

# SUNFLOWER DISEASE

## FACT SHEET

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## Phomopsis Stem Canker in sunflower

This emerging disease issue is being caused by several previously unrecorded species of *Phomopsis* that are highly virulent on sunflower.

### KEY POINTS

- A number of *Phomopsis* species are associated with stem cankers and lodging in Australian sunflowers.
- *Phomopsis helianthi*, an exotic species, has not yet been found in Australia.
- Prolonged periods of wet weather, high humidity and moderate temperatures favour disease build-up.
- Infection occurs on the leaves and progresses down the leaf petiole to the stem. Symptoms include dead or necrotic areas around the leaf margin, and brownish lesions dotted up the stems at the nodes.
- Symptoms do not appear before budding but can be confused with Phoma Black Stem and Tobacco Streak Virus.
- Yield losses occur if plants lodge during seed fill due to stem weakness caused by pith damage.
- The most effective disease management is burying crop residue deeply in the soil.
- Sunflower should not be planted into infected paddocks in the following season, but preferably after a two to four-year break depending on residue breakdown.
- *Phomopsis* species can be seed-borne so ensure all seed production crops are disease free.

Severe outbreaks of Phomopsis Stem Canker can lead to yield losses due to: early senescence, plant wilting or stem breakage during seed fill. Management of plant residues is the main method in limiting outbreaks in sunflowers. Farm hygiene is essential to limit spread of the pathogen. Currently no resistant varieties have been identified.

### What is Phomopsis Stem Canker (PSC)?

PSC is caused by a fungal pathogen that survives on crop residues and infects the next sunflower crop at budding. *Phomopsis* can be seed-borne so vigilance is essential in seed production blocks.

Recent outbreaks centred in NSW have resulted in significant yield losses due mainly to severe lodging. Infected crops in Queensland were less affected possibly due to drier conditions and lower humidity.

Current research has indicated that several *Phomopsis* species are associated with stem canker of sunflowers in Australia.

None of the species involved in the recent outbreak have been identified as *Phomopsis helianthi*, an exotic species known to cause yield losses of 40 to 60 per cent in Europe, South America and the US.



PHOTO: L SERAFIN NSW 1&amp;1

A sunflower crop infected with *Phomopsis*. The multiple brown to black lesions and associated pith destruction have caused mid-stem lodging.

## Identification

Phomopsis symptoms can be easily confused with Phoma Black Stem and with some early symptoms of Tobacco Streak Virus. Laboratory tests may be necessary to identify the mix of pathogens involved in infected crops.

*Phomopsis* lesions are usually light brown to brown, sometimes with a darker irregular shaped edge. Look behind the lesion – pith damage/dicolouration is often evident. *Phomopsis* lesions can be found dotted up the stems to the heads. Lodging may occur as the heads start to fill.



**Phomopsis**

PHOTOS: S. THOMPSON DEEDI

Phoma lesions are usually black and shield-shaped at the stem nodes. Most Phoma lesions are only surface-deep with little or no pith damage. It is unusual to see Phoma lesions beyond half-way up the stem. Phoma infections usually do not cause lodging.



**Phoma**

PHOTO: T. GULYA USDA

### Infection

Spores spread by wind or rain infect the leaf margin. Symptoms appear at budding or early flowering after the fungus grows down the leaf petiole to the stem where it develops as a lesion at the node.

Phomopsis stem canker is favoured by wet, humid conditions and moderate temperatures of 20°C to 25°C. Lack of air movement due to dense plant stands and closed leaf canopy favours infection.

Infection can be seed and stubble borne. If *Phomopsis* is identified on the stems of sunflowers in seed production blocks the seed may also be infected. Infected seed may appear disease free but after a period of warm wet weather pycnidia (fruiting bodies) can develop on the seed coat providing a source of infection for subsequent crops.

### Symptoms

Earliest symptoms are death or necrosis of the leaf margins followed by a dark-coloured streak down the petiole to the stem.

Irregularly-shaped, light brown to brownish black lesions form at the nodes producing a regular 'dotting' appearance up the stem as each node becomes infected.

Lesions in severely infected plants may join up to produce a longer brown streak up the plant or a girdle effect around the stem.

As infected plants mature they may lodge if the pathogen destroys the pith. Weakened stems can snap over as the weight of the head increases with seed fill.

Toxins produced by some *Phomopsis* pathogens may also weaken the plant and contribute to premature ripening and early plant death.

### Testing

- *Phomopsis* samples should be prepared by cutting sections of infected stem into 20-30cm lengths.
- Place in a paper bag or newspaper and send via post or courier to Sue Thompson, Plant Pathology Unit, DEEDI, 203 Tor Street (PO Box 102), Toowoomba, QLD 4350.
- Advise by phone or email that samples have been sent. Store samples in a cool place until posted. Be aware that samples stored in plastic for more than 24 hours may rot before diagnosis is possible.
- Any suspected Tobacco Streak Virus samples will be transferred immediately to the virology unit at Indooroopilly.

# Management

In Australia, experience with PSC is limited, so information on the management of this disease is based on experience from overseas and the current understanding of the pathogen under Australian conditions.

Sunflower growers should contact their agronomist or those noted in the Useful resources section for the latest information on *Phomopsis* management.

Currently, there are no Australian sunflower hybrids with known tolerance or resistance to these *Phomopsis* species, therefore, cultural controls are the only option.

As *Phomopsis* survives on the infected plant residues, practices that encourage rapid residue breakdown will minimise the risk to following crops.

## Residue management

Burying crop residues by tillage is the most effective management tool but the rate of residue breakdown will also be influenced by weather conditions. More rapid breakdown occurs in warm, moist soil.

## Rotation

*Phomopsis* can survive in crop residues for up to five years, depending on weather conditions and tillage practices. Overseas experience suggests a rotational break of between two and four years is effective. Even when residue has been incorporated growers should check that complete breakdown has occurred before sowing.

In the intervening years non-host crops should be sown. Cereals, sorghum and maize are the least likely crops to host these *Phomopsis* species based on current limited knowledge of the Australian outbreak.

## Plant density

Dense plant stands should be avoided as this results in taller plants with thinner stems making them more prone to lodging following infection.

A thick leaf canopy, which can result from dense plant stands or excessive use of nitrogen, favours the build-up of this disease and should be avoided.

## Hygiene

Limit *Phomopsis* contamination of disease-free areas by taking care not to transfer infected residues on equipment and vehicles.

Weakened stems lodge mid-stem. Crops with thinner stems due to high planting rates display increased lodging.



## Frequently asked questions

*Can sunflowers be planted in the same paddock if I had PSC in my crop last year?*

*Phomopsis* can survive in the crop residues for up to five years, depending on weather conditions and tillage practices. Rotate away from sunflowers in infected paddocks for at least two to four years depending on effectiveness of stubble burial.

*How can the risk of PSC be minimised in my next sunflower crop?*

- Burying crop residues is the most effective management tool.
- Plant disease-free seed.
- Sow sunflowers after a minimum of a two-year break of fallow or non-susceptible crops.
- Use nitrogen strategically to avoid a dense leaf canopy that favours disease build-up.
- Avoid dense plant stands – taller plants with thinner stems lodge more easily than thicker stemmed plants.

*Can I plant PSC resistant hybrids?*

The tolerance/resistance levels in Australian sunflower hybrids to these *Phomopsis* species are not known. Overseas research suggests some tolerance but no resistance to PSC.

*Does PSC affect oil content?*

No data is available for hybrids under Australian conditions. However, overseas work suggests that oil content can be reduced by up to 25 per cent if infection is severe.

*How do I tell the difference between Phomopsis Stem Canker and Phoma Black Stem infection?*

Symptoms can be difficult to tell apart – sometimes only a laboratory test can identify which pathogens are involved. Management of both pathogens is the same – burial of infected stubble.

*Can Phoma and Phomopsis spp symptoms be confused with those of Tobacco Streak Virus (TSV)?*

- Yes – at times. To date, TSV has only been identified on crops in Central Queensland. Vigilance in other growing areas is essential.
- Early black infection sites of TSV around the petiole and node could be mistaken for *Phoma* infection and vice versa.
- TSV streaks are usually black. Some *Phomopsis* species can

cause brown streaks but the most common *Phomopsis* symptoms are discrete lesions at the stem/petiole nodes. *Phoma* does not cause a streak.

- If there is any doubt about identification, send samples to Plant Pathology Unit, DEEDI, 203 Tor Street (PO Box 102), Toowoomba, QLD 4350.

*What is the best way to send suspected Phomopsis samples?*

Cut sections of infected stem 20-30cm in length, place in a paper bag or newspaper, send via post or courier to DEEDI at the address above. Store in a cool place until posted. Advise by phone or email that samples have been sent.

Be aware that samples stored in plastic for more than 24 hours may rot before diagnosis is possible.



PHOTO: S. THOMPSON, DEEDI

## Useful resources:

■ Sue Thompson, Queensland Department of Employment, Economic Development and Innovation

07 4688 1209, Email [sue.thompson@deedi.qld.gov.au](mailto:sue.thompson@deedi.qld.gov.au)

■ Loretta Serafin, Industry & Investment NSW

02 6763 1147, Email [loretta.serafin@industry.nsw.gov.au](mailto:loretta.serafin@industry.nsw.gov.au)

■ *Sunflower Ute Guide*

Ground Cover Direct, 1800 11 00 44,  
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