Managing Ascochyta blight

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The first outbreak of Ascochyta blight in commercial chickpea crops in Western Australia was detected in July 1999. By the end of 1999, over 70 crops were found to be infected. Due to difficulty in detecting low levels of the disease, it is expected that many parts of the wheatbelt that now appear free of the disease may have a low level of infection. Ian Pritchard reports on the disease symptoms, its spread, and the management principles now in place to minimise the impact of Ascochyta blight for the 2000 season.

The fungus *Ascochyta rabiei* is a major disease of chickpea in most parts of the world. The fungus is different from the species of *Ascochyta* that infects faba beans, lentils and field peas, and is present in every country where chickpeas are grown.

In Western Australia, *Ascochyta* blight was first detected in 1998 in a single seed production paddock in the Walkaway area near Geraldton. This crop was subsequently destroyed and a 20-kilometre chickpea exclusion zone was placed around the property. In addition, a quarantine restriction was placed on the import of chickpea seed into Western Australia, both from interstate and overseas. In this same year, *Ascochyta* blight was found in chickpea crops throughout eastern Australia, resulting in significant losses.

The 1999 season saw in late July the first outbreak of *Ascochyta* blight in commercial chickpea crops in Western Australia. By the end of the 1999 season, over 70 crops had been identified with the disease with all but two being in the Northern and Central agricultural regions.

Due to the difficulty in detecting low levels of the disease in the crop and on the seed, it is expected that many parts of the wheatbelt that now appear free of the disease may have a low level of infection.

**The 1999 season in perspective**

The seasonal conditions experienced in 1999 were both a blessing and a nuisance. Summer rain provided stored soil moisture that could be used at the end of the season by the chickpea crops. However, the above average September and October rainfall allowed the rapid and continual development of *Ascochyta* blight and *botrytis* grey mould.

Even with the presence of both *Ascochyta* blight and *botrytis* grey mould, yields for the 1999 season were in excess of 1.5 - 2 tonnes per hectare. This was a very positive result, with disease management really only commencing for many growers in the latter half of the season.

**Disease spread**

*Ascochyta* blight is initiated from infected seed or stubble, and is spread by rain-splashed spores which ooze from the pycnidia when the foliage is wet. Patches of infected plants can be seen to expand faster in the direction of the wind during rainfall. Secondary patches are also initiated where some spores are blown longer distances.

The disease can also be spread by vehicles, people or animals moving through the crop, particularly when the foliage is wet and the spores have been released from the pycnidia.
What to look for

The disease occurs at first in patches, most probably originating from a single seed infection. Patches in infected crops have been seen to range from one to 15 metres across.

Some plants in patches may be nearly dead and others will have stem breakage or the youngest growth drooping over. Close inspection will reveal elliptical brown lesions on the stems. These lesions contain concentric rings of small black fruiting bodies (pycnidia) of the fungus visible to the naked eye, but easier to see with a hand lens or magnifying glass.

The disease causes the stem to be weakened at the lesion and often breaks off at that point. Bleached lesions with the black pycnidia occur on leaves. Very distinctive circular brown sunken lesions with pycnidia develop on pods.

Disease management principles

The management of *Ascochyta rabiei* in chickpea crops with fungicides relies on the following principles:

- Apply fungicide to crops four and seven weeks after emergence. This is most likely to be before the disease can be seen, due to the difficulty in early detection.
- Spray timing is more critical than the type of fungicide used. Spray just before the next rainfall (infection opportunity) but be aware that high winds usually precede the passage of a rain-bearing front by about 24 hours. Spraying immediately after the rain provides no protection from the infection that occurred during the rain. All the fungicides are 'protectants', which means they protect tissue from infection for a period of about 14-18 days. They do not eradicate existing infections.

- Repeat fungicide applications should be applied from 14-21 days after your last application. Watch the rain fronts, and time applications before the rain.
- Coverage is important, so high water volumes are recommended (100 litres per hectare for ground equipment, and 30 litres per hectare for aircraft). Maintain high pressure to ensure atomisation of spray. Better penetration, and therefore leaf coverage, will be achieved before canopy closure. A small amount of dew on leaves may help the spread of fungicide across leaves by increasing the effective volume of water.

Fungicides

The use of fungicides in the management of diseases has the greatest chance of success when used in conjunction with:

- Variety selection.
- Crop husbandary – time of sowing, sowing rate, row spacing, seed dressings, etc.
- Crop and paddock rotation.

Eastern states and overseas research suggest that the timing of fungicide application is more important than the type of fungicide used. Spraying close to the start of flowering can provide additional benefits through reductions in *Botrytis* grey mould.

Three fungicides, mancozeb, chlorothalonil and carbendazim, have been registered in Western Australia for foliar application to chickpeas for *Ascochyta* blight. Eastern states and overseas data indicates that chlorothalanil is more effective than mancozeb. Carbendazim appears ineffective.

There are several products available which contain these fungicides, including Bravo® for chlorothalonil, and Dithane® for mancozeb. These fungicides are compatible and can be applied with some grass-selective herbicides and insecticides. Manufacturers should be contacted for compatibility of specific mixes.
Ascochyta Blight 2000 Management Package

Agriculture Western Australia has available a comprehensive management package to minimise the impact of Ascochyta blight in the 2000 season.

Seed testing
Test all seed for Ascochyta blight (AGWEST Plant Labs will be using a DNA test available through SARDI - this is the only test with adequate sensitivity for seed tests).

Seed source
Ascochyta blight is a seed-borne disease. Select seed with the lowest risk of disease. Low-risk seed is not guaranteed 100 per cent free from Ascochyta blight.

Crop hygiene
Undertake a program of stubble reduction (i.e. burning, cultivation, grazing) to minimise the carry-over of stubble-borne infection. Ensure stubble from the 1999 crop is not moved to the year 2000 chickpea paddock. Control volunteer chickpeas early to limit the build-up of disease pressure. It is also important to clean down ground-spraying rigs before moving between chickpea paddocks to minimise the risk of spreading Ascochyta blight.

Variety selection
Select varieties which have the lowest level of susceptibility. It is not recommended that growers change their varieties based solely on the relative susceptibility of the chickpea variety to Ascochyta blight. With current varieties, yield and quality should be the primary selection keys.

<table>
<thead>
<tr>
<th>Chickpea variety susceptibility to Ascochyta blight</th>
<th>Desi</th>
<th>Kabuli</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely susceptible</td>
<td>Lasseter Gully, Norwin, Desavic, Semsen,</td>
<td>Garnet, Kariva, Bumper</td>
</tr>
<tr>
<td>Highly susceptible</td>
<td>Heera, Tyson, Barwon</td>
<td>None</td>
</tr>
<tr>
<td>Moderately susceptible</td>
<td>Sona, Dooren</td>
<td>None</td>
</tr>
<tr>
<td>Resistant</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Seed dressings
Apply fungicide seed dressing to all seed. All seed should be treated with P-Pickel T®. Research in eastern Australia has found P-Pickel T® to be the most effective seed dressing for control of Ascochyta blight.

Paddock separation
Isolation - only sow chickpeas into a paddock that is at least 500 metres from 1999 stubble. Allow chickpea residues to decompose. Reduce chickpea stubble residues over summer.

Crop rotation
Keep a three-year break between chickpea crops in a paddock (i.e. 1:4 rotation) to minimise the carry-over of stubble-borne infection. For the year 2000 chickpea crops, paddock separation is by far more important than rotation. The level of Ascochyta blight present in 1997 and 1998 chickpea crops must have been at very low levels, as the disease was not detected until August 1999.

Sowing rate
The optimum plant density for desi chickpeas is 50 plants per square metre and for kabuli chickpeas 35 plants per square metre. To avoid early canopy closure and excessive vegetative growth, it is recommended not to exceed 100 kilograms of seed per hectare for desi varieties and 120 kilograms per hectare for kabuli varieties.

Time of sowing
Delaying the time of sowing of chickpea crops will delay the onset of Ascochyta blight and may reduce the number of fungicide applications required.

**Time of sowing recommendations for desi chickpea**

<table>
<thead>
<tr>
<th>Region</th>
<th>Zone</th>
<th>Ideal sowing window</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>L1</td>
<td>15 May - 30 May</td>
</tr>
<tr>
<td>low rainfall</td>
<td>M1</td>
<td>1 June - 15 June</td>
</tr>
<tr>
<td>medium rainfall</td>
<td>L3</td>
<td>15 May - 10 June</td>
</tr>
<tr>
<td>Central</td>
<td>M3</td>
<td>20 May - 15 June</td>
</tr>
<tr>
<td>low rainfall</td>
<td>L4</td>
<td>20 May - 15 June</td>
</tr>
<tr>
<td>medium rainfall</td>
<td>M4</td>
<td>5 June - 20 June</td>
</tr>
<tr>
<td>South</td>
<td>M5</td>
<td>25 May - 15 June</td>
</tr>
<tr>
<td>medium rainfall</td>
<td>M3E</td>
<td></td>
</tr>
</tbody>
</table>

**Time of sowing recommendations for kabuli chickpea**

<table>
<thead>
<tr>
<th>Region</th>
<th>Zone</th>
<th>Ideal sowing window</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>H1</td>
<td>1 June - 15 June</td>
</tr>
<tr>
<td>high rainfall</td>
<td>M1</td>
<td>25 May - 10 June</td>
</tr>
<tr>
<td>medium rainfall</td>
<td>M3</td>
<td>25 May - 15 June</td>
</tr>
<tr>
<td>Central</td>
<td>M3</td>
<td>25 May - 15 June</td>
</tr>
<tr>
<td>high rainfall</td>
<td>M4</td>
<td>5 June - 20 June</td>
</tr>
<tr>
<td>medium rainfall</td>
<td>M5</td>
<td></td>
</tr>
</tbody>
</table>

**Fungicide applications**
Coverage is important so high water volumes are recommended (100 litres per hectare for ground equipment, and 30 litres per hectare for aircraft). Maintain high pressure to ensure atomisation of spray.

Spray 1. 4 weeks after emergence.# 1.0 L/ha Bravo® or 2.0 kg/ha Dithane®.

Spray 2. 3 weeks after first spray.# 1.0 L/ha or 2.0 kg/ha Dithane®.

Spray 3. 3 weeks after second spray.# 1.5 L/ha Bravo®. Monitor Crop for Ascochyta blight. If disease can be found, further sprays will be necessary.

Spray 4. 3 weeks after third spray.# 2.0 L/ha Bravo®. Monitor Crop for Ascochyta blight. If disease can be found, further sprays will be necessary.

Spray 5. 3 weeks after fourth spray.# 2.0 L/ha Bravo®.

Note: Bravo® is 720g/L Formulation # Fungicides should only be applied just prior to rainfall.

Crop hygiene
It is important to clean down ground-spraying rigs before moving between chickpea paddocks to minimise the risk of spreading Ascochyta blight.
International screening for *Ascochyta* blight resistance

**Kabuli chickpeas**

In a collaborative project between the Centre for Legumes in Mediterranean Agriculture (CLIMA), the National Chickpea Breeding Program (Tamworth in New South Wales), the International Centre for Agricultural Research in Dry Areas (ICARDA Syria) and the Aegean Agricultural Research Institute (AARI - Menemen Turkey), kabuli chickpea breeding lines and commercial kabuli varieties from Turkey and Australia are being screened for resistance to *Ascochyta* blight, potential adaptation to Australian conditions and seed quality in Turkey and in Australia.

During the 1997-98 season in Turkey, 202 kabuli chickpea lines with superior *Ascochyta* resistance (score <5.0 in Turkey) and agronomic traits were selected for evaluation in Australia. Following their release from quarantine in 1999, the 202 lines were evaluated in small field plots at Bindoon (a disease-free site for Western Australia), Tamworth (New South Wales), Horsham (Victoria) and Kingsford (South Australia) for *Ascochyta* blight resistance, agronomic traits and bulking-up.

In addition to the 202 lines, the standard kabuli varieties (Garnet, Kaniva, Bumper, G846-3-9) and desi varieties (Sona and Heera) were included in the trial. *Ascochyta* ratings from the eastern states suggest that several of the 202 lines have superior *Ascochyta* resistance, confirming the observations made in Turkey. The national breeding program is already making crosses between superior *Ascochyta* resistant lines and Australian kabuli varieties.

Agronomic observations from Bindoon in 1999 were very encouraging, with a number of the *Ascochyta*-resistant kabuli lines introduced from Turkey/ICARDA having superior agronomic traits than the standard varieties.

All 202 lines and standard varieties will be further evaluated in larger plots in Western Australia (Northern Agricultural region) and the eastern states during the 2000 season for *Ascochyta* resistance and agronomic traits.

**Desi chickpeas**

During the collaborative project, a desi chickpea evaluation nursery was established in Turkey to screen for *Ascochyta*-resistant desi chickpea lines from the International Crops Research Institute for the Semi-arid Tropics (ICRISAT), India and Australia. Sixteen desi chickpea lines with superior *Ascochyta* resistance were selected and these have been grown in quarantine in Perth.

These desi lines are now being multiplied over summer at Manjimup and are also being used as parental genotypes in the Western Australian chickpea breeding program. These will be evaluated in the field in Western Australia and the eastern states in 2000.

**Acknowledgements**


**For further information**

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