Chickpea fungicide evaluation for ascochyta blight – a study across three seasons

Jade Rose and Sarah Noack, Hart Field-Site Group

Key findings

- Growers and advisors should be vigilant in applying protective fungicide sprays in chickpea crops for ascochyta blight.
- Many current and minor use permit fungicides trialed at Hart in 2019 provided good preventative control (less than 10% of plants infected) for ascochyta blight including chlorothalonil, Aviator Xpro® and Cabrio ®.

Why do the trial?

Ascochyta blight (AB) is a foliar fungal disease in chickpeas. The disease can cause severe yield loss and reduce grain quality and therefore its marketability and value. The disease can be spread by seed and survive in stubble. Spores produced by the pathogen can be carried via wind or transferred by rain-splash during wet weather.

In 2018 severe infection of ascochyta was observed in various Genesis090 and PBA Monarch chickpea crops in SA such as the upper Yorke Peninsula and the lower north region. In 2019, ongoing reports of infection in Genesis090 crops along with volunteer plants were reported from these regions. Currently, all commercial chickpea varieties are rated moderately susceptible (MS) or susceptible (S). A number of fungicides still require permits to be used. See Pulse Australia for further details on minor use permits: http://pulseaus.com.au/growing-pulses/bmp/chickpea/2018-season-fungicide-guide.

To reduce infection and spread of disease, thiram based seed dressing is essential. Growers should plan for multiple (3 – 4) foliar fungicide applications ahead of rain events for all varieties. This study evaluated the effectiveness of current and new fungicides over three consecutive years in reducing AB infection and maintaining quality and grain yield in chickpeas.

How was it done?

Plot size	1.75 m x 10.0 m		
Seeding date	May 9, 2017	**Fertiliser**	MAP @ 75 kg/ha at seeding
	May 25, 2018		MAP @ 75 kg/ha at seeding
	May 16, 2019		MAP @ 80 kg/ha at seeding
Location	Hart, SA		

From 2017-2019, experimental field trials were conducted at Hart. The trials were randomised complete block design, replicated three times at each site. The trial looked at fungicide options in Monarch (2017) and Genesis090 (2018, 2019) chickpeas. These varieties were selected due to their AB ratings of moderately susceptible to susceptible and that they are commonly grown in South Australia. Infected chickpea stubble was spread uniformly across the trial area, post sowing, to increase the incidence of infection.

All seed was treated with P-Pickle T (PPT), except the untreated control. Fungicide treatments were applied at the following growth stages/dates:

Chickpea (three sprays):

- Mid-vegetative
- Early flowering
- Podding
- Control = fortnightly sprays of chlorothalonil

A number of fungicide products with varying active ingredients and groups were trialed (Table 1). Chlorothalonil applications consisted of up to nine fortnightly sprays (2017, 2018, and 2019) from the period of June to early September.

Table 1. Fungicides trialed at Hart in 2017 - 2019.

Product name example	Active ingredient	Fungicide group
Aviator XPro®	Prothioconazole and bixafen	Group 3
Cabrio®	Pyraclostrobin	Group 11
CC Barrack ®	Chlorothalonil	Group M
Captan® 900	Phthalimide	Group M4
Veritas®	Tebuconazole and azoxystrobin	Group 3 and 11

In each season all plots were assessed for AB infection (either as % plant infection or reported as % plant infection and stem infection of 5 plants per plot). At harvest all plots were assessed for grain yield.

Results and discussion

Ascochyta blight in chickpeas

After a dry beginning to the 2019 season, AB was observed in the chickpea trial at Hart during late July. The highest level of infection was observed in untreated plots (Table 2) at 34.3% of all plants infected, along with 9.67% of all stems infected. This high infection rate was similar to both 2017 and 2018 in untreated control plots.

Across three seasons fungicide treatments decreased the level of infection in all plots compared to the untreated control. The fungicide treatments that provided the best control (<10% of plants infected) was fortnightly sprays of chlorothalonil (0% infection), followed by three sprays of Aviator XPro® or Cabrio®.

In terms of grain yield, 2017 was the only season where fungicide application increase grain yield with a trial average yield of 1.80 t/ha. Considering production costs, plant infection and grain yield, the treatments which provided best net return in 2017 (Table 3) were Aviator XPro® (treatment cost $33/ha), Cabrio® ($53/ha) and Veritas® ($25/ha).

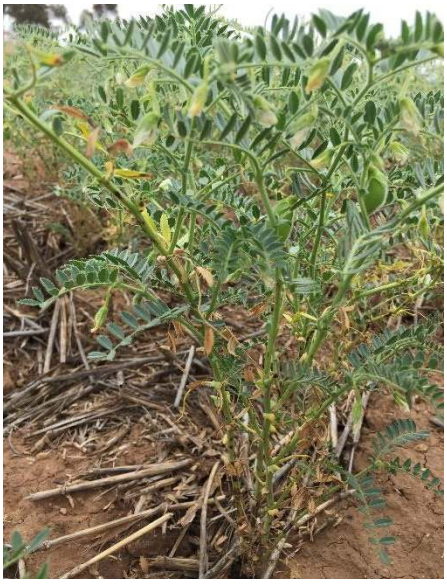

Photo 1. Chickpea infected with ascochyta blight, taken October 3, 2018.

Grain yields were low in both 2018 (trial average 0.24 t/ha) and 2019 (0.65 t/ha) and made it hard to evaluate the benefit of fungicide application. The dry seasons reduced the spread of AB and the need for fungicide application (Table 3). Individual fungicide efficacy may differ in wetter, longer seasons as rainfall determines the spread of AB.

Table 2. Chickpea ascochyta blight infection measured as % of leaf (and stem 2019 only) infected.

Fungicide treatment	AB infection %			
	2017	2018	2019	
	leaf	leaf	leaf	stem
Untreated control	36.7	35.0	34.3	9.7
PPT + Aviator XPro® @ 600 mL/ha	6.7	18.3	3.0	1.3
PPT + Cabrio® @ 400 mL/ha	5.0	16.7	3.5	2.2
PPT + Fortnightly chlorothalonil @ 1 L	2.3	13.3	0.0	0.0
PPT + Captan® 900 @ 1.1kg	16.7	18.3	18.3	5.5
PPT + Veritas® @ 1 L	13.3	20	8.5	3.2
LSD fungicide (P≤0.05)	8.5	12.2	10.9	3.8

Table 3. Grain yield (t/ha) from fungicide treatments trialed at Hart, 2019.Cost of fungicide application based on seed treatment + three fungicide applications in season.

Year	*Fungicide treatment*	*Grain yield t/ha*	*Cost of fungicide $/ha**	*Net return $/ha***
2017	Untreated control	1.31	0	602
	PPT + Aviator XPro® @ 600 mL/ha	1.94	33	1042
	PPT + Cabrio® @ 400 mL/ha	1.97	53	1044
GSR: 191mm	PPT + Fortnightly chlorothalonil @ 1 L	2.03	198	944
	PPT + Captan® 900 @ 1.1kg	1.76	16	924
	PPT + Veritas® @ 1 L	1.81	25	952
	LSD(P≤0.05)	0.26		
2018	Untreated control	0.18	0	-245
	PPT + Aviator XPro® @ 600 mL/ha	0.28	33	-202
	PPT + Cabrio® @ 400 mL/ha	0.28	53	-223
GSR: 160 mm	PPT + Fortnightly chlorothalonil @ 1 L	0.29	198	-360
	PPT + Captan® 900 @ 1.1kg	0.19	16	-253
	PPT + Veritas® @ 1 L	0.20	25	-255
	LSD(P≤0.05)	ns		
2019	Untreated control	0.74	0	175
	PPT + Aviator XPro® @ 600 mL/ha	0.69	33	105
	PPT + Cabrio® @ 400 mL/ha	0.66	53	61
GSR: 162 mm	PPT + Fortnightly chlorothalonil @ 1 L	0.59	198	-135
	PPT + Captan® 900 @ 1.1kg	0.62	16	69
	PPT + Veritas® @ 1 L	0.62	25	60
	LSD(P≤0.05)	ns		

Fortnightly sprays = nine applications from late June to early September

*Cost of fungicides based on 2019 prices

**Net return based on production costs of $380 + fungicide application and returns on grain of $750/t (Farm Gross Margin Guide 2019)

Summary / implications

Effective disease management is paramount to maximising the yield and quality of chickpeas. To minimise disease pressure and reduce losses, applying a suitable fungicide early in the season and prior to canopy closure is important. This study highlights the efficacy of a number of fungicides available for the prevention of ascochyta blight, however it is important to stay up to date of new fungicide actives that are released. Current fungicides useful to preventing ascochyta blight are chlorothalonil, Aviator Xpro® and Cabrio®. The use of fungicides is season dependent, therefore staying up to date with current advice is important.

A number of management options should be used to reduce the risk of ascochyta blight infection such as crop rotation, variety selection, and paddock selection, regular crop monitoring and strict hygiene on and off farm.

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Photo: Jade Rose, Hart and Sara Blake, SARDI prepare to discuss 'Pulse Disease Management' with farmers at the 2019 Hart Field Day.