

Managing Black Rot

GRAPES 101

Grapes 101 is a series of brief articles highlighting the fundamentals of cool climate grape and wine production.

By Tim Weigle



Figure 1. Various stages of black rot infection on berries. Photo by Tim Weigle.

Black rot (*Guignardia bidwellii* (Ellis)) is a potentially devastating fungal disease that can infect the leaves, shoots, berries and cluster stems of grapes. Susceptibility to black rot varies greatly by variety, but it can be a concern whether the grape is an American, French Hybrid or *vinifera* variety. Black rot is considered to be the bane of organic grape growers due to the limited materials that are available for its control as well as the devastating crop losses that can occur due to berry infections. Complete crop loss can occur in warm, humid climates like those of the eastern United States, but black rot is rarely found in arid growing regions.

Impact on clusters. Grape growers often find black rot to be an insidious disease: the grape clusters will appear to be developing normally until suddenly –as late as mid-summer – the fruit will start to turn brown, then black, with numerous round,

black spheres called *pycnidia* on the surface. The grape berry will eventually shrivel up into a hard, raisin-like mass called a mummy. The *pycnidia* on the mummy's surface contain inoculum, or spores, that will overwinter and be available to infect the grape crop the following year.

Overwintering inoculum and weather and the disease cycle. The amount of overwintering inoculum and the current season's weather conditions are the key factors affecting the level of black rot found in a vineyard. Black rot inoculum can overwinter within cane lesions and the mummified fruit. In the spring, when the combination of temperature, precipitation and leaf wetness are favorable, the *pycnidia* on the mummies explosively propel their spores into the air, where they can land on susceptible grape tissue. No infection by black rot occurs when temperatures are below 45°F. At 50°F it takes 24 hours of leaf wetness to provide the conditions necessary for a black rot spore to germinate and infect the green tissue of grapes.



Figure 2. Black rot Leaf lesion with black spore-containing *pycnidia*, photo by Tim Weigle.

Leaf lesions. The earliest, most recognizable indicator of black rot infections are the leaf lesions. These appear as circular, tan lesions that have a darker margin. Within these lesions are small black spheres, or *pycnidia*, which are containers for spores that can continue to infect the current year's crop. While there can be many causes of tan lesions on grape leaves, only black rot lesions will have the black *pycnidia* within the tan field.

Timing and environmental conditions for infections. The ideal conditions for black rot infection are temperatures between 70°F to 80°F, when it takes only six to seven hours of leaf wetness for infection to occur. The availability of primary inoculum peaks around bloom and drops off dramatically post bloom. It is at this time that spores from the present season's leaf infections become important because they can mature and produce secondary infections. Over the growing season berries become resistant to black rot infections. Concord is one of the first to become resistant at about four to five weeks after bloom. *V. vinifera* varieties are the latest to obtain resistance, about five to six weeks after bloom.

Sanitation. While there are a number of fungicides available for management of black rot, the importance of sanitation cannot be overemphasized. Sanitation plays a huge part in limiting the amount of black rot inoculum found in a vineyard. Removal of infected canes through pruning during the dormant season will reduce the level of overwintering inoculum. However, the largest reservoir of inoculum is typically found in the mummies. Mummies can be found either on the vineyard floor or retained in the canopy attached to old cluster stems. Removal of mummies from the canopy is critical: research has shown that these mummies provide inoculum much later into the season than those that have fallen to the vineyard floor. If mummies cannot be removed from the vineyard, the next best option is to make sure that all mummies are dropped to the vineyard floor to reduce the length of time spores will be available in the coming year. In a small planting, removal of infected fruit as it is discovered during the growing season is an excellent way to limit the amount of inoculum. Any mummies not removed from the vineyard during the dormant season should be, at a minimum, dropped to the ground where they can be covered with a dirt berm or cultivation, which effectively buries many of the mummies and limits the number of spores available for infection.

Spray timing. Even the best sanitation practices will leave low levels of inoculum in the vineyard, and this is all it takes for black rot to get a foothold. Using fungicides that are effective in managing black rot is critical, as is the correct timing of the applications. The most effective spray programs will target the overwintered inoculum to limit the number of primary infections in the beginning of the year. If primary infections occur, they can produce and release spores about two weeks after the initial infection, resulting in the continued spread of black rot through secondary infections. As spore production peaks just prior to the bloom period, it has been shown that the period just before bloom through two weeks after bloom is the most important time period to protect against black rot. However, the threat will change yearly depending on the level of black rot in the vineyard the previous year and the current season's weather conditions, as these factors can result in the need to add an earlier season spray or an additional fungicide application after bloom. The Spots chart, a model for determining the weather conditions necessary for black rot infection periods to occur, can be found on the Network for Environment and Weather Applications (NEWA) website at <http://newa.cornell.edu> by using the grape forecast models in the Pest Forecasts drop down menu.

For more information on black rot, see Integrated Pest Management [Disease Identification Sheet #102 : Black Rot](#) , by Cornell's grape pathologist Wayne Wilcox.

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