



## Phomopsis cane and leaf spot of grapevine

### Introduction

Phomopsis cane and leaf spot of grapevine is caused by the fungal pathogen, *Phomopsis viticola*. *Phomopsis* infects grapevines grown in most viticulture regions of Australia, but has not been reported in WA or Tasmania. Spores are spread by rain splash and disease symptoms include shoot lesions, leaf spots and bleached cane. Crop loss is generally through girdling of shoots and weakening and cracking of canes, which consequently lowers productivity of vines. Berry rot is rare in Australia.

The disease was associated with two fungi, *Phomopsis* type 1 (now known as *Diaporthe*) and *Phomopsis* type 2 (simply *Phomopsis*). Because *Diaporthe* does not cause injury to grapevine, only *Phomopsis* causes the disease.

Spread of *Phomopsis* occurs in wet spring weather as water is required for dispersal of asexual spores and infection. *Phomopsis* can remain dormant in infected canes, spurs and dead wood for a number of years.

### Disease life cycle

Phomopsis overwinters as mycelium and resting structures (pycnidia) in the buds, bark and canes of infected vines.

In spring, when pycnidia are in a moist environment for at least 10 hours and 96% or above relative humidity, they exude asexual spores in thread-like spore masses. Spores are splashed or washed on to young shoots, and enter the vine through pores on leaves or stems. Spores are not dispersed directly by wind, though they may be moved about in water droplets blown from infected vines.

Infection causes black lesions on shoots and leaf spots. Leaf spots (brown with a yellow halo) usually appear about 21 days after an infection, while stem symptoms can take 28 days or more.

The fungus is relatively inactive during the hot dry summer months (above 30°C). The mycelium is viable and persistent for several seasons in the vine under the right conditions, and if left untreated infected canes and spurs may produce spores for around 3 years.

## Symptoms of the disease

### Leaves

- Small dark brown spots, usually less than 1mm, surrounded by a yellow halo of 2-3mm. Appears in spring on lower leaves of shoots
- Spots generally do not increase in size but become numerous on the leaf. Spots can become necrotic, darken and drop out. Such leaves have a 'shot-hole' appearance
- Leaves with badly affected stems can turn yellow and fall.



Yellowing of leaves

### Green shoots

- Small spots with black centres develop, usually on the lower internodes, gradually expanding and elongating to form black crack-like lesions up to 5-6mm long
- Large numbers of merging spots on badly infected shoots may give a 'scabby' or 'corky' appearance which may crack and scar
- Girdled shoots can fail to mature, or become stunted and die
- Severe infections can lead to dwarfing, deformation and death of infected shoots which break off near the base
- Weakened older shoots (30-60cm long) can break in strong winds, usually where lesions are numerous.



Longitudinal lesions on green shoot

### Canes

- White areas, particularly around the nodes, become speckled with small black spots (pycnidia) bearing spores
- Although bleached canes is associated with Phomopsis, bleaching can also be caused by other agents therefore cannot be used to diagnose *Phomopsis* infection.



Bleached cane with black spots (Pycnidia)

## ***Inflorescences and bunches***

- *Phomopsis* can cause black speckled rotting of berries, but this is rare in Australia and does not occur without prior leaf and shoot symptoms.
- Infection of berries will only occur in warm wet weather. If infection of berries does occur, usually only isolated bunches are affected.
- Berries can develop light brown spots which enlarge, darken, produce pycnidia through the skin and exude yellowish spore masses, before finally shrivelling and becoming mummified.

Although *Diaporthe* causes bleaching of cane similar to *Phomopsis*, *Diaporthe* does not cause symptoms on shoots and leaves.

## **Monitoring for *Phomopsis***

With *Phomopsis*, as with many other pests and diseases, it is important to know the status of the disease in the vineyard. Monitoring allows data to be gathered so that informed management decisions can be made.

Monitoring is the key to distinguish between *Diaporthe* and *Phomopsis*.

## **Choosing monitoring sites**

- Vines chosen for monitoring should be representative of the variety.
- Wetter or sheltered parts of the vineyard, or vines with dense canopies should receive special attention.
- Blocks or rows with *Phomopsis* should be monitored for several years after the last recorded infection.

## **How to sample**

The leaf and cane symptoms associated with *Phomopsis* are visible when monitoring vines. Also, normal leaves can hide infected leaves as canopies thicken, so vines should be inspected more carefully later in the season.

In winter, look for bleached canes and spurs, with and without scarring. In the growing season, symptoms can be seen from budburst onwards:

- inspect 200 vines, briefly examining leaves and internodes on shoots, especially those on lower nodes,
- later, inspect bunches,
- record the number of vines with disease symptoms and calculate the percentage of infected vines.

Laboratory diagnosis of *Phomopsis* is advisable, to distinguish whether *Phomopsis* or *Diaporthe* are present on dormant canes.

## **When to sample**

Begin monitoring by testing for old infections around 4 weeks before budburst. If wet conditions occur, particularly in the early part of the growing season, monitor vines every 1 to 2 weeks from 3 to 4 weeks after budburst (this can be combined with monitoring for powdery mildew). Leaf spots usually appear about 3 weeks after an infection period; stem symptoms can take 4 weeks or more.

## Control

### ***Vineyard establishment***

Always use budwood monitored by the Australian Vine Improvement Association (AVIA), cuttings and rootlings when establishing new vines. Using infected cane material can allow *Phomopsis* to become established in a vineyard.

### ***Pruning and vineyard hygiene***

Do not use diseased canes and spurs to develop vine frameworks. Prune off and burn infected wood to prevent carry over of spores into the next season. Avoid hedge pruning where possible as this generally leaves more wood on the vine, and disease incidence in the next season can increase if vines are already infected.

### **Chemical control**

**NOTE:** Chemicals are only applicable for *Phomopsis*. There is no evidence that *Diaporthe* causes yield loss which would justify chemical treatment.

As chemicals available for the control of *Phomopsis* do not function as eradicants, they must be applied before the spores of the fungus can germinate in order to be effective.

These include dithianon, mancozeb, captan and shirlan.

As the fungicides registered for management *Phomopsis* have a protectant activity, these are not effective if applied after disease symptoms appear as infection has already occurred.

If *Phomopsis* has been a problem in any of the previous seasons, spray at 50% budburst (wait until green leaf tissue is becoming evident) and 2 weeks after budburst with mancozeb or dithianon (depending on state registration restrictions). This will prevent spores infecting newly develop shoots. If wet conditions persist after budburst, further fungicide applications may be required.

If there has been no history of *Phomopsis* infection in the vineyard, it will not be necessary to apply any chemical treatments. Monitoring for the appearance of symptoms will enable a fungicide program to be implemented if the disease should be introduced into the vineyard.

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