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# Phomopsis Cane and Leaf Spot of Grape

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For many years, the Eastern grape industry recognized a disease called “dead-arm,” which was thought to be caused by the fungus *Phomopsis viticola*. In 1976, researchers demonstrated that the dead-arm disease was actually two different diseases that often occur simultaneously. Phomopsis cane and leaf spot (caused by the fungus *Phomopsis viticola*) is the new name for the cane- and leaf-spotting phase of what was once known as dead-arm. Eutypa dieback (caused by the fungus *Eutypa lata*) is the new name for the canker- and shoot-dieback phase of what was once known as dead-arm. We now propose that the name dead-arm be dropped. Growers should remember that Phomopsis cane and leaf spot and Eutypa dieback are distinctly different diseases, and their control recommendations vary greatly.

Disease incidence of Phomopsis cane and leaf spot appears to be increasing in many vineyards throughout the Midwest. Crop losses up to 30 percent have been reported in some Ohio vineyards in growing seasons with weather conducive to disease development. Phomopsis cane and leaf spot can affect most parts of the grapevine, including canes, leaves, rachises (cluster stems), flowers, tendrils, and berries and can cause vineyard losses by:

- Weakening canes, which makes them more susceptible to winter injury.
- Damaging leaves, which reduces photosynthesis.
- Infecting cluster stems, which can result in poor fruit development and premature fruit drop.
- Infecting berries resulting in a fruit not near harvest.

## Symptoms

Spots or lesions on shoots and leaves are common symptoms of the disease. Small, black spots on the internodes at the base of developing shoots are probably the most common disease symptom. These spots are usually found on the first three to four basal internodes (Figure 1). The spots may develop into elliptical lesions that may grow together to form irregular, black, crusty areas. Under severe conditions, shoots may split and form longitudinal cracks. Although cane lesions often appear to result in little damage to the vines, it is important to remember that these lesions are the primary source of overwintering inoculum for the next growing season.

Leaf infections first appear as small, light-green spots with irregular, occasionally star-shaped, margins (Figure 2). Usually only the lower one to four leaves on



Figure 1. Spotting and cracking of grape cane caused by Phomopsis. These typical cane symptoms are usually present only on the first three to four internodes.



Figure 2. Symptoms on young leaves early in the season.



Figure 3. Symptoms on older leaves late in the season.

a shoot are affected. In time, the spots become larger, turn black, and have a yellow margin (Figure 3). Leaves become distorted and die if large numbers of lesions develop. Infections of leaf petioles may cause leaves to turn yellow and fall off.

All parts of the grape cluster (berries and rachises or cluster stems) are susceptible to infection throughout the growing season; however, most infections appear to occur early in the growing season. Lesions developing on the first one or two cluster stems (rachises) on a shoot may result in premature withering of the cluster stem. Infected clusters that survive until harvest often produce infected or poor-quality fruit.

If not controlled early in the growing season, berry infection can result in serious yield loss under the proper environmental conditions. Berry infections first appear close to harvest as infected berries develop a light-brown color (Figure 4). Black, spore-producing structures of the fungus (pycnidia) then break through the berry skin,

and the berry soon shrivels. At this advanced stage, *Phomopsis* cane and leaf spot can be easily mistaken for black rot. Growers should remember that the black rot fungus only infects green berries and will not infect berries after they start to mature. Berries become resistant to black rot infection by three to four weeks after bloom. Fruit rot symptoms caused by *Phomopsis* generally do not appear until close to harvest on mature fruit. Severe fruit rot has been observed in several Ohio vineyards.

Research has shown that berry infection can occur throughout the growing season; however, most fruit rot infections probably occur early in the season (pre-bloom to two to four weeks after bloom). Once inside green tissues of the berry, the fungus becomes inactive (latent), and the disease does not continue to develop. Infected berries remain without symptoms until late in the season when the fruit matures. Thus, fruit rot that develops at harvest may be due to infections that occurred during bloom.



Figure 4. Symptoms of fruit infection.



Figure 5. *Phomopsis* fruiting bodies (pycnidia) on a dormant cane.

## Causal Organism and Disease Cycle

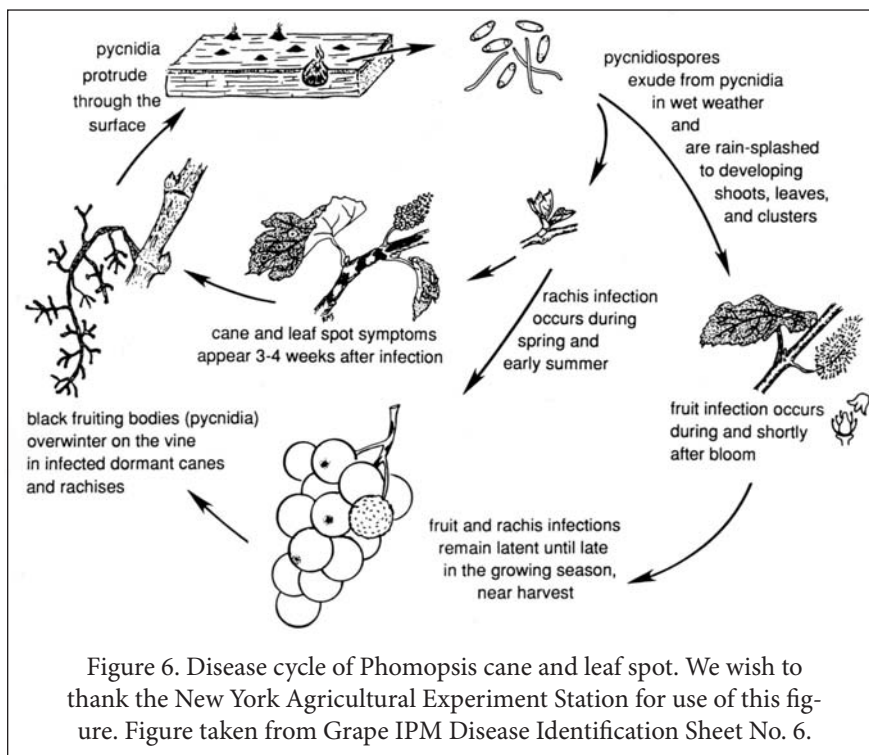
The fungus overwinters in lesions or spots on old canes infected during previous seasons (Figure 5) and requires cool, wet weather for spore release and infection. The fungus produces flask-shaped fruiting bodies called pycnidia in the old diseased wood. These pycnidia release spores in early spring and are spread by splashing rain droplets to developing shoots, leaves, and clusters. In the presence of free water, the spores germinate and cause infection. Shoot infection is most likely during the period from bud break until shoots are six to eight inches long. The optimum temperature for leaf and cane infections is between 60 and 68 degrees F, and a wetness duration of at least six hours is required at these temperatures.

As the wetness duration increases, the opportunity for infection greatly increases. Lesions on leaves appear at seven to 10 days after infection. Fully expanded leaves become resistant to infection. Lesions on canes require three to four weeks to develop. The fungus does not ap-

pear to be active during the warm summer months, but it can become active during cool, wet weather later in the growing season. Pycnidia eventually develop in cane lesions and will provide the initial inoculum for infections during the next growing season.

## Control

1. Select planting sites with direct, all-day sunlight (avoid shade). Good soil drainage and air circulation are also very important. Orient rows to take full advantage of sunlight and wind movement. Cultural practices that increase air circulation and light penetration in the vineyard will reduce wetting periods and should be beneficial for control.
2. While dormant pruning, cut out infected canes and destroy them. Select only strong, healthy canes that are uniform in color to produce the next season's crop.
3. Proper timing of early-season fungicide sprays is important for control in commercial vineyards.



For the most current spray recommendations, commercial growers are referred to Bulletin 506-B2, *Midwest Commercial Small Fruit and Grape Spray Guide*, and backyard growers are referred to Bulletin 780, *Controlling Diseases and Insects in Home Fruit Plantings*.

Printed copies of these publications can be obtained from your county Extension educator or the Extension Publications Office, The Ohio State University, 216 Kottman Hall, 2021 Coffey Road, Columbus, Ohio 43210-1044.

More information about plant diseases and online versions of Ohio State University Extension plant disease fact sheets and bulletins, with color figures, are available on the following web sites:

<http://plantpath.osu.edu>

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