



Phomopsis cane and leaf spot

Viti-note Summary:

- Causal organism
- Spore dispersal and favourable environmental conditions
- Symptoms
- Checklist of *Phomopsis* symptoms
- Monitoring for symptoms
- Confusion with other symptoms
- Where to monitor



Figure 1. Lesions on green shoot

Phomopsis viticola is a fungus that infects grapes grown in most regions of Australia, although it might be sporadic in occurrence.

Causal organism

The fungus over-winters in the buds, bark, mummified bunches and canes of infected vines. Spores are spread by splash-dispersal during wet spring weather. It is known that they can remain dormant in infected canes, spurs and dead wood for a number of years. *Phomopsis* can cause crop loss through girdling of shoots, and weakening and cracking of canes which consequently lowers productivity of vines. Yield loss is also attributed to infection of bunch stems and berry rot in humid conditions.

Spore dispersal and favourable environmental conditions

In spring the resting structures of the fungus release threads of jelly-like spore masses if wetted for at least 10 hours at an optimum temperature of 23°C (suitable temperatures between 1-30°C). Spores on the cane are spread by water and rain-splashed on to young newly-developed green shoots. Infections can be localised in the vineyard. Spores infect vines via leaves or stems if conditions remain wet for a further 8 or more hours. Spores need moist conditions to germinate and infect the vine. The risk of *Phomopsis* infection is low if there are few extended rainfall periods in spring.

COOL WET WEATHER IN SPRING FAVOURS PHOMOPSIS DEVELOPMENT



Figure 2. Characteristic bleaching and black spots showing on a spur shortly after budburst

Symptoms

Symptoms in winter are seen as bleached white areas on dormant canes speckled with small black spots. Where severe infection has taken place, black cracks are also evident. Cane bleaching is not a reliable indicator of *Phomopsis* infection however, as bleaching can also be caused by a range of factors such as weather extremes and other types of fungi. Leaf and shoot symptoms can be seen in spring and early summer.



Figure 3. Cracking on basal internode

Table 1 Checklist of *Phomopsis* symptoms

<i>Phomopsis</i>	
Leaves	<p>Leaf symptoms first appear in spring on the lower leaves of shoots.</p> <ul style="list-style-type: none">• Small dark brown spots, usually less than 1 mm, with 2-3 mm of yellowish halo surrounding the brown spot• Leaves can distort, and be partially killed or stunted• Spots can become necrotic, darken and drop out• Leaves with badly affected stems can turn yellow and fall.
Green shoots	<ul style="list-style-type: none">• Small spots with black centres develop, usually on the lower internodes, gradually expanding and elongating to form black crack-like lesions up to 5-6 mm long• Large numbers of merging spots on badly infected shoots might give a 'scabby' or 'corky' appearance• As canes grow and harden, the fissures 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 (30-60 cm long) can break in strong winds, usually where lesions are numerous.
Inflorescences and bunches	<p><i>Phomopsis</i> can cause black speckled rotting of berries particularly in humid conditions and does not occur without prior leaf and shoot symptoms:</p> <ul style="list-style-type: none">• Flower cluster rachis develops spots like those found on leaves• Severely infected clusters wither• If rain occurs just before harvest, previously uninfected berries can develop light brown spots which enlarge, blacken and exude yellowish spore masses• These berries shrivel and become mummified.
Canes	<ul style="list-style-type: none">• Infected canes might be bleached white in winter• Bleached areas, particularly those around the nodes, become speckled with small black spots (the resting structures of the fungus)• These spots are prominent in the cortex of infected one-year-old canes, on spurs, bunch and berry stems, and tendrils.

Monitoring for symptoms

Begin monitoring by looking for signs of old infections around 4 weeks before budburst.

A simple test can show if bleached canes are a result of fungal infection. After following the test below and fungi is observed, monitoring of newly developed shoots and leaves should be carried out.

- Take cuttings from suspect 1-year-old canes and spurs (especially around lower internodes and nodes) around 4 weeks before budburst. Lay the cuttings flat on a moist paper towel or sponge in a small sealed plastic container (e.g. lunchbox) and keep at room temperature (20°C-23°C), in the dark for 10 days or more.
- After this time look to see if the black spots on the canes have produced pimple-like yellow or cream-coloured spore masses. You should be able to see them with a X10 hand lens. If you have a compound microscope, spores should be visible in these masses under X400 magnification.
- If spores have been produced, check your monitoring records from the last several seasons to see if leaf spots and shoot lesions were observed in the vineyard during the growing season, particularly in the areas adjacent to where you took your sample cuttings.

If no *Phomopsis*-like symptoms were observed on leaves and green shoots in previous seasons, it is unlikely the bleaching symptom was caused by *Phomopsis*. If you want to be certain, resample the vines and forward to a laboratory for diagnosis. Always check to see if leaf spots and shoot lesions caused by *Phomopsis* are observed in the areas where bleached canes are collected.

Winter monitoring and diagnostic testing for *Phomopsis* is important as the cane symptoms of this disease can be confused with conditions such as frost damage, or resemble symptoms of other diseases.

DURING WINTER, TEST FOR FUNGI ON BLEACHED DORMANT CANES

In spring, about 3 weeks after suitable conditions for infection, leaves develop small brown spots approximately 1 mm in diameter with a yellow halo. Diseased leaves can become distorted or stunted and the centres of the spots might die and drop out.

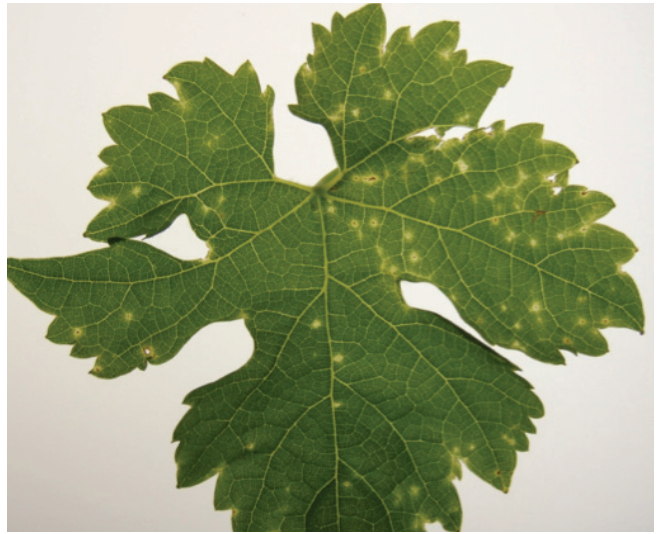


Figure 4. Leaf with characteristic yellow spots indicative of *Phomopsis* infection.

Shoot symptoms can take around 4 weeks to develop. Black lesions form on lower internodes. These might eventually crack, causing the shoots to become girdled and break.

IF WET CONDITIONS OCCUR IN SPRING, MONITOR VINES EVERY 1-2 WEEKS FROM 3-4 WEEKS AFTER BUDBURST FOR LEAF AND SHOOT SYMPTOMS

Confusion with other symptoms

Diaporthe – This fungus was once confused as a type of *Phomopsis* as it causes white bleaching of canes in winter speckled with small black spots. However symptoms do not appear on green shoots or leaves and infection is harmless.

Chemical spray damage – Numerous yellow leaf spots on leaves where contact made, no shoot lesions.

Insects - Yellow leaf spots on leaves but often associated with leaf veins and however no brown/black spots on leaves.

Black spot – leaf spots of black spot are brown-purple and larger than *Phomopsis*. Shoot infections are more circular and roughened.

Bud mite – similar distortion and stunting of leaves, however no leaf spots occur. Also mites can cause marks and elongated scars on shoots, but these do not elongate.

Botrytis, Botryosphaeria, frost – all might display bleaching symptoms, often greyish in colour but no lesions or leaf spots.

Where to monitor

The most likely places for *Phomopsis* to occur in a vineyard include blocks or rows where it has previously been a problem (there are likely to be resting spores of the fungus in buds, bark, mummified bunches and canes). These vines and the area around them should be monitored for several years after the last recorded infection. *Phomopsis* is also encouraged by damp and humid sites, such as where overhead irrigation sprinklers overlap, in sheltered areas where air movement might be low such as adjacent to wind breaks or sheds, or in hollows, and inside dense canopies.

FOCUS MONITORING IN PREVIOUSLY DISEASED AREAS AND DAMP SHELTERED SITES

A number of winegrape varieties are susceptible to *Phomopsis* including Grenache, Palomino, Muscadelle, Sultana (Thompson Seedless), Waltham Cross, Red Globe, Purple Cornichon, Muscat Hamburg, Ohanez, Cardinal, Tokay, White Malaga, Emperor, Calmeria, Rish Baba, Kandahar, Olivette Blanche, Olivette Noir, Shiraz, Pinot Noir, Chardonnay, Cabernet Sauvignon, Riesling.

TAKE SPECIAL CARE IN MONITORING SUSCEPTIBLE VARIETIES

Management

If diagnosis determines that the disease is not present in the vineyard, preventative treatment is not necessary. However if *Phomopsis* has previously been a problem, or diagnosis of dormant canes confirms it has been introduced into the vineyard, appropriate registered fungicides must be applied before the fungus produces spores and has the chance to infect new growth. Best time to spray is before spring rains. Additional applications needed if rain persists to protect new growth. Chemicals available do not eradicate the disease once new shoots and leaves have been infected – it can only act to prevent infection.

Some recommended protectant chemical groups include Fluazinam (dormancy spray only), Mancozeb, Dithianon and Captan. Refer to www.awri.com.au/agrochemicals for currently registered products.

RELY ON PRE-SEASON DIAGNOSIS FOR MANAGEMENT OF PHOMOPSIS

AVAILABLE CHEMICALS MUST BE APPLIED PRE-INFECTION

WAITING FOR LEAF AND SHOOT SYMPTOMS OF THE DISEASE TO APPEAR IS NOT RECOMMENDED AS INFECTION HAS ALREADY OCCURRED

With careful monitoring for *Phomopsis* presence and weather conditions favourable for disease development, well-timed protectant sprays can be applied to provide management of this disease. Monitor for symptoms on newly-developed leaves and green shoots after spraying to see whether treatment was effective.

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Further information

Training

For regional specific training in pest and disease control, the AWRI is running Research to Practice: Integrated Pest Management for changing viticultural environments.

Contact

Marcel Essling: rtp@awri.com.au for more information.

Agrochemical information

Agrochemicals registered for use in Australian Viticulture - updated annually.

Visit www.awri.com.au for the latest version.

Useful references

Nicholas, P., Magarey, P.A. and Wachtel, M. (Eds.) 1994 Diseases and pests, Grape Production Series 1, Hyde Park Press, Adelaide (a glove box edition of this book is also available).

For images of grapevine symptoms visit www.winetitles.com/diagnosis/index.asp.

Product or service information is provided to inform the viticulture sector about available resources and should not be interpreted as an endorsement.



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