

Mesonet Grape Black Rot Advisor

Web Address: <http://Mesonet.org> / Horticulture / Grape

Mobile Address: <http://m.mesonet.org>
 Agricultural Advisories

Advisor Active: March 15th to September 15th

Grower Decisions

The first step in using the Mesonet Grape Black Rot Advisor is to determine which Oklahoma Mesonet weather station will be used. That is an easy decision when the station is close by. When the vineyard location is in between stations, consider the information from two or three nearby Mesonet sites in making a decision. You will also want to consider which Mesonet site best monitors the environment in your vineyard. To find out more about a specific Mesonet site go to Mesonet.org, click on “About” in the upper “blue” bar, then “Mesonet Sites.”



Figure 1. Symptoms of black rot on a grape leaf

The next step is to consider the number of days a fungicide will protect the grape plants from infection. This is referred to as the fungicide protection period or interval. During the bloom period, the fungicide protection interval is considered to be no longer than 7 days, due to an increased likelihood of infection taking place during favorable weather conditions. Otherwise, the fungicide protection period can be 10 or 14 days. The Grape Black Rot Advisor allows you to enter your last spray date and a 7, 10 or 14-day protection window. If the Advisor is alerted to a currently active fungicide protection interval, it will label days within the protection window as “No Fungicide Needed,” even if they would be calculated to be a “Spray Fungicide” day if an active fungicide protection period was not indicated.

If the fungicide protection interval has lapsed and a “Spray Fungicide” warning is given, then the grower should apply a fungicide application as soon as possible.

Fungicide applications are most effective when applied within 24 hours from midnight on a “Spray Day”. Fungicides will be less effective, yet still worth applying up to 48 hours from midnight on a “Spray Day.” The daily black rot “Threshold Hours” and “Leaf Wetness Hours” are based on a 24-hour day from midnight to midnight.

When are Grapes Susceptible?

The fungus that causes black rot can attack very early in the growing season. Weather conditions need to be monitored once the new shoots of susceptible varieties elongate to three inches. Initial fungicide sprays can be applied (if weather is favorable for the disease) in the 5-10 inch shoot range on grape varieties that are slightly more resistant to black rot (see Fig. 2). After grape shoots have elongated 10 inches or more, spraying for black rot should be initiated (if weather is favorable for the disease).



Figure 2. Early season grape shoot elongation

Other Considerations

The Mesonet Grape Black Rot Advisor is a weather-based tool that provides pest control guidance. It does not replace the best judgment of the grower in making pest management decisions. Growers also need to consider the presence of other pathogens in their vineyard. For example, chemical management of powdery mildew needs to continue until harvest and may require fungicide application post-harvest.

Grape Black Rot

In Oklahoma, black rot, caused by the fungus *Guignardia bidwellii*, is the most important foliar disease of grapes. Black rot will manifest on foliage (Fig. 1), followed by secondary infections of fruit (Fig. 3). Most loss is a result of direct destruction of the fruit by the fungus. Black rot can be managed using cultural practices and chemical control.



Figure 3. Symptoms of black rot on a grape fruit cluster

Fungicides used to treat black rot should be used preventatively when weather is predicted to be favorable for infection and disease development. In Oklahoma, preventative applications of fungicides should begin when shoots are 3-10 inches in length and continue at regular intervals when weather conditions are favorable for disease. The most critical time for application of fungicides is just prior to bloom until at least 4-to-6 weeks post-bloom.

Once veraison is initiated, natural resistance in the fruit exists and fungicides are not required. Veraison is the onset of fruit ripening, characterized by color change of the grape fruits.

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Infections by the fungus are driven by leaf wetness duration periods, which vary depending on the average temperature (Table 1). Temperatures of 70°F to 80°F require the smallest duration of leaf wetness and are the most favorable temperatures for fungal infection. The Mesonet Grape Black Rot Advisor is based on the data in Table 1. The quadratic equation (Equation 1) below is used to calculate the number of threshold hours necessary for black rot development. This equation was developed from data in Table 1.

$$\text{Equation 1: Threshold Hours} = 0.0926(AT^2) - 4.2817(AT) + 54.974$$

Where:

- AT= Average daily air temperature in Celsius at 1.5 meters (5ft).
- A day is midnight to midnight Central Daylight Saving Time.

Once the number of threshold hours has been determined for the day, then the number of actual leaf wetness hours has to be determined. Normally this would be performed using a specialized leaf wetness sensor. However, Oklahoma Mesonet stations lack these special sensors. Therefore, leaf wetness is interpolated from relative humidity using a specific threshold. Based on previous research in Oklahoma, leaf wetness can be reasonably calculated using a relative humidity threshold of 85% or above. For each hour where the relative humidity is $\geq 85\%$, that hour is considered an hour of leaf wetness.

Once the observed number of “leaf wetness hours” has been determined for the day, this number is compared to the “threshold hours” calculated in the equation above. If the number of “leaf wetness hours” is **equal to or greater** than the number of “threshold hours,” then a grape black rot “risk day” has occurred. The Grape Black Rot Advisor will label a risk day with a “Spray Fungicide” warning. If the “leaf wetness hours” fall below the “threshold hours,” then a grape black rot risk day has not occurred and the Grape Black Rot Advisor gives a “No Fungicide Needed” recommendation. The box background for a “Spray Fungicide” day will be colored orange, versus a “No Fungicide Needed” day that has a green background box color.

Table 1. Hours of continuous leaf wetness required for an infection by the fungus that causes black rot at select temperatures

Temperature (°F)	Minimum hours of continuous leaf wetness
50	24
55	12
60	9
65	8
70	7
75	7
80	6
85	9
90	12

Spotts, R.A. 1977. Effect of leaf wetness duration and temperature on the infectivity of *Guignardia bidwellii* on grape leaves. *Phytopathology* 67:1378-1381