Impact and timely control of ascochyta blight of chickpea

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Key words

chickpea, ascochyta, management, foliar fungicides

GRDC code

GAPP, Grains Agronomy & Pathology Partnership – A strategic alliance between GRDC and NSW DPI (DAN00213): BLG206 IDM for Broadleaf Crops in southern and central NSW

Take home messages

- Ascochyta blight is the most damaging disease of chickpea in Australia
- In southern NSW outbreaks of the disease are usually less severe due to the reduced occurrence of chickpea within cropping rotations
- An Integrated Disease Management approach should be taken when managing this disease and not rely on fungicides alone
- Foliar fungicides are an important component of disease management and should be used strategically at critical crop development stages
- Manage ascochyta blight early and grow chickpea varieties with the best resistance to minimise disease impact.

Introduction

Ascochyta blight (ascochyta) is the most serious disease of chickpea in Australia and can cause 100% yield loss in years favourable to the disease. In northern NSW, chickpea producers contend with outbreaks of the disease every year, with the high frequency of chickpea within cropping rotations driving disease development. Whereas chickpea is not widely grown in southern NSW, and many producers are still in the early stages of learning to manage the crop and understand the behaviour of ascochyta outbreaks.

Chickpea is sold into human consumption markets and as such requires a higher level of disease management compared to other grain legumes such as lupin or field pea. Ascochyta can not only reduce yield potential, but also reduce grain quality, so effective management of disease is required for the life of the crop. Taking an integrated approach, there is a range of strategies that can be used to effectively manage ascochyta.

This paper will outline critical considerations when managing ascochyta in southern NSW and key disease management strategies that should be considered. This includes key findings and observations from disease management experiments and commercial chickpea crop surveys in southern NSW.

Early stages of disease development – germination to vegetative

Paddock selection: The fungus that causes ascochyta survives on old chickpea trash; it does not survive in soil. In northern NSW, the high frequency of chickpea in cropping rotations makes separation of last year's stubble from this season's crop often difficult and significantly increases

disease pressure. The same also applies to the frequency of chickpea in the rotation, once every four years is ideal.

In southern NSW, separation of last year's chickpea stubble from new season's crops is far easier to achieve and should be a high priority. Also consider the logistics of multiple fungicide applications when selecting paddocks to be sown to chickpea. This also includes the possibility of using aircraft to apply fungicides if conditions are too wet for a ground rig.

Seed**:** The fungus that causes ascochyta can survive within infected chickpea seed if the infection occurs during formation of the seed within the pod. Often though infection occurs late during seed development and the fungus is restricted to the seed coat. Infestation of seed can also occur during harvest where small particles of infected seed pod or stubble can mix with harvested seed and contaminate the seedlot.

Sowing of infected or infested seed is a significant source of introduction of the disease into new seasons crops in southern NSW. Often seed for sowing is sourced from northern NSW or the Wimmera region of Victoria, where ascochyta is far more prevalent. Treating chickpea seed with a fungicide for sowing will significantly reduce, but not eliminate ascochyta. This includes commercially sourced seed. Following emergence, seedlings grown from fungicide treated seed will have limited systemic protection from ascochyta and may be prone to infection.

Transmission and spread of ascochyta can still occur from chickpea seed treated with a seed-applied fungicide.

Seedling – vegetative**:** Symptoms of ascochyta are not always easily seen at early stages of crop establishment. In southern NSW, chickpea is often slow to emerge and slow for crops to establish due to cold temperatures in late autumn and winter. During this time Ascochyta can develop in random hotspots and may go largely undiagnosed. Frequent rainfall events and cool temperatures favour the spread and establishment of ascochyta during this time. Often by the time the disease is noticeable within crops, significant levels of infection have occurred.

Recent field experiments conducted by NSW DPI at Wagga Wagga and grower experience have indicated this period of crop development can provide significant opportunities to effectively manage ascochyta and reduce disease pressure later in the season. The application of a foliar fungicide at this stage can be very effective at reducing the initial establishment and spread of the pathogen, given the ability to attain excellent plant coverage. This suggests that the combination of a fungicide seed dressing and early application of a foliar fungicide are highly complementary in reducing levels of ascochyta within chickpea crops. This approach becomes even more effective if growing chickpea varieties that have reduced levels of resistance.

Scouting for disease during the growing season is important at all growth stages. The susceptibility of chickpea varieties to ascochyta and the ability of ascochyta to spread quickly requires commercial crops to be inspected at regular intervals (every 7 – 14 days). Effective scouting for disease requires crops to be inspected on-foot, at several locations. Inspect crops making note of possible disease symptoms, changes in disease symptoms and development of ascochyta hotspots within crops. Use pegs to mark inspection points within crops or the location of ascochyta hotspots.

Ascochyta is largely splash dispersed during the growing season. Pycnidiospores produced within leaf and stem lesions are dispersed short distances by rain droplets and can be blown further by wind-blown rain. Every rainfall event that occurs during the growing season is an opportunity for ascochyta to spread further and cause infection if crops are not adequately protected.

With warmer temperatures the rate of crop growth will increase. Canopy closure is a significant crop development stage with the foliage in adjacent rows closing over. Within the canopy humidity increases and potential infection periods also increase. The ability of foliar fungicides to

penetrate the canopy significantly decreases at the same time, which makes early fungicide applications important.

Vegetative – late podding: Ascochyta has the potential to develop and spread quickly in late winter and spring. Following canopy closure, the ability for moisture to remain within the crop canopy to initiate infections increases considerably. Warmer temperatures also decrease generation times for ascochyta to approximately 5-7 days, allowing infections to spread quickly with frequent rainfall events.

Infections that develop during this period are more difficult to manage. This is due to a combination of reduced fungicide penetration into the canopy and shorter generation times from the ascochyta fungus.

Rapid crop growth during this period is often very 'soft' and susceptible to infection. Flowers and developing pods are also very susceptible to ascochyta. Continue to scout crops for symptom development.

Ascochyta prevention is important during the reproductive stage as the disease on pods causes seed abortion, seed infection and seed defects, and may not be suitable as planting seed for the following season or can be downgraded at delivery.

Foliar fungicide applications during this period aim to maintain protection of newly emerging growth and protect developing pods from infection. Spring rainfall patterns will dictate the number of fungicide applications required.

Late podding – maturity: Management of ascochyta during this period continues to focus on protecting pods. Be aware that late rains around maturity can result in some late seed infection and seed discolouration.

Using foliar fungicides

Begin monitoring as soon as the crop has emerged. If ascochyta is detected, apply a registered fungicide as close to the next rainfall event as practical. Fungicide use should focus on prevention of new infections and spread of the disease **NOT** curing old infections. Currently fungicides fall into two categories, older fungicides and new fungicides.

Older fungicides (active ingredients such as chlorothalonil and mancozeb):

- Preferred products in-crop, being the most reliable and cost effective. They provide excellent protection when applied before rain with thorough coverage and high-water volumes.
- Chlorothalonil and mancozeb are persistent and rain fast (up to 50 mm rain in 10 minutes).
- Expect several weeks control on plant tissue sprayed (14-20 days) with chlorothalonil and mancozeb, but no protection of new growth as they have no systemic movement through the plant.
- Refer to fungicide labels for maximum amount of chlorothalonil that can be applied per season.

Newly released fungicides (products include Aviator® Xpro® (prothioconazole + bixafen), Amistar® Xtra (azoxystrobin + cyproconazole) and Veritas® (tebuconazole + azoxystrobin).

Points to note:

- These chemicals offer protection via different chemical groups, which is important in an integrated disease management program to prevent resistance

- These fungicides are more expensive than chlorothalonil with equivalent efficacy as preventive fungicides
- Post-infection or salvage applications should not be considered part of a standard management program
- Aviator Xpro has limited curative activity as well as residual control.
- Veritas, Amistar Xtra and Aviator Xpro labels state a maximum of two applications of each in any one season. Aviator Xpro cannot be applied after late flowering. Veritas can be applied at any growth stage but has a harvest withholding period (WHP) of four weeks, while Amistar Xtra has a harvest WHP of eight weeks
- Expect several weeks control on sprayed plant tissue (up to 21 days), but new growth will not be protected as they have little systemic activity.

What to do if disease found in the paddock

Monitoring your chickpea crop for ascochyta regularly is the most effective means of managing the disease. The appearance of the disease or spread of the disease will be most easily seen 7 -10 days after a rainfall event.

If the disease is detected for the first time, apply a registered foliar fungicide. Movement of the disease will be limited while conditions are dry, so focus on managing the disease between rainfall events and periods of protection from the fungicide. Continue to regularly monitor for disease and check for lesion development and spread within the crop. This is very important for susceptible varieties (e.g. Kyabra).

Summary

Ascochyta blight is the most important disease of chickpea in Australia.

In southern NSW the area sown to chickpea is still small, compared to northern NSW, so pressure from this disease within cropping rotations is low. The fungus that causes ascochyta blight is transmitted between seasons on old, infected crop trash and infected seed.

Management of ascochyta commences with the use of clean seed that is treated with an appropriate fungicide seed treatment. Once the crop has emerged, regular crop inspections are key to applying foliar fungicides at the right time, with prophylactic use before rainfall events essential in high risk situations and when using varieties that do not have good genetic resistance.

In addition to using treated seed, the critical timings for foliar fungicide applications are:

Critical period 1: **4- 6 weeks post emergence**; apply a foliar fungicide to contain or eliminate any seed-borne infections.

Critical period 2: **Just prior to canopy closure**; apply a foliar fungicide to the crop to obtain adequate coverage of the lower canopy before the crop canopy closes. It is important to ensure coverage of the lower canopy and potential infection sites.

Critical period 3: Podding; continue to monitor the crop during podding to protect pods from infection.

Continue to monitor the crop regularly throughout the growing season and time foliar fungicide applications according to the period of protection offered by the fungicide product applied and rainfall events.

Other resources

NSW DPI – Winter Crop Variety Sowing Guide

NSW DPI - Managing ascochyta blight in chickpeas in 2021 (Penny Heuston and Kevin Moore)

Acknowledgements

The research undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the GRDC, the author would like to thank them for their continued support. The author would also like to thank NSW DPI for on-going co-investment.

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