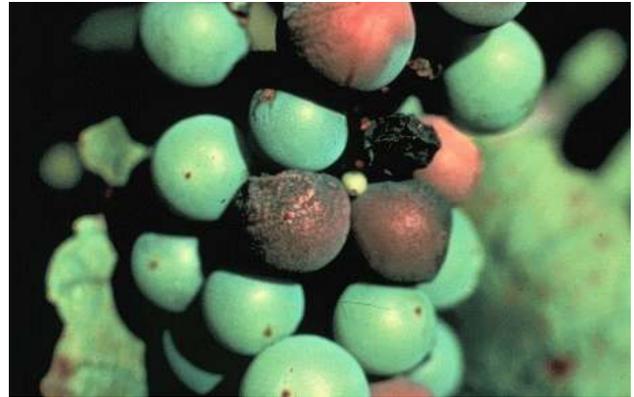


Figure 3. Black rot symptoms on berries (R.C. Pearson).

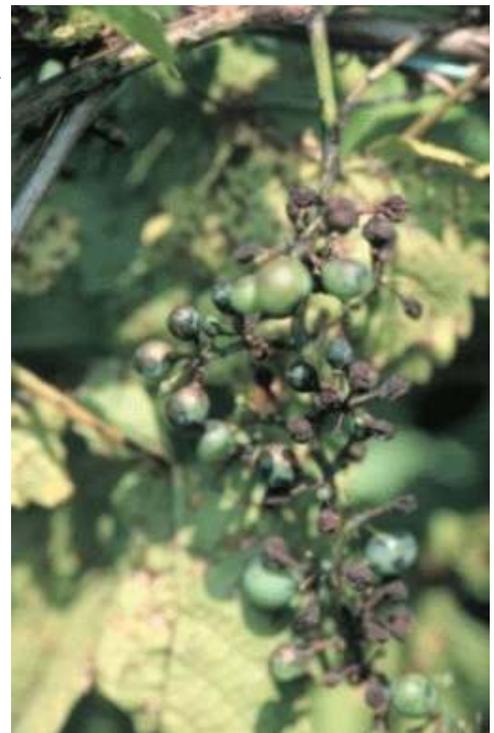


Figure 4. Black rot on a grape cluster. Note shrunken rotted berries.

infection.

2. **Prune the vines each year during the dormant period.** Select only a few strong, healthy canes from the previous year's growth to produce the following season's crop. Remove the prunings, diseased and overwintering berries, leaves and tendrils from the vineyard and burn or otherwise destroy them. This practice reduces inoculum of the fungus, thus limiting disease development.
3. **Keep the fruit planting and surrounding areas free of weeds and tall grass.** This practice will promote rapid drying of vines, and thereby limit infection by the fungus.
4. **Where feasible, cultivate the vineyard before bud-break to bury the mummified berries.** Diseased berries covered with soil do not produce spores that will reach the developing vines.
5. **Grape cultivars differ in their susceptibility to black rot.** The reactions of many grape cultivars to black rot and seven other important diseases are given in the Table 1.
6. **Fungicide sprays are needed in wet seasons, to protect the developing new growth.** Follow the grape spray schedule outlined in ICSG1, "Illinois Commercial Small Fruit and Grape Spray Guide." (website): <http://www.hort.purdue.edu/hort/ext/sfg/>). Thorough coverage of all the plant parts above ground with each application is essential for control of the disease and for successful fruit production. The important sprays to control black rot are: (1) as new shoots are about 1/2 inch long and repeated at 7-14 days intervals; (2) just before bloom; and (3) just after bloom, when the fruit has set. After these crucial sprays, applications should continue at about 10-day intervals as long as the weather is rainy and muggy. The sprays can be discontinued when the weather turns dry. Several fungicides, including Abound, Bayleton, Elite, Ferbam, Flint, Mancozeb, Nova, Procure, Rubigan, Sovran, and Ziram are effective against black rot. Always follow the label directions.

For more information on black rot of grape, refer to the "Midwest Small Fruit Pest Management Handbook" (website: <http://www.ag.ohio-state.edu/~ohioline/b861/index.html>) and "Compendium of Grape Diseases" from the American Phytopathological Society, St. Paul, MN.

The above mentioned publications are available from the University of Illinois P345, 1917 S. Wright St., Champaign, IL 61820, 1-800-345-6087.

Table 1. Relative Disease Susceptibility and Chemical Sensitivity of Grape Cultivars

The relative ratings in this chart apply to an average growing season under conditions usually favorable for disease development. Any given variety may be more severely affected.

Variety	Susceptible or Sensitive to:									
	BR	DM	PM	Bot	Phom	Eu	CG	ALS	S[1]	C[2]
Aurore	+++	++	++	+++	+	+++	++	+++	No	++
Baco Noir	+++	+	++	++	+	++	+++	++	No	?
Cabernet Franc	+++	+++	+++	+	?	?	+++	?	No	+
Cabernet Sauvignon	+++	+++	+++	+	+++	+++	+++	?	No	+
Canadice	+++	++	+	++	?	?	++	++	?	?
Cascade	+	+	++	+	++	++	+	?	No	?
Catawba	+++	+++	++	+	+++	+	+	+	No	++
Cayuga White	+	++	+	+	+	+	++	++	No	+
Chambourcin	+++	+	++	++	?	?	++	?	Yes	?
Chancellor	+	+++	+++	+	+++	+	+++	+++	Yes	+++
Chardone	?	++	++	++	?	?	++	++	No	?
Chardonnay	++	+++	+++	+++	+++	++	+++	++	No	+
Chelois	+	+	+++	+++	+++	+++	++	+++	No	+
Concord	+++	+	++	+	+++	+++	+	+	Yes	+
Cynthiana/Norton	+	++	+	+	+	?	+	?	Yes	?
DeChaunac	+	++	++	+	+++	+++	++	+++	Yes	+
Delaware	++	+++[3]	++	+	+++	+	+	+	No	+
Dutchess	+++	++	++	+	++	+	++	+	No	?
Elvira	+	++	++	+++	+	+	++	++	No	++
Einset Seedless	+++	++	+++	+	?	?	+	?	?	?
Foch	++	+	++	+	?	+++	+	+	Yes	?
Fredonia	++	+++	++	+	++	?	+	+	No	?
Gewii rztraminer	+++	+++	+++	+++	?	?	+++	+	No	+
Himrod	++	+	++	+	?	?	?	+	No	?
Ives	+	+++	+	+	?	++	+	+	Yes	?
Limberger	+++	+++	+++	+	?	+++	+++	?	No	?
Melody	+++	++	+	+	?	?	?	?	No	?
Merlot	++	+++	+++	++	+	+++	+++	?	No	++
Moore's Diamond	+++	+	+++	++	?	++	?	?	No	?
Muscat Ottonel	+++	+++	+++	++	?	+++	+++	?	No	?
Niagara	+++	+++	++	+	+++	+	++	+	No	+
Pinot blanc	+++	+++	+++	++	?	?	+++	?	No	+
Pinot gris	+++	+++	+++	++	?	+++	+++	?	No	?
Pinot Meunier	+++	+++	+++	+++	?	+++	+++	?	No	?
Pinot Noir	+++	+++	+++	+++	?	?	+++	+	No	+
Reliance	+++	+++	++	+	++	?	?	?	No	+
Riesling	+++	+++	+++	+++	++	++	+++	+	No	+
Rosette	++	++	+++	+	++	++	++	++	No	+++
Rougeon	++	+++	+++	++	+++	+	++	+++	Yes	+++
Sauvignon blanc	+++	+++	+++	+++	?	?	+++	?	No	+
Seyval	++	++	+++	+++	++	+	++	++	No	+
Steuben	++	+	+	+	?	?	+	++	No	?
Vanessa	+++	++	++	+	+	?	+	?	?	?
Ventura	++	++	++	+	+	?	+	+++	No	?
Vidal 256	+	++	+++	+	+	+	++	+	No	?
Vignoles	+	++	+++	+++	++	++	++	++	No	?
Villard noir	?	+	+++	+	?	?	?	?	?	?

Key to susceptibility or sensitivity: BR = Black rot; DM = Downy Mildew; PM = Powdery Mildew; Bot - Botrytis; Phom = Phomopsis; Eu = Eutypa; CG = Crown gall; ALS = Angular leaf scorch; S = Sulfur; C = Copper.

Key to ratings: + = Slightly susceptible or sensitive; ++ = Moderately susceptible or sensitive; +++ = Highly susceptible or sensitive; No = Not sensitive; Yes = Sensitive; ? = Relative susceptibility or sensitivity not established.

[1] Slight to moderate Sulfur injury may occur even on tolerant varieties when temperatures are 85°F or higher during or immediately following the application.

[2] Copper applied under cool, slow-drying conditions is likely to cause injury.

[3] Berries not susceptible.

We thank the New York Cooperative Extension service for the use of this table.