

## 2011 Chickpea Disease Management Considerations for Northern Growers and Agronomists.

Kevin Moore<sup>1</sup>, Mal Ryley<sup>2</sup>, Gordon Cumming<sup>3</sup>, Leigh Jenkins<sup>1</sup>

<sup>1</sup> Industry & Investment NSW, <sup>2</sup> Department of Employment, Economic Development and Innovation, <sup>3</sup> Pulse Australia.

### The threat from seed-borne, foliar and root diseases is higher than it has ever been.

For chickpeas in 2011, only grow varieties with an Ascochyta rating as good as or better than PBA HatTrick<sup>®</sup> (R/MR), and a Phytophthora rating as good as or better than Jimbour (MS/MR). (refer to Table 1, page 5).

Follow the current Best Management Packages as outlined in this and other Bulletins, be vigilant and prepared to take appropriate in crop management actions in accordance with seasonal conditions.

### Will diseases be a concern in 2011 chickpea crops?

This can be assessed using the three elements of the Disease Triangle:

- A pathogen with abundant inoculums.
- A susceptible host.
- An environment favourable for infection and disease development.

The 2010 chickpea season in the northern GRDC region was the worst on record for diseases, excessive vegetative growth, reduced pod set, waterlogging, lodging, shot and sprung grain, weather damage and harvest problems.

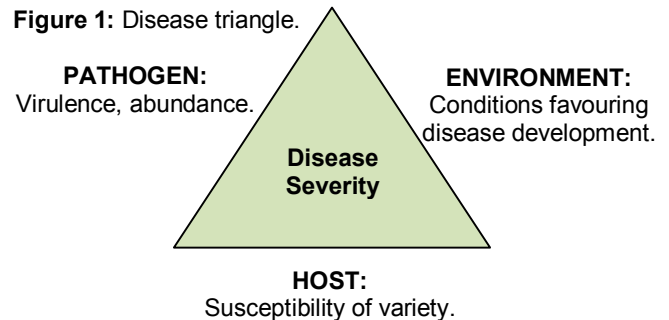
Unfortunately, 2010 not only favoured diseases caused by ascochyta, sclerotinia, phytophthora, botrytis and nematodes, it also favoured large increases of inoculum of those pathogens. Further, surface water flow and flooding have since spread that inoculum across large areas of the cropping belt. Thus we enter the 2011 season with one component of the disease triangle already in place.

The second component, a susceptible host is also in place for sclerotinia and botrytis because no current variety has any useful resistance to either of these pathogens. It is also more or less in place for phytophthora, because whilst PBA HatTrick<sup>®</sup>, Yorker<sup>®</sup> and Jimbour have some resistance to phytophthora, under high disease pressure (high inoculum, favourable conditions), they will be killed.

This leaves ascochyta and here we have good news. In most cases, PBA HatTrick<sup>®</sup> and the Genesis<sup>™</sup> lines handled the 2010 ascochyta pressure well. All other varieties should be considered susceptible to ascochyta for the coming season.

So, will diseases be a concern in 2011 chickpea crops? If conditions favour infection, the answer is an unreserved YES.

Figure 1: Disease triangle.



### Community diseases

Some chickpea diseases like ascochyta are community diseases in that what happens in the paddock next door or even several kilometres away can impact on your crop.

As such, these diseases should be managed at the community level.

**For example:** you are following the ascochyta management recommendations and have delayed or suppressed early season disease. However, someone nearby (especially upwind) has not followed the recommendations and has allowed ascochyta to get a hold of their crop early in the season?

This puts your crop under extra disease pressure and in a season that favours ascochyta may render difficult or impracticable its management on susceptible varieties.

It's not just susceptible varieties. 2010 showed that growing varieties with improved ascochyta resistance close to susceptible varieties, made disease management in those "resistant" varieties challenging.

As mentioned before, there is already plenty of inoculum waiting to infect your young 2011 chickpea crops – communities that work together will have a far better chance of successfully managing diseases like ascochyta.

## Quality seed

Quality seed from the 2010 harvest is likely to be in short supply.

- Do not sow seed with poor germination and vigour or unknown levels of seed borne pathogens (ascochyta, botrytis, sclerotinia).
- Do not sow seed with ascochyta and/or botrytis infection levels greater than 20%.
- Whilst increasing sowing rate of poor quality seed may seem reasonable, it carries a high risk of seedling disease. If the poor quality is caused by seed borne pathogens, the seed will be a source of infection for healthy seed and seedlings.
- Obtain seed from a commercial supplier or from a source known to have negligible levels of seed borne pathogens.
- Use seed from 2009 crops if its germination and vigour are acceptable.
- Irrespective of year of harvest and source, all seed must be thoroughly treated with a registered thiram-based seed dressing (*refer to Table 2, page 5*).

Research on 2010 harvested seed has shown a germination test does not accurately predict emergence. Accordingly, growers are advised to conduct their own emergence test, as follows.

After grading and treatment, sow 100 seeds at least 5cm deep in the 2011 paddock that you intend for chickpeas and water if necessary. Count the number of seedlings that have emerged after one, two and three weeks and note their appearance. Do they look healthy or are they stunted and distorted.

If you want to get an idea of variability in emergence and the paddock, replicate the test i.e. sow 100 seeds in 3-4 different locations in the paddock. This will also help identify potential herbicide residue problems.

For additional detailed information refer to:

- \* Pulse Australia - Northern Pulse Bulletin; [‘Chickpea: Sourcing High Quality Seed’](#)
- \* GRDC Fact Sheet; [‘Retaining Seed’](#)

## Paddock selection

The standard recommendations of maintaining a distance of at least 500m (further is better) from the previous year's chickpea paddocks and a break of at least three years between chickpea crops in the same paddock may not be effective disease management tools in 2011.

These tools work by reducing the amount of inoculum available to initiate infection at the beginning of the season. This has been compromised by surface water flow and floods which can move soil, roots, nematodes, chickpea stubble and pathogen survival structures great distances.

Nevertheless, there are some fundamental rules that still apply.

- Never sow a crop back into its own residue or that of a related species.
- Do not attempt to keep a paddock of volunteer chickpeas as a summer crop. Plants will be severely infected by pathogens (and *Heliothis*) and will provide early season inoculum for you and your neighbours 2011 chickpeas.

Avoid growing chickpeas in poorly drained paddocks, apart from the obvious risks of phytophthora and waterlogging. Observations in 2010 indicate that the natural resistance all plants have to pathogens and pests is compromised when plants are stressed from saturated conditions.

In one 2010 trial at Tamworth, the variety Flipper<sup>db</sup> had more ascochyta than an adjoining plot of Yorker<sup>db</sup> – this is not what we would expect.

In another Tamworth trial there was more ascochyta in the wettest Kyabra<sup>db</sup> plot compared with better drained plots of Kyabra<sup>db</sup>, in spite of the fact that all plots had received 8 applications of chlorothalonil at 1.0L/ha of product.

- i.e. stress from waterlogging had reduced our ability to manage ascochyta with a strategy that worked in less stressed plots.

## Sowing Time

For all diseases, consider sowing in the later part of the suggested sowing window for your district.

Whilst this may lead to lower potential yields (compared to an average year), it will reduce the risk of early season ascochyta and phytophthora infection events.

Later sowing will result in less biomass in late winter/early spring which will lessen the risk of botrytis grey mould. It is not known if later sowing will reduce the risk of sclerotinia basal stem rot, but it will lower the risk of *Sclerotinia sclerotiorum* infecting aerial parts of the plant by air borne spores (ascospores).

It will also mean more available soil moisture during pod fill should conditions in spring be dry.

For additional detailed information refer to:

- \* Pulse Australia - Northern Pulse Bulletin; [‘Chickpea: Effective Crop Establishment’](#)

## Row spacing

Consider growing the crop on wider rows because these result in increased air movement through the crop and reduced humidity within the canopy.

This will reduce the number and duration of infections events for ascochyta, botrytis and sclerotinia.

Wider rows are unlikely to have much impact on soil borne diseases caused by phytophthora and nematodes but may reduce inter-row spread and may reduce the consequences of such diseases as plants are less likely to be stressed from lack of water in spring.

## Ascochyta blight

(*Ascochyta rabiei*)

High levels of ascochyta blight in most 2010 chickpea crops means 2011 chickpea crops will be at high risk from ascochyta blight.

Ascochyta infected chickpea residue from 2010 crops is already in paddocks intended for chickpeas in 2011 as a result of harvest operations and movement of water. When chickpea seedlings emerge they will be at risk from infection during the first post-emergent rain event. Sowing ascochyta infected seed will produce infected seedlings and these will establish the disease in the crop.

If possible do not sow seed known to be infected with ascochyta. Fungicide seed treatments are very effective in preventing seed transmission of ascochyta but if the seed has high levels of infection, some escapes are inevitable.

All varieties, including PBA HatTrick<sup>®</sup> should be sprayed with a registered ascochyta fungicide before the first post-emergent rain event and again before the second post-emergent rain event. In 2010, crops that were sprayed on this schedule had the least ascochyta and subsequent management whilst challenging was successful. In contrast, 2010 crops that missed one or both their early ascochyta sprays were in trouble by the middle of August and many ended up being abandoned.

If you farm in an area with a history of ascochyta, carefully review the management requirements of growing ascochyta susceptible varieties under high disease pressure.

For additional detailed information refer to:

- \* Pulse Australia - Northern Pulse Bulletin; [‘Chickpea: Ascochyta Blight Management’](#)

## Botrytis grey mould (BGM) and Botrytis seedling disease (*Botrytis cinerea*)

Botrytis grey mould caused serious losses to chickpea crops in 2010. The disease is favoured by warm moist conditions and these were common from mid to late September, especially in crops that had lodged.

The BGM fungus has a wide host range (including lentil and faba bean) and can grow on dead plant tissue. This wide host range and saprophytic capacity means inoculum of *B. cinerea* is rarely limiting. If conditions are favourable, BGM will occur.

*B. cinerea* also causes pre and post-emergent seedling death. This happens when chickpea seed, infected during a BGM outbreak, is used as for sowing.

2011 chickpea crops are at high risk from botrytis seedling disease and all seed should be treated with a registered fungicide seed dressing.

For additional detailed information refer to:

- \* Pulse Australia - Northern Pulse Bulletin; [‘Chickpea: Botrytis Grey Mould Management’](#)

## Phytophthora root rot (PRR)

(*Phytophthora medicaginis*)

Phytophthora is a soil and water-borne disease that can establish permanently in some paddocks.

2010 was particularly conducive to phytophthora because damage is greatest in seasons with above average rainfall. However, only a single saturating rain event is needed for infection.

Once a plant or crop is infected with phytophthora, there is nothing a grower can do. Unlike ascochyta and botrytis, crops cannot be sprayed for phytophthora. Thus phytophthora can only be managed by pre-sowing decisions.

The most effective control strategy is to not sow chickpeas in high-risk paddocks, which are those with a history of.

- Phytophthora noted in previous chickpea or lucerne crops.
- Lucerne or annual or perennial medics.
- Waterlogging or prone to flooding.

If considerations other than phytophthora warrant sowing in a high-risk paddock, choose PBA HatTrick<sup>®</sup> or Yorker<sup>®</sup> which have a moderate level of resistance (refer to Table 1, page 5).

For additional detailed information refer to:

- \* Pulse Australia - Northern Pulse Bulletin; [‘Chickpea: Phytophthora Root Rot Management’](#)

## Root lesion nematodes (RLN)

(*Pratylenchus thornei*, *P. neglectus*)

Root lesion nematodes cause poor plant growth in situations that otherwise appear favourable. They attack cereals and pulses and are thus a threat to the whole farming system.

The nematodes feed and multiply on and in the roots of chickpea plants and in sufficient numbers reduce growth and yield. Chickpea varieties differ in their resistance and tolerance to RLN but are generally considered more susceptible (allowing nematodes to multiply) than field pea, faba bean and lupin, but less so than wheat.

Reduce the risk of losses from RLN by not sowing chickpea in paddocks that had susceptible or intolerant cereal varieties in 2010.

Follow the recommendations in:

- \* I&I NSW; [‘Winter Crop Variety Sowing Guide’](#)
- \* DEEDI; [‘Management of Root Lesion Nematodes in the northern region’](#)
- \* DEEDI; [‘Test Your Farm For Nematodes’](#)

**Sclerotinia base rot** (*Sclerotinia sclerotiorum*, *S. minor*) & **Sclerotinia aerial blight** (*S. sclerotiorum*)

In 2010, sclerotinia was more common than in previous years and in some paddocks caused serious damage (Figure 1) - 100% loss in one kabuli crop near Dubbo.



**Figure 1:** *S. sclerotiorum* killed these plants – eventually the whole crop was lost. Photo: Kevin Moore.

There are two species that attack chickpeas and they can be distinguished by the size of their sclerotes (survival structures).

*S. sclerotiorum* produces large irregular shaped sclerotes 5-10 mm in diameter as high up as 20-30 cm on the stem (Figure 2).



**Figure 2:** Sclerotes of *S. sclerotiorum*. Photo: Mal Ryley.



*S. minor* produces sclerotes that are angular and much smaller, rarely larger than 2-3 mm in diameter (Figure 3).

**Figure 3:** Sclerotes of *S. minor*. Photo: Kevin Moore.

*S. sclerotiorum* is the more prevalent species in cooler wetter regions whilst *S. minor* is more common in warmer drier environments. Both species cause a basal stem rot when their sclerotia germinate in soil and infect the base of the plant.

In dense crops, during moist conditions, a white cottony fungal weft develops around the base of plants (Figure 4).



**Figure 4:** Fungal weft of sclerotinia in the lower canopy of a chickpea crop. Photo: Kevin Moore.

Under cool wet conditions, *S. sclerotiorum* sclerotia can germinate to produce small cup like structures (apothecia) at ground level.

These release air borne ascospores that infect above ground parts of the chickpea plant, often starting in leaf axils (Figure 5). Stem tissues above and below the infection point initially remain green.



**Figure 5:** Ascospore infection of chickpea stem by *S. Sclerotiorum*. Photo: Gordon Cumming.

Both species of sclerotinia have wide host ranges including many broadleaf weeds and crops such as canola, faba bean and sunflower.

Cotton and cereals are not hosts to either species.

Reduce the risk of losses from sclerotinia by sowing seed free of sclerotia and by not sowing chickpea in paddocks that have had alternative host crops in the past 10 years because the resting structures (sclerotes) can survive that long.

We acknowledge that 10 years, in most situations, is impracticable, but do not sow chickpea in paddocks that had a broadleaf crop (other than cotton) in 2010.

The worst cases of sclerotinia in 2010 were in crops of Almaz but it is not known if Almaz is more susceptible to sclerotinia than other varieties.

**No fungicides are registered or under permit for sclerotinia in chickpea and it's unlikely that any would be effective against the basal stem rot phase of the disease.**

## Viruses (several species)

Viruses were not a problem in 2010 chickpea crops. However, viruses that damage chickpea, their vectors and alternate hosts are likely to have built up over the summer of 2010/11 and therefore pose a threat to 2011 chickpea crops.

For additional detailed information refer to:

- \* Pulse Australia - Northern Pulse Bulletin; [‘Virus control in chickpea special considerations’](#)

**Table 1:** Resistance ratings<sup>#</sup> of some northern region varieties to *Ascochyta*, *Phytophthora* and *Botrytis*.

Variety	Ascochyta	Phytophthora	Botrytis
PBA HatTrick <sup>Ⓛ</sup>	MR/R	MR	S
Flipper <sup>Ⓛ</sup>	MR	MS	S
Yorker <sup>Ⓛ</sup>	MS/MR	MR	S
Howzat	S	MS	MS
Jimbour	S	MS/MR	S
Kyabra <sup>Ⓛ</sup>	S	MS	S
Moti <sup>Ⓛ</sup>	VS	MS	MS
Genesis <sup>™</sup> 090	R	VS	S
Genesis <sup>™</sup> 425	R	MS	S
Almaz	MS/MR	VS	S

<sup>#</sup> Resistance ratings are for low-moderate disease pressure situations.

In a season such as 2010 when repeated cycles of infection occur, even MR varieties can have yield-reducing levels of disease

**Table 2:** Seed dressings registered for the control of seed borne ascochyta blight and botrytis grey mould.

Active Ingredient	Example trade name	Rate (per 100 kg seed)
thiram (600 g/L)	Thiraflo <sup>®</sup>	200 mL
thiram (800 g/kg)	Thiragranz <sup>®</sup>	150 g
thiram + thiabendazole (360 + 200 g/L)	P-Pickel T <sup>®</sup>	200 mL

Refer to the current product label for complete ‘Direction For Use’ prior to application.

**Table 3:** Foliar fungicides for the control of ascochyta blight and botrytis grey mould.

Active Ingredient	Example trade name	Rate	
		Ascochyta blight	Botrytis Grey Mould
Chlorothalonil (720 g/L)	Crop Care Barrack <sup>®</sup> 720 <sup>#</sup> Barrack Betterstick <sup>®#</sup> Nufarm Unite <sup>®</sup> 720 <sup>#</sup>	1.0 – 2.0 L/ha	Not Registered
Mancozeb (750 g/kg)	Dithane <sup>™</sup> Rainshield <sup>™</sup>	1.0 – 2.2 kg/ha	1.0 – 2.2 kg/ha
Mancozeb (420 g/L)	Penncozeb <sup>®</sup> SC	1.8 – 3.95 L/ha	Not Registered
Carbendazim (500 g/L)	Spin Flo <sup>®</sup>	Not Registered	500 mL/ha

<sup>#</sup> These are the only registered chlorothalonil products. It is an offence to use any other product.

Refer to the current product label for complete ‘Direction For Use’ prior to application.

## For additional information contact

Kevin Moore – Senior Plant Pathologist I&I NSW

ph: 02 6763 1133

email: [kevin.moore@industry.nsw.gov.au](mailto:kevin.moore@industry.nsw.gov.au)

Mal Ryley – Principal Plant Pathologist DEEDI

ph: 07 4688 1316

email: [malcolm.ryley@qld.gov.au](mailto:malcolm.ryley@qld.gov.au)

Gordon Cumming – Pulse Australia, Northern Manager

ph: 0408 923 474

email: [pulse.gordon@bigpond.com](mailto:pulse.gordon@bigpond.com)

Leigh Jenkins – District Agronomist I&I NSW

ph: 0419 277 480

email: [leigh.jenkins@industry.nsw.gov.au](mailto:leigh.jenkins@industry.nsw.gov.au)

Jayne Gentry – Development Officer DEEDI

ph: 0428 459 138

email: [jayne.gentry@deedi.qld.gov.au](mailto:jayne.gentry@deedi.qld.gov.au)

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