Department of Primary Industries
and Regional Development

Managing diseases of chickpea 2025

Key points

- Understand your disease risk for each paddock – is it high or low? Can you control the disease in-crop?
- Eliminate volunteer chickpea plants over summer/autumn. Control of the 'green bridge' is very important especially to reduce aphid numbers that can transmit virus (Figure 1).
- Practice good on-farm hygiene to reduce disease sources and prevent spread between paddocks.
- Avoid planting chickpea into poorly drained paddocks and those prone to waterlogging.
- Avoid planting chickpea in the same paddock for at least 4 years or next to the previous year's chickpea stubble.
- If you can see intact chickpea stubble assume disease pathogens are viable.
- Choose your variety with care – variety choice remains the main management tool for chickpea diseases and root lesion nematodes (RLN).
- Know the latest disease ratings of your varieties.
  See NVT Disease Ratings | NVT (grdc.com.au)
- Test seed for pathogen presence, germination and vigour.
- Test soil for pathogen levels. Predicta® B tests for a number of chickpea pathogens, as well as RLN's. See PredictaB DNA Soilborne disease tests –northern region | SARDI.
- Treat all planting seed with a registered fungicide whether you have seen disease in your district or not.
- Know which fungicides are currently registered for use in chickpea, the safe use instructions, and availability. Ensure you have requirements covered.
- Ensure you have adequate resources to manage the logistics around fungicide applications (i.e. equipment, fungicides and labour) prior to rainfall.
- Monitor the crop for disease symptoms 7 to 14 days after each rainfall event.

Figure 1 Healthy chickpeas established inter-row of tall cereal stubble.

The 2024 chickpea crop

In 2024 the area of chickpea sown increased dramatically from 150,000 ha to 550,000 ha. This area will likely continue to rise if market access is maintained.

The NSW DPIRD team conducted random disease sampling in northern NSW (Narromine to Moree) on the 2024 crop. Predicta® B testing was used with 60% of samples showing *Phytophthora medicaginis* DNA and 25% of these samples at high levels. Some paddocks around Moree had up to 30% yield losses due to phytophthora root rot (PRR).

For the latest chickpea sowing information and more, head to the Winter Crop Sowing Guide 2024 | NSW DPIRD (nsw.gov.au)

The results showed elevated phytophthora pathogen inoculum levels following the 2024 wet winter and spring. These elevated 2024 levels present a high risk of phytophthora inoculum carry over to future chickpea crops in these paddocks.

Table 1 Chickpea diseases and their pathology.

Disease	Pathogen	Survival	Spread	Infection by	Ideal climatic conditions	Control options
Ascochyta blight	*Phoma rabiei* (formerly *Ascochyta rabiei*)	• Seed • Stubble • Volunteer chickpea plants	• Seed • Stubble • Water splashed spores	• Water splashed spores	• Develop from 5–30 °C • Quickest: 15–25 °C	• Control green bridge. • Crop rotation • Varietal choice • Clean seed • Seed dressings • In-crop fungicides
Botrytis grey mould	*Botrytis cinerea*	• Seed • Stubble • Sclerotia • Alternative hosts	• Stubble • Seed • Soil • Airborne spores	• Airborne spores	• Most active when >15 °C • Ideal 20–25 °C • Humidity in-crop >95%	• Crop rotation • Delay sowing to avoid large, bulky crops • Wider row spacings • In-crop preventative fungicides, once before and once after canopy closure
Botrytis seedling disease	*Botrytis cinerea*	• Seed	• Seed	• Seed	• Can occur at all temperatures	• Clean seed • Fungicide seed dressings
Phytophthora root rot	*Phytophthora medicaginis*	• Oospores • Alternative hosts	• Soil • Surface water	• Mycelia • Waterborne spores	• Occurs at all temperatures • More severe under high rainfall conditions with flooded soil	• Avoid paddocks prone to waterlogging or low-lying areas • Control the 'green bridge', including alternative hosts (i.e. medics) and volunteer chickpea plants • Crop rotation • Varietal choice
Sclerotinia	*Sclerotinia* spp.	• As sclerotia in seed, stubble, soil • Alternative hosts	• As sclerotia in seed, stubble, soil • Airborne spores	• Airborne spores or direct infection of base of stem	• Cool, damp	• Crop rotation • Seed free of sclerotia • Delay sowing to avoid large, bulky crops
Root lesion nematodes	*Pratylenchus thornei* and *P. neglectus*	• Soil	• Soil • Water	• Contact with soil where RLN present	• Optimum soil temperature 20–25 °C	• Grow tolerant crop varieties • Crop rotation
Viruses	Numerous	• Seed • Insects	• Insect vectors • Seed	• Insect vectors • Seed	• Aphid vectors are more mobile in late spring when temperature 18–26 °C	• Control green bridge • Sow inter-row into standing cereal stubble • Minimise aphid numbers

Ascochyta blight (AB)

The fungus that causes AB is *Phoma rabiei* (formerly *Ascochyta rabiei*) and persists on chickpea seed, stubble and volunteers, with chickpea the only known host. Ascochyta is spread within a paddock and regionally by water splash or movement of infected chickpea residue but does not survive in soil. The fungus can be viable for several years on chickpea stubble that has not broken down.

Symptoms become visible in 4–5 days as a pale green/yellow discolouration on leaves, often referred to as 'ghosting' (Figure 2). Toward the centre of the lesion, small, black fruiting bodies called pycnidia develop in 7–10 days, often in concentric rings (Figure 3). Spores ooze out of pycnidia and are spread by rain-splash upwards within the plant and sideways to nearby healthy plants. Lesions often girdle the stems of the plant (Figure 4, left), causing them to weaken and break off, making later detection difficult.

'Hot spots' can appear in crops but by this stage considerable damage has occurred.

A more aggressive, southern AB isolate was first observed in Victoria in 2015 and has been found further north in recent years. This has resulted in the decreased varietal resistance in many varieties, as reflected in the NVT Disease Ratings tables with a separate column for the 2 regional areas.

Figure 2 Ghosting in chickpeas

Ideal climatic conditions

The disease can develop over a wide range of temperatures (5–30 °C) and infection can occur after only 6 hours of leaf wetness. Light rain showers can result in infection and spread the disease.

More virulant isolates of AB were found in 2022. Monitor crops early. Assume MS rating at best for commercial desi varieties.

Ascochyta develops quickest when temperatures are 15–25 °C and humidity is high. The longer the leaf wetness period and higher the humidity the more widespread and severe the infection.

Under ideal conditions foliar symptoms are apparent in 4–5 days after rainfall and the disease becomes reproductive within 7–14 days in very susceptible varieties.

Early seedling AB infection has the greatest effect on seasonal disease severity.

Figure 3 Ascochyta blight early infection on leaves.

Figure 4 Ascochyta blight lesions circling the stem (left) and on pods (right).

Control options

- Variety choice remains the best management tool against AB yield loss.
- All planting seed should be treated with a registered seed fungicide (Figure 5), irrespective of seed age and origin, to control seed-borne AB (internal and external), seed-borne botrytis seedling disease (BSD) and other seedling diseases.

Figure 5 Effective application of P Pickel T® seed fungicide (left) compared with inadequate application (right).

- Research has shown that seed fungicide treatment products containing only thiram (e.g., Thiram® 600) are equally effective against AB as P-Pickel T® (thiram plus thiabendazole). Follow label directions and ensure good seed coverage.
- Begin monitoring as soon as the crop is out of the ground. A preventative fungicide before the first rainfall event post emergence is highly recommended in high risk situations. After this application, monitor for AB post rainfall and apply a fungicide before the next rainfall event if AB is detected in the paddock or adjacent paddock.
- Continue to monitor crops throughout the growing season. Look for signs of disease development, e.g. spreading leaf lesions and patches within crops.
- Preventative fungicide applications prior to rain events are the most reliable and cost effective management option once AB is present in the crop. They provide excellent protection when applied before rain. They have little systemic activity, so new growth will not be protected.
- The newer fungicides have some curative activity. They do not have better preventative activity than older chemistry.
- Curative fungicides should be used as a last resort and must be applied within 48 hours of a rainfall event.
- Curative fungicide applications for seedling infection in susceptible varieties is insufficient to prevent yield loss from further AB development throughout the season.
- A preventative fungicide during podding reduces the risk of AB on pods (Figure 4, right), which can cause seed abortion, seed infection and seed defects. Pod infection risk depends on weather forecasts and disease levels in the crop. If the disease is not present in the crop and the forecast is dry application is not necessary.

Newer fungicide chemistry does not have any better preventive activity than the older, cheaper products

- Consider the logistics (i.e., spray rig capacity, labour resources) of multiple fungicide applications prior to rainfall events when selecting paddocks to be sown to chickpea, remembering ground-rig application is preferred over aerial application.

Recent research and more information

- Ascochyta isolates from 2022 evaluations identified isolates from northern NSW and the Darling Downs in Queensland that were more aggressive than previous isolates from these regions. The distribution and prevalence of these aggressive isolates is currently unknown. Growers need to increase crop monitoring intensity to ensure early AB infections are detected.
- Research conducted by NSW DPIRD in 2021 at Trangie identified gross margin losses of $300/ha in Kyabra$^{\phi}$ (VS) compared to gains of up to $1000/ha in PBA Seamer$^{\phi}$ (MS) when no fungicide was applied and AB was present, compared to a strategic fungicide program.
- Research conducted by NSW DPIRD at Wagga Wagga demonstrated that early foliar fungicide applications are highly effective at managing AB outbreaks, rather than allowing the disease to persist later into the season.
- Research conducted by AgVic in 2020 at Dooen found inter-row sowing chickpea into standing cereal stubble resulted in 31% yield loss due to AB compared to 55% in slashed cereal stubble. Ascochyta spread was often confined to the row, with adjacent rows remaining disease free. See Pulse disease research update. GRDC Update paper Feb 2021.

Managing ascochyta blight in chickpeas in 2021, Penny Heuston and Kevin Moore, NSW DPIRD 2021.

The impact of Ascochyta on chickpea yield and economics when infection occurs at three different growth stages, Hayley Wilson, Leigh Jenkins, Steven Harden and Kevin Moore, GRDC Update paper 2022.

Impact and timely control of ascochyta blight of chickpea, Kurt Lindbeck and Kevin Moore, GRDC Update paper 2022.

Botrytis

The Botrytis pathogen is found everywhere, with a host range >70 plant families. *Botrytis cinerea* causes both botrytis grey mould (BGM) and botrytis seedling disease (BSD). The fungus will digest live tissue then continue to grow on the dead tissue, including minimally affected crops, such as sorghum and cotton. The primary source of inoculum is stubble

carry over and it can also survive as sclerotia in the soil leading to direct infection of plants or the production of airborne spores.

Despite being caused by the same fungus, visual symptoms of BGM and BSD and control are different.

Botrytis seedling disease is seed borne only, spread by planting infected seed. Botrytis seedling disease can occur at any temperature and in any location. It does not need the wet, humid conditions that favour BGM.

Correct and effective seed treatment provides 100% control of BSD.

Botrytis grey mould is caused by infection from airborne spores. Symptoms include fluffy, grey lesions with grape-like clusters of white spores 5–7 days after infection in ideal conditions (Figure 6). Often the first symptom of BGM infection in a crop is drooping of the terminal branches. Fluffy sporulating fungal growth will often occur first under the canopy.

When plant death is obvious in the upper canopy, disease control with foliar fungicides is too late.

Figure 6 Fluffy fungal growth of Botrytis grey mould on a chickpea pod and stem.

Figure 7 Botrytis grey mould affected chickpea seed that would be downgraded and not suitable as planting seed.

Despite being caused by the same fungus, visual symptoms of BGM and BSD and control are different.

Ideal climatic conditions

Botrytis grey mould is most active with temperatures >15 °C, with an optimal range 20–25 °C. It likes dense crop canopies and warm, humid weather. The spores can be blown many kilometers and if deposited on chickpea plants, can remain dormant until conditions favour fungal activation.

Control options

- Botrytis seedling disease is readily controlled with fungicide seed dressings, as long as the seed is treated correctly with good coverage.
- Seed treatment is ineffective against BGM.
- Sow chickpea away from paddocks where BGM was a problem the previous year, be this chickpea or other broadleaf, BGM host crops.
- In BGM favourable seasons, a preventative fungicide application just before canopy closure with a follow-up spray 2 weeks later may reduce disease development.
- None of the fungicides currently registered for BGM will eradicate established infections. A number of fungicides registered for AB control are not registered for BGM.
- Consider later sowings to reduce biomass – dense canopies favour BGM development.
- Plant on wide rows (66 cm or greater) to improve airflow through the crop leading to more rapid drying after rain or dew.

More information

Managing Botrytis in chickpeas in 2021, Kevin Moore, NSW DPIRD 2021.

Phytophthora root rot (PRR)

Phytophthora medicaginis is a soil borne disease. Infection can occur at any growth stage, causing: pre- and post-emergence damping off (Figure 8), loss of lower leaves, and yellowing, wilting and death of older plants (Figure 9). Symptom development is sometimes delayed if temperatures are cool and the soil is moist.

The pathogen is spread by movement of infected soil and water. The disease survives as oospores in the soil. When the soil is saturated, the oospores germinate to produce mycelia and motile zoospores which can swim to host root systems. This results in multiple infection points causing severe disease. The pathogen can survive in the soil for up to 10 years at low numbers. Crop rotations to non-host species such as cereals is still important to reduce PRR risk.

Figure 8 Phytophthora root rot damage to chickpea seedlings. Photo: Pulse Australia.

Figure 9 Chickpea crop at Croppa Creek where more than 40% of paddock was lost to PRR.

Ideal climatic conditions

PRR can cause significant yield losses in wetter than normal seasons or following periods of waterlogging.

Control options

- The most effective control strategy is to avoid sowing chickpea in high-risk paddocks, those with a history of:
  - previous chickpea or lucerne crops that were infected with PRR
  - lucerne or medics
  - poor drainage, waterlogging or prone to flooding.
- Know the disease levels in your paddock. Use PreDicta® B tests for *Phytophthora medicaginis* populations. The pathogen has the ability to multiply rapidly. Detection of the pathogen means there is a high risk of developing PRR under favourable conditions. However, no detection of the pathogen may still result in PRR development in highly conducive conditions due to the explosive nature of the pathogen.
- Grow a variety with a high level of resistance. Do not plant very susceptible (VS) or susceptible–very susceptible (S–VS) rated varieties into paddocks with a risk of PRR.
- Metalaxyl-based seed dressings offer some control but only provide 6–8 weeks protection after sowing.
- Once a plant or crop is infected with PRR, there is no in-crop control options.

The PRR yield loss tool

A decision making tool to estimate yield and associated income losses due to PRR in your chickpea crop. Access at: Phytophthora root rot yield loss tool | NSW DPI (nsw.gov.au)

Recent research and more information

Research by NSW DPIRD into PRR and waterlogging has shown:

- although moderate field resistance is available in some varieties such as PBA HatTrick$^{\phi}$ and PBA Seamer$^{\phi}$ (S resistance rating), substantial yield losses (up to 70%) can still occur under conditions highly favourable to PRR development
- chickpea varieties such as PBA HatTrick$^{\phi}$ are more affected by waterlogging at the late vegetative growth stage (83% yield loss) than waterlogging at an early vegetative growth stage (26% yield loss).

PRR yield loss tool

The reproduction and spread of PRR is highly dependent on soil moisture and seasonal rainfall. Yield loss is strongly related to these factors, and this information has been used to develop a tool to estimate in-crop PRR yield loss from rainfall to assist with key management decisions: Phytophthora root rot yield loss tool | NSW DPIRD (nsw.gov.au)

Phytophthora root rot management in chickpeas | NSW DPIRD (nsw.gov.au)

Phytophthora root rot and waterlogging in chickpeas – minimising risk and management options, Nicole Dron, Merrill Ryan, Clayton Forknall, Kristy Hobson, Tim Sutton, Sean Bithell, GRDC Update paper 2022.

Sclerotinia

Sclerotinia diseases of chickpea is caused by three species *Sclerotinia sclerotiorum*, *S. minor* and *S. trifoliorum*. The most common of these being *S. sclerotiorum*. The disease is seed, soil and air borne and can survive in soil as sclerotes for many years (8–10 years) without susceptible host plants. Canola, other broadleaf crops and many pasture species are hosts. Chickpeas are highly susceptible to the disease.

Symptoms of stem rot appear in crops from mid-vegetation onwards. At first, water-soaked lesions appear on the stems and leaves. Later affected areas develop a soft, slimy rot which exudes droplets of brown liquid. The infected tissue dries out and becomes covered with fine, white fungal growth.

Small black, irregular spots may sometimes be seen just below the surface. These stem lesions turn grey and the branch above the lesion dies. Affected plants wilt and die rapidly, without losing their leaves. Late infection can affect the pod and seeds. Infected seeds are smaller than normal and discoloured.

Figure 10 Sclerotinia basal infection (circled).

In dense crops, during moist conditions, a white cottony fungal growth develops around the base of plants (Figure 10). Sclerotia can germinate to produce small golf-tee like structures (apothecia) at ground level which can release airborne ascospores infecting plant parts higher in the canopy. Basal infections can also occur, where sclerotes germinate in soil and directly infect chickpea plants with mycelium. Survival structures of the fungus (sclerotes) need to be present for the disease to develop.

Ideal climatic conditions

The disease is favoured by cool, moist weather. Once established, the fungus can move rapidly to neighbouring healthy, tissue.

Control options

- Know the disease levels in your paddock, sclerotinia tends to develop in those districts with a recent history of the disease and a high frequency of broadleaf crops in the rotation.
- Use disease free seed.
- Crop rotation: use a cereal as a 'break crop'. Do not plant chickpea after a canola crop.
- Follow the recommended sowing rates and dates for your district. Don't be tempted to sow early, which can result in bulkier crop canopies which favour disease development.
- Plant on wider rows (66 cm or greater) to improve airflow through the crop leading to more rapid drying after rain or dew.

Chickpeas are highly susceptible to sclerotinia.

Root lesion nematodes (RLN)

Root-lesion nematodes are microscopic, worm like organisms that extract nutrients from plant roots. Roots are damaged as RLN feed and reproduce inside them. *Pratylenchus thornei* and *P. neglectus* are the most common RLN species in Australia, with *P. thornei* the most common species in northern NSW. They attack both cereals and pulses.

Severely affected plants are stunted and may have some yellowing but often have no obvious foliar symptoms.

Roots are generally shorter with fewer root hairs.

Chickpea varieties differ in their resistance and tolerance to RLN. Generally, they are considered more susceptible than field pea, faba bean and lupin.

Ideal climatic conditions

Optimum soil temperature for the proliferation of RLN is in the range of 20–25 °C.

Control options

- Know the RLN levels in your paddock via a Predicta® B test.
- Reduce losses by not sowing chickpea in paddocks that had susceptible or intolerant cereal varieties the previous season.
- Rotate with resistant crops to keep RLN levels low.
- Maintain a robust fertiliser program.
- Ensure that farm machinery is free of soil when moving between paddocks, especially if it has RLN.
- Reduce water run-off and erosion from contaminated fields.

Recent research

Recent research by NSW DPIRD into RLN has shown:

- a double break of 40 months free of host plants is needed to reduce numbers to a minimum threshold (2/g soil). Even a starting population of 10/g soil still requires a break of 30 months.

Viruses

There are more than 14 species of virus that infect chickpea, with the main ones of concern being *Turnip yellow virus* complex (TuYV, formerly known as *Beet western yellows virus*), *Alfalfa mosaic virus* (AMV) and *Cucumber mosaic virus* (CMV).

Most pulse viruses require an insect vector, mostly aphids, for plant transmission. There are a small number of viruses that are seed borne. Viruses are generally non host crop specific. The presence of volunteer pulses and some weeds provide a green bridge for transmission of viruses between cropping seasons as they offer the aphids a refuge. Viruses do not survive in stubble or soil as they need a living host to survive.

Symptoms include bunching, reddening (Figure 11), yellowing, death of shoot tips and early death of whole plants. Often plants affected are scattered throughout the crop.

Figure 11 Virus can cause reddening of leaves and stems.

Control options

- Curative control of viruses is not possible.
- Virus control strategies are all based on preventing infection, particularly during the crop's early growth stages.
- Legume plants within or near crops should be controlled before the crop emerges.
- Where possible avoid sowing chickpea close to perennial pasture (e.g., lucerne) or other crops that host viruses.
- Minimise the number of incoming virus vectors (aphids).
- Grow varieties with increased resistance.
- Sow crops inter-row into standing cereal stubble to deter aphid feeding.
- Establish and maintain a uniform, healthy plant stand using seed with good vigour. Aphids love to attack weak plants and crops where the plant stand is not uniform.

More information

Managing viruses in pulse crops in 2021 | NSW DPI (nsw.gov.au)

Aphid management in pulse crops | NSW DPI (nsw.gov.au)

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