



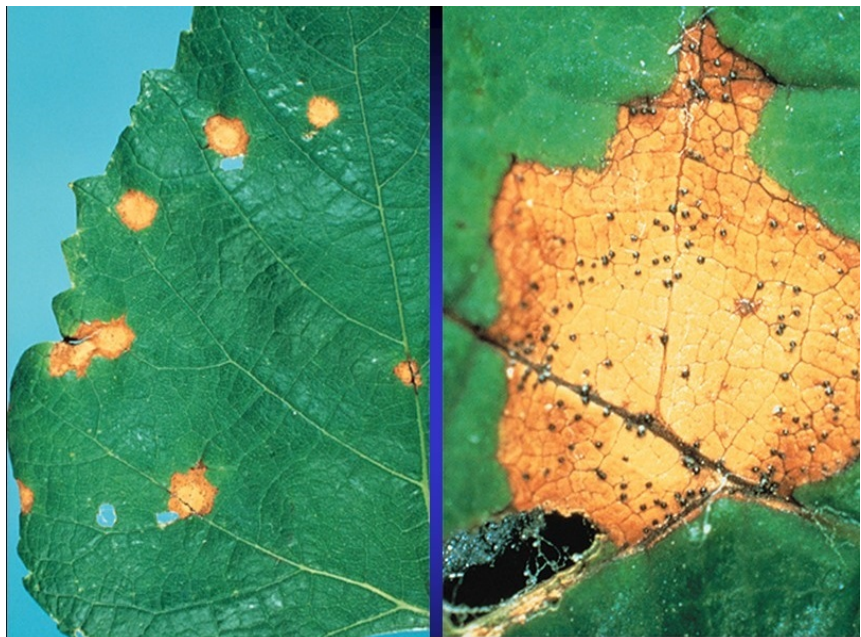
## BLACK ROT OF GRAPE

Black rot, caused by the fungus *Guignardia bidwellii*, is one of the most serious disease a of cultivated and wild grapes in Illinois. The disease is most destructive in warm, 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. Black rot was seen in 1804 in Kentucky vineyard; however, the first detailed report was in 1886. The disease has been reported to cause up to 80% crop losses. Susceptibility of grape cultivars varies.

### Symptoms

#### LEAVES

Reddish brown and circular-to-angular spots appear on the upper surface of the leaves starting in the late spring (Figure 1). Spots vary from 2 to 10 mm in diameter. As spots merge, they form irregular blotches that are reddish brown. The number of spots or lesions per leaf varies from 1 to more than 100, depending on the severity of the disease. The center of the leaf spot turns tannish brown and is surrounded by a black margin. Fungus fruiting bodies (pycnidia) that are speck sized and black are arranged in a definite ring just inside the margin of the spot. Only young, rapidly growing leaves are susceptible.



**Figure 1.** Left, black rot lesions on a grape leaf; Right, fruiting bodies (pycnidia) of *Guignardia bidwellii* within a black rot lesion (Courtesy APS, R. C. Pearson).

#### FRUIT

Fruit infections can take place shortly after the calyx (flower petal) falls. However, most infections occur when the fruit is half to almost full size. A small spot appears that is circular and whitish tan, often surrounded by a brown ring. Such spots first appear on the berry - usually while it is still green. The spots rapidly enlarge, darken, and may cover half or more of the berry within 48 hours. The center of the spot becomes sunken, wrinkled, and dark. Within a few days, the entire berry becomes black, hard, and

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For further information concerning diseases of small fruits, contact Dr. Mohammad Babadoost, Extension Specialist in Fruit and Vegetable Pathology, Department of Crop Sciences, University of Illinois at Urbana-Champaign.

mummified (Figure 2). Most of the diseased fruit 'shell' or shatter and drop early. The surface of the withered fruit is soon covered with minute, black pimple-like reproduction body of the pathogen (pycnidia) that are often arranged in circular zones.

#### SHOOTS, LEAF AND FRUIT STEMS, AND TENDRILS

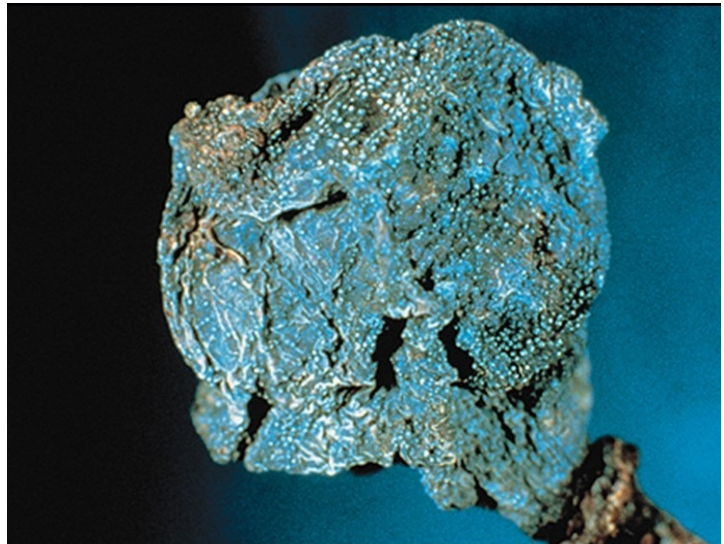
The lesions on these parts are dark purple to black, oval to elongated, and somewhat sunken. The speck-sized black pycnidia are scattered over the surface of the lesions. As the canes grow, the bark tends to split along the length of the lesion. If the berry stem is infected early, the flow of sap is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



**Figure 2.** Black rot in various stages of disease development on a grape cluster. Not pycnidia of *Guignardia bidwellii* on berries (Courtesy APS, R. C. Pearson).

#### Disease cycle

*Guignardia bidwellii* produces ascocarps (sexual spores) in perithecium (sexual fruiting bodies) and conidia (asexual spores) in pycnidia (asexual fruiting bodies). The fungus overwinters in mummified berries (Figure 3) on the soil or in old clusters still hanging in the vines. Ascospore discharge begins in spring shortly after budbreak (Figure 4). Ascospores are ejected after 0.3 mm or more of rain and may be discharged for up to 8 hours after one rainfall. Ascospores cause leaf lesions and also infect blossoms and young fruits. Fruit infections occur from mid-bloom until onset of berry color. Mature leaves and ripe fruits are not susceptible. Ascospores require free water for germinations. They germinate in as little as 6 hours at 81°F (27°C), which is also optimal temperature for leaf infection.



**Figure 3.** Mummified berry with black rot (Courtesy APS, L. V. Madden).

Pycnidia develop in overwintered mummies and newly rotted berries and can develop in leaf lesions three to five days after infection. Once pycnidia mature, conidia are liberated following 3 mm or more of rain. Vast number of conidia are liberated from pycnidia in leaf lesions and rotted fruit during the growing season and cause secondary infection. Rain lasting for 1-3 hours is optimal for dispersal of conidia. Conidia can attack leaves, blossoms, and young fruits. New black rot infections continue into

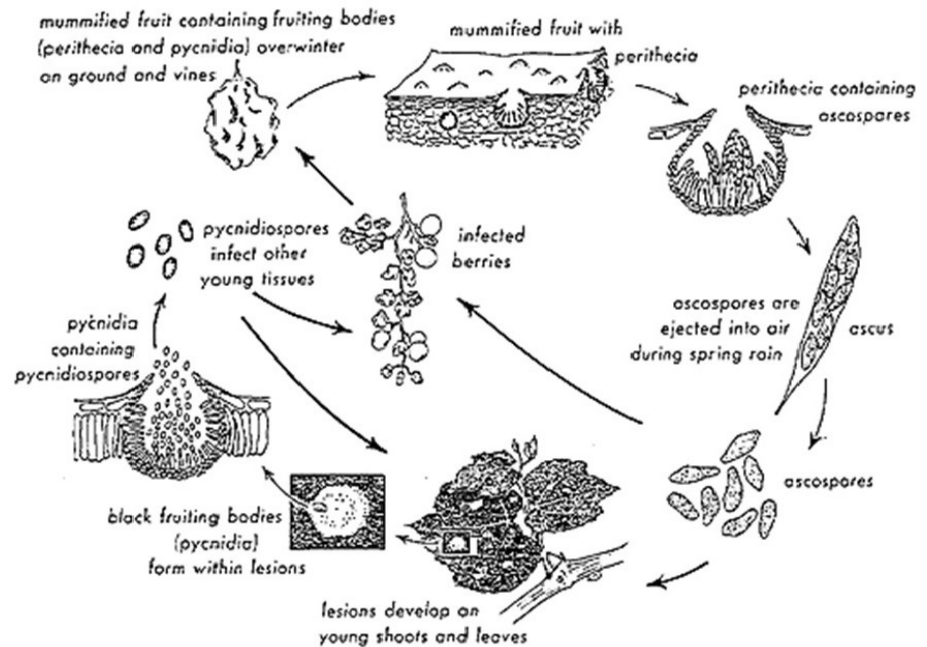


late spring and summer during prolonged periods of warm, rainy weather.

## Disease management

Black rot can be effectively managed, 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 infection.



*Figure 6. Disease cycle of black rot of grape (Courtesy New York State Agricultural Experiment Station).*

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.
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 other important diseases are given in the Table below.
6. **Use protective fungicide sprays, which are needed in wet season, to protect the developing new growth.** Follow recommendations in the Midwest Fruit Pest Management Guide, University of Illinois Extension - ICSG (<https://ag.purdue.edu/hla/hort/documents/id-465.pdf>). This is an annually updated publication. Thorough coverage of all the plant parts above ground with each application is essential for control and for successful fruit production. The important sprays to control black rot are: (1) as new shoots emerge when they are 2 to 4 inches long, and again when they are 10 to 15 inches long; (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.

Cultivar	Susceptibility								Sensitivity	
	BR	DM	PM	Bot	Phom	Eu	CG	ALS	Sulfur <sup>1</sup>	Copper <sup>2</sup>
Aurora	+++	++	++	+++	+	+++	++	+++	No	++
Baco Noir	+++	+	++	++	+	++	+++	++	No	?
Cabernet Franc	+++	+++	+++	+	?	?	+++	?	No	?
Cabernet Sauvignon	+++	+++	+++	+	+++	+++	+++	?	No	+
Candice	+++	++	+	++	?	?	++	++	?	?
Cascade	+	+	++	+	++	++	+	?	No	?
Catawba	+++	+++	++	+	+++	+	+	+	No	++
Cayuga White	+	++	+	+	+	+	++	++	No	+
Chambourcin	+++	++	+	++	?	?	++	?	Yes	?
Chancellor	+	+++	+++	+	+++	+	+++	+++	Yes	+++
Chardonel	++	++	++	++	?	?	++	++	No	?
Chardonnay	++	+++	+++	+++	+++	++	+++	++	No	+
Chelois	+	+	+++	+++	+++	+++	++	+++	No	+
Concord	+++	+	++	+	+++	+++	+	+	Yes	+
Cynthiana/Norton	+	++	+	+	+	?	+	?	Yes	?
DeChaunac	+	++	++	+	+++	+++	++	+++	Yes	+
Delaware	++	+++ <sup>3</sup>	++	+	+++	+	+	+	No	+
Dutchess	+++	++	++	+	++	+	++	+	No	?
Elvira	+	++	++	+++	+	+	++	++	No	++
Einset Seedless	+++	++	+++	+	?	?	+	?	?	?
Foch	++	+	++	+	?	+++	+	+	Yes	?
Fredonia	++	+++	++	+	++	?	+	+	No	?
Frontenac	++	+	++	++	+	?	?	?	No	?
Gewüztraminer	+++	+++	+++	+++	?	?	+++	+	No	+
Himrod	++	+	++	+	?	?	?	+	No	?
Ives	+	+++	+	+	?	++	+	+	Yes	?
Jupiter	++	+	+++	+	+	?	?	?	?	?
LaCrosse	+++	++	++	+++	++	?	?	?	?	?
Leon Millot	+	++	+++	+	+	+	?	?	Yes	?
Limberger	+++	+++	+++	+	?	+++	+++	?	No	?
Marechal Foch	++	+	++	+	?	+++	?	+	Yes	?
Marquis	+	+++	+	+	+++	?	?	?	?	?
Mars	+	+	+	+	+	?	+	?	?	?
Melody	+++	++	+	+	?	?	?	?	No	?
Moore's Diamond	+++	+	+++	++	?	++	?	?	No	++
Muscat Ottonel	+++	+++	+++	++	?	+++	+++	?	No	?
Niagara	+++	+++	++	+	+++	+	++	+	No	?
Pinot Blanc	+++	+++	+++	+++	+++	+++	+++	+++	No	+
Pinot Gris	+++	+++	+++	++	?	+++	+++	?	No	?

<b>Table 1. Relative Susceptibility and Sulfur and Copper Sensitivity of Grape Cultivars - Continued</b>										
<b>Cultivar</b>	<b>Susceptibility</b>								<b>Sensitivity</b>	
	<b>BR</b>	<b>DM</b>	<b>PM</b>	<b>Bot</b>	<b>Phom</b>	<b>Eu</b>	<b>CG</b>	<b>ALS</b>	<b>Sulfur<sup>1</sup></b>	<b>Copper<sup>2</sup></b>
Pinot Meunier	+++	+++	+++	+++	?	+++	+++	?	No	?
Pinot Noir	+++	+++	+++	+++	?	?	+++	+	No	+
Reliance	+++	+++	++	+	++	?	?	?	No	?
Riesling	+++	+++	+++	+++	++	++	+++	+	No	+
Rosette	++	++	+++	+	++	++	++	++	No	+++
Rougeon	++	+++	+++	++	+++	+	++	+++	No	+++
Saint Croix	?	++	++	++	?	?	?	?	?	?
Sauvignon Blanc	+++	+++	+++	+++	?	?	+++	?	No	+
Seyval	++	++	+++	+++	++	+	++	++	No	+
Steuben	++	+	+	+	?	?	+	++?	No	?
Traminette	+	++	+	+	?	?	++	?	?	?
Vanessa	+++	++	++	+	+	?	+	?	?	?
Ventura	++	++	++	+	+	?	+	+++	No	?
Vidal Blanc	+	++	+++	+	+	+	++	+	No	?
Vignoles	+	++	+++	+++	++	++	++	++	No	?
Villard Noir	?	+	+++	+	?	?	?	?	?	?

Key to susceptibility: BR = Black rot; DM = Downy mildew; PM = Powdery mildew; Bot = Botrytis; Phom = Phomopsis; Eu = Eutypa; CG = crown gall; ALS = angular leaf scorch.

Key to rating: + = slightly susceptible or sensitive; ++ = moderately susceptible or sensitive; +++ = highly susceptible or sensitive; No = not sensitive; Yes = sensitive; and ? = relative susceptibility or sensitivity not established.

<sup>1</sup> Slight to moderate sulfur injury may occur even on tolerant cultivars when temperatures are 85°F (30°C) or higher during or immediately following the application.

<sup>2</sup> Copper applied under cool , slow-drying conditions is likely to occur injury.

<sup>3</sup> Berries not susceptible.