

Managing diseases in chickpeas in 2022

Key points

- Understand your disease risk for each paddock – is it high or low? Can you control that disease in-crop?
- Eliminate volunteer chickpea plants over summer/autumn. Control of the 'green bridge' is very important.
- Practice good on-farm hygiene to reduce disease sources and prevent their spread.
- Choose your variety with care – variety choice remains a critical tactic for managing diseases and root lesion nematodes (RLN).
- Know the latest disease ratings of your varieties. See [NSW Winter crop variety sowing guide 2022](#)
- Test all seed for the presence of disease, germination and vigour.
- Avoid planting chickpeas in the same paddock for at least four years or next to the previous year's chickpea stubble.
- If you can see intact chickpea stubble assume disease pathogens are viable.
- Avoid planting chickpeas into poorly drained paddocks and those prone to waterlogging.
- Test your soil for pathogens. Predicta® B has a number of new "tests under evaluation" for Ascochyta blight, phytophthora, sclerotinia, as well as root lesion nematode. 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.
- Secure your fungicides early – they are likely to be in short supply.
- Monitor the crop for disease symptoms 7 to 14 days after each rainfall event.



Challenges for 2022

- Unknown paddock health:** In many areas the 2021 season ended with flooding and localised water movement. Phytophthora root rot and RLN move in both soil and surface water. They may be in paddocks where they have not been seen before. The movement of stubble with floodwaters also spreads the disease.
- Chickpea volunteers and the 'green bridge':** Wet summer conditions have been challenging for timely

fallow spraying, increasing the likelihood of chickpea volunteers being present. These plants offer a 'green bridge' for some diseases and act as a refuge for insects, such as aphids, that spread viruses.

- Poor seed quality:** The wet harvest of 2021 may have reduced seed germination and/or vigour. Quality planting seed will be limited. Test before purchase and planting.

Table 1: Chickpea diseases and their pathology.

Disease	Pathogen	Survival	Spread	Infection by	Ideal climatic conditions	Control options
Ascochyta blight	<i>Phoma rabiei</i> (formerly <i>Ascochyta rabiei</i>)	Seed Stubble Volunteer chickpeas	Seed Stubble Water splashed spores	Water splashed spores	Develop from 5–30 °C Quickest: 15–25 °C	Control 'green bridge' Crop rotation Varietal choice Seed dressings In-crop fungicides
Botrytis grey mould	<i>Botrytis cinerea</i>	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	<i>Botrytis cinerea</i>	Seed	Seed	Seed	Can occur at all temperatures	Fungicide seed dressings
Phytophthora root rot	<i>Phytophthora medicaginis</i>	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 chickpeas Crop rotation Varietal choice
Sclerotinia stem rot	<i>Sclerotinia sclerotiorum</i>	Seed Soil Alternative hosts	Soil Water Airborne spores	Airborne spores or directly into crowns	Cool, damp	Crop rotation Delay sowing to avoid large, bulky crops
Root lesion nematodes	<i>Pratylenchus thornei</i> and <i>P. neglectus</i>	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 temperatures are warmer (18–26 °C)	Control 'green bridge' Sow crops into standing stubble Minimise aphid numbers

Ascochyta blight (AB)

Ascochyta blight (*Phoma rabiei* formerly *Ascochyta rabiei*) is a fungus that persists on chickpea seed, stubble and volunteers, with chickpea the only known host. AB is spread within a paddock and regionally by water splash or water movement but does not survive in soil. Under ideal conditions symptoms are apparent in 4–5 days after rainfall and the disease becomes reproductive within 7–14 days in very susceptible varieties.

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.

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

Early seedling AB infection has the greatest impact on disease severity.



Ascochyta blight: early infection on leaves.

Control options

- Variety choice remains the best management tool against yield loss from AB.
- Know the disease levels in your paddock and region and where the disease was in the previous season. Predicta® B has started testing for a number of new diseases. This testing is still under evaluation but includes AB.
- All planting seed should be treated with a registered seed fungicide, irrespective of seed age and origin, to control seed-borne AB (internal and external),

seed-borne botrytis seedling disease (BSD) and other seedling diseases.

- Begin monitoring as soon as the crop is out of the ground. In a high-risk year, such as 2022, a preventative fungicide before the first rainfall event post emergence is highly recommended. After this application, monitor for AB post rainfall and apply a fungicide before the next rainfall event if AB is detected.
- Continue to monitor crops throughout the growing season. Look for signs of disease development, e.g. spreading leaf lesions and patches within crops.
- Preventative fungicides are the most reliable and cost effective. They provide excellent protection when applied before rain. They have little systemic activity, so new growth will not be protected.
- The new fungicides have some salvage activity. They do not have better preventative activity than older chemistry.
- Salvage fungicides should be used as a last resort and must be applied within 48 hours of the rainfall event.
- Salvage application of fungicide for seedling infection in susceptible varieties is insufficient to prevent yield loss.
- A preventative fungicide during podding reduces the risk of AB on pods, which can cause seed abortion, seed infection and seed defects. It will depend on weather forecasts and disease levels in the crop. If the disease is not present in the crop and the forecast is dry it may not be necessary.
- Consider the logistics (i.e., spray rig capacity, labour resources) of multiple fungicide applications when selecting paddocks to be sown to chickpea, remembering ground-rig application is preferred.



Ascochyta blight: pod lesions can cause seed abortion, infection and defects, resulting in germination and grain quality issues.



Ascochyta: stem lesions.

Recent research and more information

- Recent research conducted by NSW DPI at Trangie identified gross margin losses of \$300/ha in Kyabra[®], compared to gains of up to \$1000 in PBA Seamer[®], when no fungicide applied and AB present compared to a strategic fungicide program.
- Research conducted by NSW DPI 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.

[Managing ascochyta blight in chickpeas in 2021](#)

Penny Heuston and Kevin Moore, NSW DPI 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 grey mould (BGM, BSD)

Botrytis is ubiquitous in the environment with a host range in excess of 70 plant families. Botrytis 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.

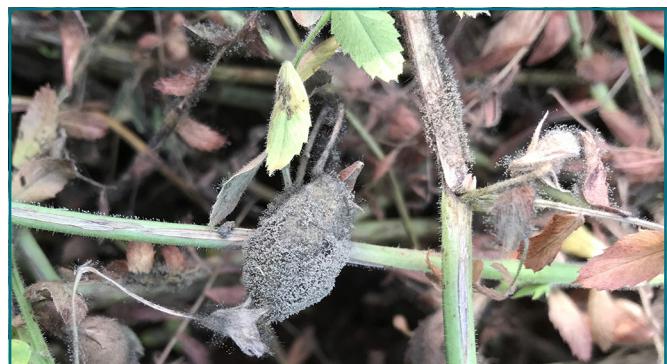
Botrytis cinerea causes both botrytis grey mould (BGM) and botrytis seedling disease (BSD). Visual symptoms and control of the two forms of the disease are different.

Botrytis seedling disease is a seed borne only, spread by planting infected seed. BSD 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 infection is caused by airborne spores. Symptoms include fluffy, grey lesions with grape-like clusters of white spores 5–7 days after infection in ideal conditions. 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 fungicides is too late.



Botrytis grey mould: fluffy fungal growth on a chickpea pod.

Ideal climatic conditions

BGM 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

- BSD is readily controlled with fungicide seed dressing, as long as the seed is treated correctly with good coverage.
- Seed treatment is ineffective against BGM.
- Sow chickpeas as far away from paddocks where BGM was a problem the previous year, be this chickpea or other broadleaf crops that host BGM.
- In seasons favourable to BGM 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 as this will reduce biomass – dense canopies favour BGM development.
- Plant on wider 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 DPI 2021.

Phytophthora root rot (PRR)

Phytophthora medicaginis is a soil borne disease. Infection can occur at any growth stage, causing: seed decay; pre- and post-emergence damping off; loss of lower leaves; yellowing, wilting and death of older plants. Symptoms are 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. When the soil is saturated the oospores germinate to produce mycelia and zoospores which can swim to hosts. This results in multiple infection points causing severe disease. The disease can survive in the soil for up to 10 years.



Phytophthora root rot: causing death of chickpea plants.

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 chickpeas 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 PRR means there is a high risk of developing the disease under favourable conditions.
- Grow a variety with a high level of resistance. Do not plant very susceptible (VS) or susceptible–very susceptible (S–VS) rated varieties.
- 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.

Recent research and more information

Research by NSW DPI into PRR and waterlogging has shown:

- Although moderate field resistance is available in some varieties such as PBA HatTrick[®] and PBA Seamer[®] (S resistance rating), substantial yield losses (up to 70%) can still occur under conditions highly favourable to disease development.
- Chickpeas such as PBA HatTrick[®] 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).

[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 stem and crown rot of chickpea is caused by three species *S. 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 for many years (up to 12) without susceptible host plants. Canola, other broadleaf crops and many pasture species are hosts.

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.



Sclerotinia: basal infection (circled).

In dense crops, during moist conditions, a white cottony fungal weft develops around the base of plants. Sclerotinia 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. 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. Predicta® B has a number of new "tests under evaluation", including sclerotinia.
- Use disease free seed.
- Crop rotation: use a cereal as a 'break crop'. Do not plant chickpeas after a canola crop.
- Consider later sowing, as this will reduce biomass – dense canopies favour sclerotinia development.
- Plant on wider rows (66 cm or greater) to improve airflow through the crop leading to more rapid drying after rain or dew.

Root lesion nematodes (RLN)

Root-lesion nematodes are microscopic, worm like animals 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 disease 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 fertilizer program.
- Ensure that farm machinery is free of soil when moving between paddocks, especially if it has RLN.
- Lessen water run-off and erosion from contaminated fields.

Recent research

Recent research by NSW DPI 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 not 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.

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

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 chickpeas close to perennial pastures (e.g., lucerne) or other crops that host viruses.
- Minimise the number of incoming virus vectors (aphids).
- Grow varieties with increased resistance.

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- Sow crops into standing stubble to deter aphids.
- 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](#), Joop van Leur, NSW DPI 2021.

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