

CHICKPEAS in South Australia & Victoria



INTRODUCTION

Chickpea (*Cicer arietinum*) is well suited as a winter crop to the medium rainfall (300 – 500mm) areas of south-eastern Australia . Crop growth during winter months is very limited but accelerates with warmer weather in spring.

Chickpea is a high value pulse crop used almost entirely for human consumption. Attractive presentation of the grain product is of paramount importance. A dirty sample, broken or split grain or discolouration due to weathering, disease or insect damage all detract from the market value.

Chickpeas were first grown during the 1980s, the area peaking in the mid 1990's before ascochyta blight caused the almost demise of the southern chickpea industry. This is going to change. Chickpeas are about to be more widely grown again after the release of new ascochyta resistant varieties.

Historically desi types have been most widely grown, however there will now also be a developing kabuli chickpea industry.

GROWING REQUIREMENTS

Soil type

Chickpea is a crop suited to well-drained, neutral and alkaline soils of good water holding capacity. Alkaline to neutral sandy loam or clay soils (pH in water 6.0 to 9.0) suit chickpeas. Good drainage is important.

Chickpea prefers well drained, neutral to alkaline (a pH of 6.5 to 8 measured in water) loams and clay loams. They are best grown on the deeper wheat growing soils with higher water holding capacity. Chickpeas grow poorly on sands, on tight hard-setting clays and acidic soils. Chickpeas will not tolerate waterlogging.

Climate

Chickpeas are not as well suited to low rainfall areas (less than 350 mm). Kabuli types are less tolerant than Desi types to dry conditions, as they require more moisture to achieve a satisfactory grain size and yield. Desi types require above 350 mm annual rainfall and kabuli types need more than 400 mm. Spring sowing is a preferred option in high rainfall areas (greater than 550mm).

Chickpeas will tolerate higher temperatures during flowering than peas or lupins. Cool wet conditions at flowering can adversely affect seed set.

PLACE IN ROTATION

Chickpea fits a crop sequence with cereals and canola. A minimum of four years between chickpea crops in the same paddock is needed to minimise the risk of ascochyta blight and root lesion nematodes.

Be aware of herbicide residues and plant-back requirements in the rotation.

Chickpeas are grown in rotation with cereals. They have the advantage of:

- being an alternative pulse crop which fits well into cereal rotations, increasing the yields of following cereal crops and allowing an extended phase of cropping,
- maintaining available soil nitrogen. Chickpeas gain most of their nitrogen needs from fixation rather than the soil. In contrast, other crops such as cereals and oilseeds deplete available soil nitrogen. Chickpeas often fix less nitrogen than beans, lupins and peas,
- decreasing cereal disease. Grass free chickpea crops break the cycle for CCN and Take-all,
- offering an alternative pulse to peas, beans and lentils where soils are suitable, thereby extending the cropping phase for these crops to assist in disease control,
- controlling weeds. Grass weeds that are difficult to control in cereals, such as Brome Grass and Barley Grass, can be controlled in chickpeas with selective grass selective herbicides.
- Assisting in snail control as chickpeas are not attractive for snail multiplication.

Crop topping of herbicide resistant weeds is not possible due to the late maturity of chickpeas relative to the weeds.

Effective control of broad leaf weeds begins in the previous crop.

Do not sow on to a field pea or faba bean stubble. Do not sow for two years after a dun field pea type or after faba bean. It is almost impossible to grade volunteer peas out.

Wheat yields and protein in the past have tended to be poorer after chickpea crops than after other pulses. Barley is likely to be a better option than wheat in the year after chickpea. The older chickpea varieties were a host for the root lesion nematode (*Pratylenchus neglectus*, *P. thornei*). Newer chickpea varieties are not as susceptible to root lesion nematode multiplication. Any potential yield loss in the cereal following chickpeas can be remedied by applying an additional 10 to 20 kg of nitrogen Fertiliser to that cereal. Nitrogen Fertilisers, particularly those containing ammonium, have been found to limit nematode infection. Root lesion nematode may adversely affect the growth and yield of the chickpeas in some cases, but has more effect on the following cereal crop.

As a higher value crop, kabuli types are often grown on fallow where extra moisture can mean larger seed.

Be aware of herbicide residues and plant-back requirements in the rotation.

For more detailed information on 'Herbicide residues and rotation planning' [click here for herbicide residual brochure](#) or [GRDC 2007 brochure](#) after the drought (including herbicide residues)

Profitability of Chickpeas and Disease management

Management and control of ascochyta blight is the important factor in determining the viability of chickpea production. The first variety with improved ascochyta blight resistance, Genesis 508, became available in 2005, Genesis 090 followed it in 2006, and others like Genesis 509 follow in 2008. The large kabuli varieties Almaz and Nafice became available in 2006. They along with all older varieties will require strategic fungicide management through the application of well-timed protective foliar fungicides.

Disease levels will vary according to season, rotation history of the paddock and its surrounds, stubble management, seed hygiene, sowing time and timing of fungicide applications. *There is no doubt that the resistant varieties do survive intense ascochyta disease pressure. Also that sustained fungicide use can protect highly susceptible chickpea varieties from ascochyta blight.*

Table 1 estimates gross margins for chickpeas with ascochyta susceptible versus ascochyta resistant varieties. Fungicide costs are based on 8 applications at \$20/ha per application for the susceptible variety versus one for the resistant variety. Assuming variety yields are the same, desi gross margin of \$130 versus \$270/ha may be achieved from a 1.5 t/ha grain yield. A \$180 versus \$420/ha return could be obtained from a kabuli yield of 1.0 t/ha. If choosing a variety susceptible to ascochyta blight, growers should consider kabuli production in preference to desi where conditions are suitable.

The lower yields in lower rainfall districts make the production of highly susceptible desi types, less profitable than most other cropping options when fungicide application costs are taken into account. However Kabuli yields may be poor where annual rainfall is less than 375-400 mm.

Table 1: Estimated desi and kabuli returns

Grain yield (t/ha)	Grain price (\$/t)	Fungicide cost Susceptible variety (\$/ha)	Fungicide cost Resistant variety (\$/ha)	Other costs All varieties (\$/ha)	Gross margin Susceptible variety (\$/ha)	Gross margin (\$/ha) Resistant variety (\$/ha)
DESI						
0.5	300	160	20	160	-170	-30
1.0	300	160	20	160	-20	120
1.5	300	160	20	160	130	270
2.0	300	160	20	160	280	420
KABULI						
0.5	500	160	20	160	-70	70
1.0	500	160	20	160	180	420
1.5	500	160	20	160	430	570
2.0	500	160	20	160	680	820

The national chickpea program is committed to the re-establishment of the chickpea industry in south-east Australia. A number of international lines with excellent resistance to ascochyta blight have been released and these are the first resistant varieties available. All releases will require less fungicide support than the current options, but will still require one spray at podding to produce good quality seed.

Resistant varieties offer growers greater yield security. However, fungicides are still likely to be required to minimise yield losses through pod and seed infection. Seed infected by ascochyta blight can be small and blemished. It may also attract lower returns through downgrading. Sowing diseased seed sets back crop prospects from the outset.

VARIETIES

Types

There are two types of chickpea. Desis are often used for splitting or processing into flour after removal of the seed coat. Kabulis are traded as whole grain and are usually consumed in that form. They can also be used to prepare dips (hommos). The larger kabuli grain is generally more valuable with a premium paid for the larger grain.

Variety attributes and yields

The decision to grow chickpeas is made much easier now with ascochyta resistant varieties that are well adapted being available. The risk of ascochyta is minimised, and only a single fungicide at podding may be required in some areas. It is important to know the ascochyta resistance status of the variety you sow. The actual variety choice is the next consideration, and must be made on the suitability of the variety for your district and the market you are targeting.

If the decision is to grow an older, ascochyta susceptible variety (eg Howzat, Kaniva), then appreciate that it will need frequent and regular fungicide applications. Six or seven fungicide applications could cost \$130 to \$200 per ha, hence high yields and high prices are needed to make the crop of that chickpea variety economic to grow.

The wisest choice of the most suitable chickpea variety is to choose one with ascochyta resistance, given that this devastating disease has been widespread in southern Australia, and has not disappeared.

For the latest SARDI chickpea variety sowing guide [click here](#)

For descriptions on varieties for sowing in Victoria, [click DPI sowing guide 2007 update](#) or for 2006 chickpea sowing guide [click here](#)

For detailed information on 'Chickpea Disease Management Strategies for each variety type' [click here](#)

For the 'Variety management package for Genesis 090 kabuli chickpea' [click here](#)

For the 'Variety management package for Genesis 508 desi chickpea' [click here for page 1](#) and [for page 2 click here](#)

For more detailed PBR information [click here](#)

SOWING

Sowing time, variety choice, stubble cover and row spacing can help influence the risk of frost damage.

[Click here for ways to minimise frost damage in pulses](#)

Seed quality

High quality seed is vital. Check seed labels for germination percentage and purity and ask for the germination certificate. The results of a germination test must be supplied with all seed for sale. Take the additional precaution of having the seed tested for both ascochyta and botrytis grey mould. Harvesting on time minimises the development of disease on the seed.

For information on disease and health testing of seed, [click here](#)

Inoculation

In South Australia , all chickpea seed sown should be inoculated with the specific chickpea rhizobium inoculum (Group N), even in paddocks where chickpeas have been grown before. If the seed is to be treated with an insecticide or fungicide, it should be inoculated last, immediately before sowing.

Do not mix inoculants and seed dressing together unless the inoculant's label specifies compatibility. New granular and other forms of inoculum becoming available may assist in rhizobial survival, particularly in acid soils or when the chickpea are sown dry.

In Victoria , on acid soils, it is essential to inoculate every sowing.

In the Wimmera, inoculate seed with chickpea Rhizobium (Group N inoculant) if the paddock has never grown chickpeas or only one 'successfully' nodulated crop. Effective nodulation is 70% or more plants with healthy nodules. Chickpea rhizobia can survive in the soil for up to eight years. The sure way to successful nodulation is to inoculate every time, but on Wimmera grey clay soils the following compromise works:

- Step 1 Two well inoculated crops of chickpeas preferably 4 years apart.
- Step 2 Up to 8-year break from inoculation: chickpeas grown in this period do not need inoculation.
- Step 3 Inoculate next crop of chickpeas.
- Step 4 Repeat steps 2 and 3.



For information on assessing nodulation [click here](#).

Seed dressing

Chickpeas, particularly kabuli varieties, are susceptible to root rot fungal diseases that affect crops in the seedling stage. Seed should be treated with the fungicidal seed dressing P-Pickel -T ® at 2L/tonne as a precaution against disease, in particular ascochyta blight.

A fungicidal seed dressing to suppress any early development of ascochyta blight is also essential. Use thiabendazole and thiram combined which is also effective against grey mould. Thiram alone is only effective against grey mould. Complete coverage is vital for effectiveness. An auger treatment is unlikely to give the coverage needed. Use the services of seed treatment professionals. Seed dressing must precede inoculation.



For information on 'Pulse seed treatment and foliar fungicides' [click here](#)

Paddock preparation

Seed is best sown into friable soil, with direct drilling often possible following a cereal crop. Good seed-to-soil contact is required and is helped by the large seed size of chickpeas. Retention of adequate plant residues on the surface is important to protect the soil from erosion both during growth and after harvest. This will not affect chickpea germination and growth, and can improve establishment on hard-setting, surface-crusting soils.

There are few problems when sowing chickpeas with conventional seeding equipment, but occasionally cracking of seed may occur with the larger seeded kabuli types.

Sowing rate

Crop densities of 40-50 plants/m² are recommended for desi varieties. For South Australia, use sowing rates to achieve 30-40 plants/m² in the 300-350 mm rainfall zone, and 25-35 plants/m² in the 350-500 mm rainfall zones are suggested. For the new small kabuli variety, Genesis 090, target a similar plant density to desi types.

For medium to large kabulis 25-35 plants/m² are optimum. The largest grades of kabuli chickpeas (8-9 mm or more) should be used. Sowing rate will depend on germination percentage and seed weight. Allow for a reduced germination of 5-10% on poorly structured soils. Table 2 shows the range of sowing rates that should be expected for a germination range of 70-95% assuming an average seed weight.

Calculate seeding rate for the required density of plant. Use the formula:

Seeding rate (kg/ha) = Plant density (plants/m²) x 100 seed wt (g) x 10 ÷ Germination percentage

Table2: Suggested sowing rates for chickpeas

Variety	Seeding rate (kg/ha) for 30 plants/m ² (95-70% germ)	Seeding rate (kg/ha) for 50 plants/m ² (95-70% germ)
DESI		
Howzat	66-90	110-150
Genesis 508	57-77	95-129
Sona	63-86	105-143
Tyson	41-56	68-93
KABULI		
Bumper	142-193	-
Genesis 090	95-129	158-214
Kaniva	120-163	-
Almaz	130-178	-
Nafice	138-187	-

Sowing depth

Seed should be sown at a depth of 25 to 80 mm. On clay soils a minimum depth of 50mm is suggested. This sowing depth can also assist in preventing ascochyta-infected seed from emerging. On light textured soils, shallow sowing can lead to pre-emergent herbicide damage. On heavy textured soils, surface sealing and deeper sowing delays emergence, reduces plant establishment and early plant vigour. Chickpeas are slow to emerge. Later sowing can take 4 weeks or more to emerge with cold conditions.

If simazine or metribuzin is used for weed control in a wet winter, leaching can cause root damage. On lighter soils leaching into the root zone will be more of a problem.

Timing

Chickpea crops are best sown from mid May in the 300-400 mm rainfall zone, and mid-June in the 400-500 mm rainfall zone to maximise yield. However later sowing has been successful in maximising yield while reducing ascochyta blight and fungicide applications. Early sowing increases the risk of ascochyta blight. Varieties resistant to ascochyta blight may be sown at the earlier pre-ascochyta blight sowing dates.

For information on sowing dates in Victoria see 2006 chickpea sowing guide [click here](#).

For information on 'Dry sowing of pulses' [click here](#).

Rolling

Rolling after sowing is desirable on most soils to provide a level surface for herbicide application, and for easier harvesting free of stones and clods. This reduces herbicide washing into seed furrows, harvester wear and soil contamination in the seed sample. If the soil is prone to hard setting, crusting or erosion on sandy or sloping country, rolling should be delayed until the crop is 15 to 25 cm high. Avoid rolling chickpeas when plants are just starting to emerge as emerging shoots will be broken off. If rolling chickpeas post emergent choose a time when the plants are limp such as in the afternoon to reduce the amount of damage. Rubber tyred rollers are preferable, but steel rollers can be used. Avoid rolling either two weeks before or after applying a post-emergent herbicide.

NUTRITION

Phosphorus

In order to match the nutrient requirement of a crop yielding 1.5-3.5 t/ha, a guide for alkaline soils with a good Fertiliser history is 7-16 kg/ha of phosphorus (P). This is equivalent to 80-186 kg/ha of single super or 40-95 kg/ha of double super.

Sulphur

Sulphur (S) is needed at higher rates for chickpea. Use "grain legume" Fertilisers. If the paddock has a history of single super then S may be adequate, particularly on clay soils. Prolonged use of double or triple super could lead to an S deficiency, especially on lighter soils.

Nitrogen

Nitrogen (N) Fertiliser is not usually necessary. If available soil N is low or sowing is late then "starter" N rates of 5-10 kg/ha may be beneficial.

Zinc

Chickpeas are prone to zinc (Zn) deficiency. Low or marginal zinc levels are widespread in many cropping districts. Zinc and to a lesser extent iron deficiency are prevalent on calcareous soils, particularly dark brown clay soils with high pH.

Zn lasts about 2 years on calcareous clays and 6-7 years on Mallee loams. Zn is not mobile in the soil and an even distribution is important. Zinc can be applied by spray to the soil, coated on granular Fertiliser or as a foliar spray.

Boron

Chickpeas are considered sensitive to boron toxicity. Symptoms show as a yellowing or dying of the tips and margins of the leaves, with the older leaves being more severely affected than younger leaves.

Crop with Confidence, Rural Solutions SA <http://www.ruralsolutions.sa.gov.au>

WEED MANAGEMENT

Chickpeas are poor competitors with weeds because of their slow emergence and growth during winter. Effective weed control is essential for good yields and to avoid the build up of troublesome weeds in the rotation. Management for broad leaf weeds needs to begin in the preceding cereal year because there are few options for in-crop control. In particular vetch and other self sown pulses can be problematic weeds.

Sow chickpeas into paddocks with low broadleaf weed populations. Make the most of opportunities to reduce broadleaf weeds in the preceding crop when weed control is likely to be more effective, cheaper and the crop less sensitive. Delaying chickpea sowing until after a germination of broadleaf weeds also assists in areas or seasons where this is possible.

The overuse of particular groups of herbicides through the rotation can lead to herbicide resistance, which has occurred in grass weeds especially. To avoid herbicide resistance, weed management through the rotation should aim to minimise the need for herbicides, to avoid the overuse of any one group of herbicides and to use

the least selective herbicide. Effective grass control in the chickpea crop has the benefit of reducing the need for selective grass herbicides in the following cereal year.



For South Australia refer to latest *Pulse weed spraying chart* available from Rural Solutions SA Roseworthy Information Centre are: Freecall: 1800 356 446 www.ruralsolutions.sa.gov.au

DISEASE MANAGEMENT

Ascochyta blight (*Ascochyta rabiei*)

Ascochyta of chickpea is a different species of blight from those infecting field pea, lentil or faba bean.

At this stage it is thought that only the asexual cycle exists in Australia. Asexual spores (conidia) are produced on living and dead tissue, have a sticky coating and are not airborne (carried by the wind). Conidia are spread by rain splash, animals, humans, machinery etc.

Management implications

The fungus over-summeres on infected chickpea stubble. When the stubble wets up in late autumn, the fungus becomes active. The fungus can survive for two years on surface stubble, but if it is buried the fungus dies within four months. Stubble management is vital to disease management. Wind blown stubble and plant debris can be a source of inoculum for crops sown into adjacent paddocks.

The growing crop is the major source of conidia, which will be spread by rain splash to infect new growth and new plants. Continuous monitoring of crops is necessary to correctly time protectant fungicide applications. In the right weather conditions the disease can spread to previously healthy crops.

The fungus can infect pods and seeds. Fungicide seed treatments must have systemic as well as contact activity. Storage does not kill the fungus: seed kept for 5-10 years has remained infected.

Choose seed from paddocks which have been inspected and considered clean. Use a seed testing service to check the degree of infection of farm grown seed. Reject any which tests positive. Testing "clean" does not mean that there is no infection, it may be low but manageable.

Paddock symptoms

Symptoms appear as patches of dead plants that may look similar to the broken stems of hail damage. In advanced infections, concentric rings of black spores appear on leaves and stems.

- If infected plants occur in small circles, then the infection probably started from seed.
- If infected plants occur in a uniform pattern, then infestation probably started from infected stubble in the paddock or adjacent paddock.

A summary of best management practice for ascochyta control

- Sow resistant varieties.
- Work chickpea stubble in immediately after first summer rains, even if not planning to grow a chickpea crop.
- Plan 4 years between chickpea crops in one paddock.
- Avoid a paddock adjacent to a chickpea crop in the previous season.
- Use seed from paddocks that were inspected and rated as clean. Have the seed tested for ascochyta.
- Treat seed with a fungicide that has systemic and contact activity. Use recommended rates to achieve complete seed cover.
- Control self-sown chickpea plants.
- Do not sow susceptible varieties before late May in the Mallee and before mid-June in the Wimmera.
- Inspect crops weekly for disease.
- If growing susceptible varieties, budget for a minimum of 4-5 (max 8) fungicide sprays. If growing a resistant variety budget for a minimum of 1, (max 2) fungicide sprays.
- When applying fungicides, use high water rates and high pressure applications: 50 L/ha by air; 100-200 L/ha by ground boom; 5-6 bar, (90 psi).
- Hose down/disinfect machinery, boots etc after being in an infected crop.
- Avoid stock movement in or through infected crops. Sheep, dogs and feral animals can spread the disease.



Typical stem lesions caused by Ascochyta infection.
Stems break at lesions and wither.



Typical leaf lesions, these are seen as round spots with brown margins.
Small dark specks (fruiting bodies) are often present



Ascochyta infected pod

Botrytis grey mould (*Botrytis cinerea*)

Grey mould is most common in a wetter than average spring when there are conditions of prolonged high humidity. Subsequent use of infected seed causes pre-emergence seed rot and post-emergent damping off.

Options to reduce the impact of this disease are:

- Avoid susceptible varieties (kabuli types and Lasseter are more susceptible).
- Avoid sowing crops too thick, - crops dry more quickly on wider row spacings.
- Early sown crops appear most susceptible due to early formation of a dense crop canopy



To prevent pre-emergence seed rot, use disease free seed (a seed test is available) or a seed dressing.
A seed dressing treatment must precede inoculation of the seed.



Comparison of stem infection caused by sclerotinia (top) and botrytis (lower).
Note different colour of fungal growth.



Botrytis infected pod stem and pod.
Seed discolouration caused by botrytis infection.

Root lesion nematode (*Pratylenchus spp*)

Root lesion nematodes are a significant problem in rotations which include wheat and chickpeas. Yield losses of 30-40% in wheat and up to 60% in chickpeas have been measured.

Control of these nematodes relies on the inclusion of poor host crops or pastures in the rotation. Crop symptoms are variable. Soil tests are available to diagnose or predict a problem within a paddock.



Chickpea disease management summary

- Variety selection is critical. Growing an ascochyta 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 4 years between chickpea crops. Having a high frequency of crops like lentil, faba bean, vetch, field pea, lathyrus or clover pasture puts chickpeas greater at 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 infection, particularly with ascochyta susceptible varieties.
- Fungicide seed dressing can be effective in high disease risk situations, but the benefits depend on location and the disease being controlled. Seed dressing is essential for ascochyta susceptible varieties.
- Sowing date. Return to original sowing dates with ascochyta resistant varieties, but do not sow too early. Aim for the optimum sowing window for the district. If using an ascochyta susceptible variety, delay sowing to minimize ascochyta risk.
- Sowing depth. If using an ascochyta 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 resistant varieties do not require the same regular foliar fungicide program that susceptible varieties need to effectively control ascochyta and grey mould. With the susceptible varieties in particular, success is dependent on monitoring, timeliness of spraying and correct fungicide choice, so 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.



For more detailed information on 'Chickpea Disease Management Strategy' [click here](#)

Disease	Organism	Symptoms	Occurrence	Hosts	Control
Ascochyta blight more information	<i>Ascochyta rabiei.</i>	Pale brown lesions on leaves, stems and pods. Lesions may have a grey centre containing small black specks which are the fruiting bodies. Infected stems wither and break.	Occurs in all regions. Affects both kabuli and desi types. Most severe in spring.	Chickpea.	Seed dressing, foliar fungicides, rotation, avoid susceptible varieties, avoid early sowing.
Grey mould	<i>Botrytis cinerea.</i>	Poor emergence and death of young plants. Soft rot at the base of the stem. Grey mould growth on leaves, stems and pods. Lodging of plants in dense crops. Discolouration of seed with grey/black mould.	Occurs in all regions. Affects both kabuli and desi types. Most severe in wet seasons. Dense crops are more likely to be affected than thin crops.	Chickpea, most pulses, including lentil and faba bean	Seed dressings, lower plant densities, avoid early sowing.
Sclerotinia more information	<i>Sclerotinia sclerotiorum.</i>	Scattered dead plants within a crop. Cottony white fungal growth on the lower stems of dead plants. Soft rot and white mould on stems and pods.	Occurs in all chickpea growing regions. Most severe in wet seasons where chickpea is planted in fields recently cropped to chickpea.	Most pulses, oilseeds and broadleaf weeds	Crop rotation. (Seed dressings of no benefit.)
Damping-off	<i>Pythium spp.</i>	Poor crop establishment under	Problem in all regions, particularly in	Kabuli chickpea,	Seed dressings, avoid poorly

		wet conditions. Seed rotting in the ground. Sudden death of young seedlings.	soils that become very wet just after sowing. More severe on kabuli than desi chickpea.	most pulses.	drained soils.
Phytophthora	<i>Phytophthora megasperma</i> .	Plants suddenly wither and die, particularly after waterlogging. Dark brown to black discolouration of the tap root.	Most serious disease in northern Australia . May be a problem in poorly drained soils in southern Australia under wet conditions.	Chickpea, lucerne.	Resistant varieties.
Phoma blight more information	<i>Phoma medicaginis</i> .	Blackening of the stem near ground level. Dark, tan coloured lesions on leaves, stems and pods.	Common in most chickpea growing regions. Most severe in wet seasons.	Most legumes.	Crop rotations.
Root lesion nematode more information	<i>Pratylenchus thornei</i> and <i>Pratylenchus neglectus</i> .	Ill-thrift, lack of branching of root system, small dark stripes on roots.	Favoured by wheat in rotation with chickpea, medic, vetch.	Wheat, chickpea, medic, vetch, narbon bean.	Crop rotation (predictive soil test available).

In summary, the principle underlying any fungicide strategy on chickpea is a preventative strategy, and part of a fully integrated disease management plan. Chlorothalonil and mancozeb products best control ascochyta in chickpeas, but carbendazim and procymidone products are effective on botrytis grey mould, but not ascochyta. Check for the current registration or permit for these fungicides to be used in chickpeas.

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 (ie adjacent chickpea stubbles, early sown, close rotations), treat seed with P-Pickel-T ® for ascochyta protection, irrespective of variety.

With ascochyta resistant varieties (Genesis 508, Genesis 090), only consider applying an early foliar fungicide for ascochyta 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 have less fungicide applied for ascochyta control, the risk of Botrytis Grey Mould infection will arise in environments that favour that disease.

With ascochyta susceptible varieties (eg Howzat, Kaniva, Sonali, Rupali), regular foliar fungicide applications for ascochyta 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.

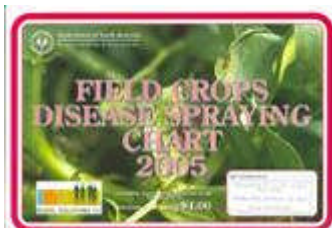


For information on 'Pulse seed treatment and foliar fungicides' [click here](#).

For the latest information on permits and registrations in pulses visit the Pulse Australia site at <http://www.pulseaus.com.au> or

<http://services.apvma.gov.au/PubcrisWebClient> (registrations)

<http://www.apvma.gov.au/permits/permits.shtml> (permits)



For south Australia, refer to latest *Field crops disease spraying chart*. Available for purchase from Rural Solutions SA Roseworthy Information Centre are: Freecall: 1800 356 446 www.ruralsolutions.sa.gov.au .

Viruses

For information on how to minimize viruses in pulses and control of their transmission by aphids and other vectors, [click here](#)

For more information on specific viruses, for Bean Leaf Roll Virus (BLRV) [click here](#) for more information. For Alfalfa Mosaic Virus (AMV), [click here](#) . For Cucumber Mosaic Virus (CMV), [click here](#) For Bean Yellow Mosaic Virus (BYMV), [click here](#)

PESTS

Establishment pests: Redlegged Earth Mite (*Halotydeus destructor*) and Blue Oat Mite (*Penthaleus major*).

Monitor young crops weekly. Inspect plants in 0.5 m of crop row at 10 different sites within the crop. Weather conditions affect mite activity. If weather is fine estimate the numbers per leaf, if cold and cloudy estimate the numbers per 100 cm² (10 cm x 10 cm) around the base of the plants. Repeat this at 10 sites within the crop. Mite damage is typically greater around the edge of paddocks, where there is higher pressure from mites invading from outside the paddock. An average of 50 mites per area warrants spraying.

Establishment pest: Lucerne Flea (*Sminthurus viridis*)

Lucerne Flea is an occasional problem. Look for small round holes in leaves. Estimate if control is needed by checking 10 plants at 5 sites. An average of 10 or more holes per leaf may warrant action.

Flowering and podding pests: Native Budworm (*Helicoverpa punctigera*)

Moths migrate into crops in spring. Females lay eggs on leaves, stems, flowers or pods. Young larvae are rarely seen on plants, but older larvae (more than 1 cm long) burrow into pods and feed on developing grain. Broad-leaf weeds, volunteer pasture and other legumes in the crop may harbour budworm larvae.

Use a sweep net to monitor for budworm. Take 10 sweeps and repeat at 5-10 sites across the paddock. Control is warranted if the following thresholds are exceeded:- kabuli type: 2-3 larvae per 10 sweeps; desi type: 5 per 10 sweeps. Delay spraying until the largest larvae are at least 1 cm long. Smaller larvae do not cause pod damage. Chickpea plants do not host damaging populations of budworm every season. For more information [click here](#).

For information on lesser budworm (*Heliothis punctifera*), [click here](#)

Flowering and podding pests: Lucerne Seed Web Moth (*Etiella behrii*)

The larvae bore into pods and mature there. Only when fully fed do they exit to pupate in the soil. The damage to seed occurs while they are protected from sprays.

Management involves controlling the moths before they lay eggs. The slender bodied moth has a distinct beak. The wings are grey with a white streak along the front and a yellow band near the base. The wingspan is 2 cm.



Guide to the key pests of Pulses [click here](#).



For south Australia, refer to latest *Insect spraying chart field crops and pastures*. Available for purchase from Rural Solutions SA Roseworthy Information Centre are: Freecall: 1800 356 446 www.ruralsolutions.sa.gov.au.

HARVESTING

Open or closed front machines are suitable. Some fingers may need to be removed from closed front machines

Crop height is from 15 to 60 cm with pods held up in the canopy. Direct heading without crop-lifters is possible with open-front and closed-front harvesting machines, although some fingers may need to be removed when using closed-front machines.

Timing

Harvest as soon as the crop is mature and moisture is below 14%. If moisture is too low there is a high risk of seed loss from shattering and seed cracking, particularly in kabuli types. Minimise seed loss due to pod drop or shatter and the late development of disease on pods and seed by harvesting as soon as it is ready. Drier seed, especially seed of kabuli types is liable to crack.

Desiccation

Chemical desiccation of chickpeas is sometimes necessary to ensure even maturity for harvest or to 'brown off' late weed infestations to improve the ease of harvest. To reduce yield and quality loss when desiccating it is best to apply desiccants when less than 15% of chickpea pods are green, a stage when 90-95% of seeds have reached physiological maturity, as indicated by the green seed colour beginning to lighten and the pod wall beginning to yellow.



'Windrowing and desiccation of pulses' GRDC Hi-Grain update 2003. [click here](#)

For further chickpea harvest information, [click here](#)

Harvester settings

Chickpeas thresh and crack easily, so reduce thresher speed (400 to 600 rpm) and open concave (18 to 25 mm). Remove alternate concave wires and blocking plates. Maximum wind settings and appropriate sieves. Concave clearances should be open and the drum speed reduced. If summer weeds are present, increase the drum speed to prevent weeds blocking the machine. Also turn off the rake at the back of the sieve to stop weeds entering the returns. Chickpeas are larger than cereals, alternate wires and blanking off plates on the concave need to be removed. Use maximum wind setting and barley sieves.

Handling and Storage

Chickpea seed is easily damaged by augers, particularly kabuli seed. Augers must be run full and at a slower speed than for cereals. Belt shifters are recommended.

Chickpeas can be stored in sheds, bunkers and silos. They are not a host for pea weevil so a sealed storage is not needed.

MARKETING

Chickpeas are exported for human consumption and there are specific markets for the different types. Desi chickpeas are mostly milled to remove the seed coat and produce dhal (split seed). The trade prefers the larger, lighter coloured desi chickpeas. The grain is exported as farmer dressed grades in bulk, or else in containers after local cleaning or splitting.

Export markets also exist for whole kabuli chickpeas, but currently only limited quantities are sold overseas. The larger kabuli sizes are preferred (greater than 10 mm diameter), attracting substantial premiums. Kabuli chickpeas are sold direct to processors for grading and packaging.

Both types of chickpeas can be used as stockfeed, but the premium prices usually paid by the human food market make this the most desirable sales outlet.

Australia , after Turkey is the world's second largest exporter of chickpeas. The main importers are India , Pakistan , Bangladesh and Sri Lanka . Chickpea prices tend to be volatile due to only 3% of world production being exported.

Receival standards

The national receival standards for chickpea are set by Pulse Australia and are used in South Australia by receival agents (Table 4). The standards are reviewed annually, and seed quality as required by the market is the critical focus. Emphasis is on minimal cracking and insect damage, along with minimal discoloured seed and ascochyta lesions on seed.

See pulse receival and export standards at www.pulseaus.com.au/standards/

Australian chickpea receival standards.

	Maximum moisture content (%)	Minimum purity (%)	Maximum defective plus poor colour (%)	Screen size for defective (mm)	Poor colour maximum (%)	Foreign material maximum in total (%)
Desi receival standard	14	97	6	3.95 slotted	2 (but 1% ascochyta)	3
Kabuli receival standard	14	97	3	6.00 round	2 (but 1% ascochyta)	3
	Unmillable material maximum	Snail maximum	Insect maximum	Nominated weed seed maximums (maximums for each type)		
Desi receival standard	0.5 (0.3% soil)	1 per 200g	15 per 200g	See footnote for weeds and amounts allowable		
Kabuli receival standard	0.5 (0.3% soil)	2 per 400g	30 per 400g	See footnote for weeds and amounts allowable		

Definitions:

Defective grains: includes max 2% field peas (in desi), 2% poor coloured grains, broken, damaged and split, shrivelled, distorted, grub eaten, sprouted and affected by field mould.

Poor colour: if cotyledon is distinctly blemished and/or off colour from the characteristic yellow colour of the predominate class, including the 1% visible ascochyta.

Foreign material: includes unmillable material and all foreign vegetable matter (includes cereals, Wild Oats, oilseeds, other legumes and weed seeds not otherwise specified).

Unmillable material: includes soil, stones, metal and non-vegetable matter .

Nominated foreign weed examples:

Type 1 (4 per 200g): three -cornered jack

Type 2: (nil per 200g): wild garlic, coriander and any other tainting agents.

Type 3a (1 per 200g in total): Bathurst burr, caltrop.

Type 3b (2 per 200g total): vetches (tares).

Type 3c (4 per 200g total): heliotrope.

Type 4a (10 per 200g total): cut leaf mignonette, melilotus (if no taint) nightshades, skeleton weed, variegated thistle,.

Type 5 (20 per 200g in total): knapweed, salvation jane

Type 6 (5 seeds/5 pods total per 200g) medic pods, marshmallow pods, saffron thistle, wild radish pods

Type 7a (10 seeds per 200g total): other pulses.

Type 7b (10 seeds per 200g total): cereals, turnip weed, bindweed.

Type 7c (1 seed in total per 200g): safflower, sunflower.

Type 8 (100 seeds per 200g): bellvine.

Small foreign seeds (0.6% by weight): amsinkia, canola, charlock, marshmallow seeds, hedge mustard, etc.

FURTHER INFORMATION

Grain Legume Handbook and its 2006 updates. (The Grain Legume Handbook Committee)



Carter J (1999) *Chickpea Growers Guide: A Guide to the Production of Chickpeas* (Agriculture Victoria - Horsham)

Topcrop Chickpea Paddock recording card [click here](#)

To identify early growth stages in pulses, [click here](#)



Pulse & Canola - Frost Identification: The back pocket guide (Bulletin 4401) (TOPCROP Australia, Grains Research and Development Corporation) some local DPI offices and Ground Cover Direct Free phone 1800110044 fax 1800009988.



Wurst M. et al (2002) *Winter Pulse Disorders: The ute guide* (Primary Industries and Resources SA) For sale through some local DPI offices and Ground Cover Direct Free phone 1800110044 fax 1800009988.

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