SUMMARY

• Variety selection is critical. Growing an ascochyta blight resistant variety minimizes the necessity for the regular use of foliar fungicides.

• Paddock isolation from chickpea stubble is a high priority. Aim for a separation of at least 500m.

• Paddock history. Aim for a break of at least 2 to 3 years between chickpea crops. Having a high frequency of crops like lentil, faba bean, vetch, field pea, lathyrus or clover pasture puts chickpeas at greater risk to diseases such as Phoma, Sclerotinia or Botrytis grey mould. Similarly canola can increase the sclerotinia risk.

• Seed source. Use seed from a paddock where disease was not detected and where fungicides at podding were applied. Do not use seed with ascochyta blight infection, particularly with ascochyta blight susceptible varieties.

• Fungicide seed dressing are effective in high disease risk situations, particularly for Botrytis Grey Mould and phoma. Seed dressing is essential for ascochyta blight susceptible varieties.

• Sowing date. Return to original sowing dates with ascochyta blight resistant varieties, but do not sow too early. Aim for the optimum sowing window for the district. If using an ascochyta blight susceptible variety, delay sowing to minimize ascochyta blight risk.

• Sowing depth. If using an ascochyta blight susceptible variety, sow deeper than normal.

• Sowing rate. Aim for a plant population of 35-50 plants per square metre (depending on region, sowing time, crop type (kabuli/desi), variety), adjusting seeding rate according to seed size and germination.

• Hygiene. Take all necessary precautions to prevent the spread of disease. Destroy last years chickpea stubble and self sown chickpeas before the new crop emerges.

• Foliar fungicide applications. Ascochyta blight resistant varieties do not require the same regular foliar fungicide program that ascochyta blight susceptible varieties need to control the ascochyta. They may require fungicide treatment for Botrytis Grey Mould. Border fungicide protection may be needed if close to a chickpea stubble (<500m).

• Foliar fungicide success for disease control is dependent on monitoring, timeliness of spraying and correct fungicide choice. Early detection and correct disease identification are essential.

• Harvest management. Early harvest can help to minimise disease infection of seed, and is important for grain quality and to minimise harvest losses. Crop desiccation enables even earlier harvest, but do not prematurely desiccate and affect grain quality, particularly with the large seeded kabulis. Receival standards now allow higher moisture contents (14%) at delivery.
INTRODUCTION

1. Knowing the diseases

Disease management of chickpea in southern areas should primarily focus on ascochyta blight (*Ascochyta rabiei*), without ignoring grey mould (*Botrytis cinerea*), sclerotinia, phoma blight, other seedling root diseases (*Pythium* spp, *Fusarium* spp and *Rhizoctonia* spp). Some viruses and root lesion nematodes (*Pratylenchus neglectus*, *P. thornei*) can affect chickpeas. Phytophthora root rot is a most damaging disease in northern NSW and Queensland, but is not a problem in southern areas.

Ascochyta blight (*Ascochyta rabiei*) can attack the plant at any growth stage. It can be seed-borne, attacking the seedling from emergence. The first symptoms are small water-soaked pale spots on younger leaves. With wet conditions the small spots (lesions) enlarge and join with other lesions to blight leaves and buds. Small black spots (pynnidia) can be seen within the lesions. Stem lesions can form which often girdle the stem resulting in stem death above the lesion and breakages. Round, sunken lesions, with pale centres and dark margins can form on pods later in the season. The fungus can penetrate the pod wall and infect the seed. Severe pod infection can result in reduced seed set and discoloured seed.

Infected plants will partially recover by re-shooting below the stem lesions. Crop losses are worse in wet springs in crops with dense canopies. The fungus can carryover on infected stubble and so crop hygiene is important in removing old chickpea stubbles and avoiding paddocks that had chickpeas less than 4 years previously.

Ascochyta blight resistant varieties are now available and aid disease management, but must not be considered the solution alone. Strategic fungicide use remains a need, but it is important to implement an integrated approach to disease management through variety, seed quality, seed dressings, paddock selection and crop management. Varieties like Genesis 090 with significantly improved resistance to ascochyta blight will still require a foliar fungicide application at early podding to protect seeds and ensure high seed quality.

If growing an ascochyta blight susceptible variety like Howzat or Kaniva, then 4 to 10 fungicide sprays may be needed throughout the growing season, and timing is critical. Crop hygiene becomes even more important. Also early sowing of the susceptible variety would need to be avoided, and shallow sowing should be avoided in these high risk situation.

Botrytis grey mould (*Botrytis cinerea*) can attack the plant at any growth stage. It can be seed-borne, attacking the seedling during emergence and causing root rot on the upper taproot and collar. Affected areas develop a soft rot and a fluffy grey mould. Botrytis grey mould as a seedling blight can reduce seedling establishment significantly if infected seed is sown without a fungicide dressing. Later in the season significant crop losses can occur during wet spring conditions in crops with dense canopies. Control grey mould by using seed from disease free crops, applying a seed dressing and using foliar fungicides. The fungicides applied to control ascochyta blight may give some control of grey mould, however better control of grey mould might be achieved with other more effective products such as carbendazim.

Sclerotinia has caused significant crop losses in chickpeas in eastern Australia but tends to be sporadic. It may first appear during very wet conditions in July. The disease is readily identified as white mycelial growth on infected plant tissue, which later produces small, black survival bodies called sclerotia. It is favoured by cool, wet conditions in winter and spring. Control by using disease free seed and by crop rotation with cereals and other non-host crops.

Phoma blight causes foot rot and brown-black lesions on the lower stem and leaves. The pathogen can survive in soil, on infected seed and on crop residue. This disease has the potential to be a serious disease in a wet growing season. Pod infection can occur by the pathogen which can penetrate the pod wall and infect developing seeds. This disease is managed through use of disease free seed and crop rotation with non-host crops such as cereals and oilseeds. Fungicide seed dressings can help reduce the disease but may not eliminate it.

Root rots and damping off are caused by fungi living in the soil, such as *Pythium* spp. They can reduce emergence and grain yield, particularly in kabuli varieties. These diseases are managed with seed dressings.

Root Lesion Nematode (either *Pratylenchus thornei* or *P. neglectus*) is considered a disease, but is a nematode that multiplies on the roots of chickpea plants causing stunting of roots. They may reduce the growth and yield of chickpeas and the following cereal crop. Sowing of tolerant cereal varieties and using higher rates of nitrogen fertiliser will avoid losses in subsequent cereal crops.

Chickpea and cereal varieties now differ in their tolerance to root lesion nematode and their susceptibility to its
multiplication. Recent new variety releases are considered to be far less susceptible to root lesion nematode than varieties like Desavic that contributed to a poor reputation for chickpeas and root lesion nematode. Chickpeas are however generally considered more susceptible to multiplying root lesion nematodes than are field peas, beans, lentils and lupins, but less than wheat.

2. Disease carry-over and on–farm hygiene (post harvest-pre sowing)

- Ascochyta blight and botrytis carry from one season to the next on infected chickpea stubble, but can also carry over on infected seed, or volunteer plants.
- Seed retained on-farm should be from the ‘cleanest’ paddocks, where least, or preferably no disease, was detected. Seed crops should have received a spray at podding for ascochyta blight.
- Control volunteer chickpeas pre seeding to limit the build-up of disease inoculum for the new crop.
- Particularly with ascochyta blight susceptible varieties, undertake a program of stubble reduction where this will not create an erosion risk. Possibilities include to chop, bury, destroy, graze or burn infected crop residue.

3. Paddock selection

Close proximity to chickpea stubble and volunteer chickpea plants should be avoided.

- Do not sow adjacent to chickpea stubble, particularly downwind. Aim to separate by a distance of at least 500 m.
- Be aware that self-sown chickpeas or early sown chickpea crops may be a source of ascochyta blight spread into adjacent, later sown chickpea crops.
- A break of at least 4 years between chickpea crops is usually required to minimise soil inoculum. In paddocks that grew faba bean, chickpea, vetch, lathyrus, field pea, medic or clover pastures two years previously, there is a slight risk of phoma (*Phoma medicaginis var pinodella*), Sclerotinia or Botrytis Grey Mould attacking chickpeas.
- There is a greater risk of Grey Mould in chickpeas if sown down wind from a crop or infected stubble of lentils or faba beans.
- Border and increased fungicide protection may be required if chickpeas are sown close to a chickpea stubble.
- Observe the maximum plant-back period for sulphonylurea herbicides (eg Glean®, Logran®), Lontrel®, triazines and imidazolinones (eg Spinnaker®). Herbicide residues may increase susceptibility to disease.
- Paddocks with low soil fertility or nutrient status can lead to stress, predisposing the chickpeas to disease.

<table>
<thead>
<tr>
<th>DISEASE RATING</th>
<th>ASCOCHYTA BLIGHT</th>
<th>GREY MOULD</th>
<th>PHYTOPHTHORA</th>
<th>ROOT LESION NEMATODE P. neglectus</th>
<th>ROOT LESION NEMATODE P thornei</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2 HR (Highly Resistant)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3 R (Resistant)</td>
<td>Genesis 090, Genesis 508</td>
<td>-</td>
<td>-</td>
<td>Norwin, Lasseter, Gully, Yorker</td>
<td>Barwon, Lasseter Kybra</td>
</tr>
<tr>
<td>4 MR (Moderately Resistant)</td>
<td>Nafice, Almaz, Flipper</td>
<td>-</td>
<td>Yorker</td>
<td>Semsen, Howzat, Barwon, Bumper, Kaniva, Dooen</td>
<td>Amethyst, Norwin, Gully, Dooen, Kaniva, Garnet, Yorker</td>
</tr>
<tr>
<td>6 MS (Moderate Susceptible)</td>
<td>Yorker, Rupali, Sonali</td>
<td>Howzat, Jimbour</td>
<td>Howzat</td>
<td>Jimbour, Tyson, Heera, Sonal</td>
<td>Jimbour, Tyson, Kybra</td>
</tr>
<tr>
<td>7 MS-S (Moderate Susceptible- Susceptible)</td>
<td>Howzat, Genesis 508, Genesis 836</td>
<td>Flipper, Nafice, Almaz, Amethyst, Gully, Sonal, Rupali</td>
<td>-</td>
<td>Desavic, Sonali</td>
<td>Yorker</td>
</tr>
<tr>
<td>8 S (Susceptible)</td>
<td>Tyson, Genesis 090, Rupali, Sonali, Tyson, Desavic, Yorker, Flipper, Nafice, Almaz</td>
<td>-</td>
<td>-</td>
<td>Sona</td>
<td>-</td>
</tr>
<tr>
<td>9 VS (Very Susceptible)</td>
<td>Kaniva, Jimbour, Bumper, Lasseter, Desavic</td>
<td>Kaniva, Bumper, Lasseter, Gully</td>
<td>Sonali, Bumper, Kaniva, Desavic</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
4. Varieties
- Yield and marketability, along with disease resistance, are the major factors to consider in variety choice.
- Varieties resistant to ascochyta blight are not immune to that disease, and may suffer some production losses or grain quality damage under high disease pressure.

5. Seed
Select seed of the highest possible purity, germination and pathogen free status. For ascochyta blight susceptible varieties, use seed with nil disease infection because ascochyta blight epidemics can be initiated by very low levels of seed infection. Ascochyta blight infected seed will often fail to emerge, and can act as a source of disease for new districts.
- Botrytis can occur on seed and significantly affect establishment if not treated with a fungicide seed dressing.
- Seed retained on-farm should be from the ‘cleanest’ paddock or section, and have had a fungicide applied at podding. Select the area before harvest, and harvest it before any other chickpeas to prevent contamination from other diseased chickpea crops.
- If seed is more than one year old, frosted, weather damaged or diseased, its germination and vigour may have deteriorated. This may increase its susceptibility to disease attack.
- Re-test seed for germination percentage before sowing if retained in silos for more than one year.

6. Seed dressing
No chickpea variety is resistant to some seed infection by ascochyta blight or botrytis. All ascochyta blight susceptible varieties should be treated with a seed dressing. Kabuli and all ascochyta blight resistant varieties will benefit from a seed dressing to protect against botrytis and other seedling rots (see table and fungicide section). Seed dressings may have a deleterious effect upon rhizobia, particularly under acid soil conditions, so minimize the contact time. Either apply seed dressing first, then separately mix the inoculum and apply it to the seed immediately before sowing, or consider using granular inoculums.

7. Sowing date
Sow within the optimum time for the region (see table)
- With ascochyta blight resistant varieties, sow at traditional sowing dates. Delayed sowing is not necessary.
- With ascochyta blight susceptible varieties, delayed sowing has been a most important strategy for ascochyta blight management. It reduces the duration of exposure of chickpea seedlings to ascochyta blight spores. It will not help though if self-sown chickpeas are nearby. Be aware though that delayed sowings can result in lower yields due to increased risks of dry finishes and high temperatures during podding.
- In all varieties, sowing too early can produce poor early pod set if flowering is in a colder period.

Table 2

<table>
<thead>
<tr>
<th>Region (annual rainfall)</th>
<th>Month</th>
<th>May</th>
<th>June</th>
<th>July</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Week 1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Less than 400mm - SA/Vic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 400mm - sth NSW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400-450mm - SA/Vic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400-450mm - sth NSW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>450-500mm - SA/Vic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>450-500mm - sth NSW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500-600mm* - SA/Vic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500-600mm* - sth NSW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Marginal areas or low disease risk areas
Preferred planting time
For high disease risk areas or varieties

*preferred sowing time for spring-sown chickpeas in south-eastern Australia is August-September

CHICKPEA SEED TREATMENTS

<table>
<thead>
<tr>
<th>Company</th>
<th>Active Ingredient</th>
<th>Rate (per 100kg seed)</th>
<th>Av. cost to treat 100kg seed ($)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop Care</td>
<td>Thiram</td>
<td>1. 125-150g</td>
<td>$3.10-$5.20</td>
</tr>
<tr>
<td>2. 3. Crompton</td>
<td>2. 3.</td>
<td>4. Barmac</td>
<td>4. 600 g/L</td>
</tr>
<tr>
<td>1. P-Pickel T®</td>
<td>Thiram 360 g/L, TBZ 200 g/L</td>
<td>200 ml</td>
<td>$18.40-$22.50</td>
</tr>
<tr>
<td>1. Mantele®</td>
<td>Metalaxyl-M</td>
<td>350 g/L</td>
<td>$18.40-$22.50</td>
</tr>
<tr>
<td>2. Rampart®</td>
<td>Metalaxyl</td>
<td>350 g/kg</td>
<td></td>
</tr>
</tbody>
</table>

CHICKPEA DISEASES CONTROLLED (✓)

<table>
<thead>
<tr>
<th>Botrytis</th>
<th>Ascochyta Blight</th>
<th>Phytophthora</th>
<th>Seedling Root Rot</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>1, 2, 3. ✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Always read the label. P = application allowed under permit, ® = registered trademark, NR = not registered for this disease, 1 = prices are GST inclusive and based on retail price April 2005.
• Early sowing can produce increased vegetative growth and may increase lodging, which will increase the risk of grey mould incidence particularly in the larger plant types.
• In a disease prone area or higher risk situation, sow at the later end of the recommended optimum for the district.

8. Sowing rate
• Higher seeding rates lead to greater canopy vigour, increased lodging and higher humidity, and under ideal growing conditions can increase the risk of botrytis grey mould.
• Avoid double sowing headlands, as the denser crop can be more prone to disease establishment and lodging.
• Seeding rates below the minimum recommended plant populations will have minimal impact on disease incidence, but reduce potential yield and increase harvest losses.
• See your local regional production guidelines for seeding rate recommendations

9. Row spacing
Wider row spacing does not reduce ascochyta blight incidence in chickpeas, but could reduce the occurrence of grey mould. It may allow better fungicide penetration and cover.

10. Disease monitoring and control periods
Disease impact is greatly reduced when a fully integrated disease management program is initiated before seeding and maintained through the growing season. A crop is considered to be at high risk if susceptible varieties are grown, crop rotation tight, sown adjacent to chickpea stubble, sown early or where all integrated management strategies cannot be followed. The potentially critical periods for disease development in chickpeas are in the early vegetative stages, flowering and during seed fill. Depending on the variety sown and the risk, fungicide spraying for control is not necessarily needed or may be absolutely essential at these stages. Monitoring should start at 2-3 weeks after emergence if a susceptible variety is grown and foliar fungicide use is planned.

Some ascochyta resistant varieties like Genesis 090 can have a black stem that should not be confused with disease.

Ascochyta blight (Ascochyta rabiei)
A seed treatment containing thiram (Thiragranz® or Thiraflo ST®) or thiram plus thiabendazole (P-Pickel T®) is essential to control seed-borne infection.

Chlorothalonil is the more effective foliar fungicide for ascochyta blight, and is now permitted for use (permit No 8505 till December 2006). Mancozeb can also provide some protection from ascochyta blight if timeliness of application is observed; e.g. mancozeb might give protection for a fortnight compared to chlorothalonil which could protect for 21 days. Efficacy differences between the products can arise if ascochyta blight is present. The protective fungicide sprays should be applied 1-3 days ahead of rainfall to prevent infection spreading during the rainy period. No new ascochyta blight infections will occur during dry periods, so fungicide applications can be held off until rain (>5mm) is forecast. Do not wait until after the rain.

With ascochyta blight resistant varieties like Genesis 508 and Genesis 090, spraying for ascochyta blight before the podding stage is unlikely to be needed, especially if no ascochyta blight lesions are present. A single application of mancozeb or chlorothalonil at podding may be sufficient for grain protection in these more resistant cultivars. Chlorothalonil will be more effective if any ascochyta blight lesions are present.

Table 3

<table>
<thead>
<tr>
<th>Company</th>
<th>Active Ingredient</th>
<th>Rate</th>
<th>Av.Cost($/ha)</th>
<th>Chickpeas</th>
<th>Botrytis</th>
<th>Ascochyta blight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Barrack®</td>
<td>1. Crop Care</td>
<td>Chlorothalonil 720 g/L</td>
<td>1.0-2.0 L/ha</td>
<td>$16.70-$33.42</td>
<td>-</td>
<td>✓, RA</td>
</tr>
<tr>
<td>2. Unite 720®</td>
<td>2. Nufarm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Bravo®</td>
<td>3.4. Syngenta</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Bravo Weather Stik®</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Bavistin®</td>
<td>1. Crop Care</td>
<td>Carbendazim 500 g/L</td>
<td>500 mL/ha</td>
<td>$10.00-$13.50</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>2. Carben®</td>
<td>2.3. Nufarm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Spinflo®</td>
<td>4. Farmoz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Howzat®</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Penncozeb 420SC®</td>
<td>1. Nufarm</td>
<td>Mancozeb 420g/L</td>
<td>1.8-3.5 L/ha*</td>
<td>$11.10-$26.60</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>2. Penncozeb 750 DF®</td>
<td>1. Nufarm</td>
<td>Mancozeb 750 g/kg</td>
<td>1.0-2.2 kg/ha*</td>
<td>$7.60-$16.70</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. Dithane Rainshield®</td>
<td>2. Dow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Polyram®</td>
<td>1. Nufarm</td>
<td>Metiram 2.0 kg/ha</td>
<td>2.0 kg/ha</td>
<td>✓, E, RA</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2. Sumisclex®</td>
<td>1. Sumitomo</td>
<td>Procymidone 500 g/L</td>
<td>500 ml/ha</td>
<td>$16.40-$33.80</td>
<td>RA</td>
<td>-</td>
</tr>
</tbody>
</table>

Always read label before use. * = Lower rates to be used on shorter crops or to the commencement of flowering, whichever comes first. Use higher rate for the dense crops and if disease severe. RA = registration applied for, check if registration approved. ✓ = application allowed under permit, but check permit expiry. ✓E = application allowed under permit until 31 Dec 2005 when permit expires. ® = registered trademark, 1 = prices are GST inclusive and based on retail price at April 2005 and are subject to change.
Grey mould  *(Botrytis cinerea)*

Seed treatments containing thiram (Thiragranz®, Thirafl ST®, Thirafl FF® or Thiram®) or thiram plus thiabendazole (P-Pickel T®) will control seed-borne infection. If infected seeds are sown untreated, botrytis seedling blight can reduce plant establishment throughout the growing season.

Warm, humid conditions under a dense crop canopy in spring are ideal for the spread of grey mould. Carbendazim or procyomidone are most effective against a grey mould epidemic. The use of mancozeb or chlorothalonil as a foliar spray for control of ascochyta blight has the added benefit of providing some protection and control of grey mould.

**Phytophthora root rot** *(Phytophthora megasperma)*

Not usually an issue in the southern region. The disease can be reduced by seed treatments containing metalaxyl (Apron XL®, Rampart® or Mantle®).

11. **Foliar Fungicide Application Guide:**

- **all environments.**

Consider the variety grown, potential crop yields, rainfall zone and disease risk when deciding on fungicide use.

If the crop is at high risk of ascochyta blight (ie adjacent chickpea stubbles, early sown, close rotations), treat seed with P-Pickel-T® for ascochyta blight protection, irrespective of variety.

With **ascochyta blight resistant varieties** (Genesis 508, Genesis 090), only consider applying an early foliar fungicide for ascochyta blight if the disease is present. A foliar fungicide applied during podding will likely be required to protect grain quality. Because varieties with resistance to ascochyta blight have less fungicide applied for ascochyta blight control, the risk of Botrytis Grey Mould infection will arise in environments that favour that disease.

With varieties that are **intermediate in ascochyta blight resistance** (eg Almaz, Nafice, Genesis 836), 3 to 4 strategic foliar fungicide applications for ascochyta blight control will be necessary in many areas. Apply a fungicide early, before the disease is detected pre-flowering. Strategic applications will likely be needed at the commencement of flowering, early podding and late podding. Timing of the protective applications is critical, as control is less effective if the fungicides are applied after the disease has taken hold.

With **ascochyta blight susceptible varieties** (eg Howzat, Kaniva, Sonali, Rupali), regular foliar fungicide applications for ascochyta blight control will be necessary in all areas. Apply a fungicide before the disease is detected, from emergence through flowering until 4 weeks before maturity. Timing of the early, protective applications is critical, as control is often ineffective if fungicides are applied after the disease has taken hold.

Any fungicide program needs to take into account:

- Disease Risk Categories, based on:
  - Varietal susceptibility or resistance
  - Source of seed and treatment of seed
  - Proximity to chickpea stubble
  - Level of ascochyta blight inoculum present from crop residue or volunteer plants
  - Climatic conditions for disease infection.

- Registration or Permit Status
- Withholding Periods.
- Fungicide Resistance Management: The maximum number of sprays of a product must be adhered to.
- Mode of action: Using products with a range of mode of actions for control of diseases further reduces the chance of fungicide resistance development and improves efficacy. Use at times of the disease life cycle where they will be most effective according to their mode of action.
- Cost Effectiveness.

12. **Early harvest**

- Harvest as early as possible to minimise ascochyta blight infection on seed and potential seed down grading. The damage from the disease is usually more severe when crops are harvested late. Harvest losses, seed splitting and downgrading in quality can be substantial if chickpea harvest is below 12%.

- Chickpea crop desiccation assists in early harvest, as does the higher moisture contents now allowable on delivery (14%). Care is needed in desiccating because of the late maturity of chickpeas. Do not prematurely desiccate as it can affect grain quality, particularly in the large seeded kabulis.

- Early harvest will give the best chance of achieving the number 1 grade chickpea receival standard, in which there is a maximum of 1% poor colour (due to disease, water staining, frost).

### References

- Grain Legume Handbook

### DISCLAIMER

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