Lentil and chickpea fungicide evaluation for ascochyta blight

Sarah Noack, Hart Field-Site Group

Key findings

- Growers and advisers should be vigilant in applying protective fungicide sprays in chickpea and lentil crops for ascochyta blight.
- Many current and minor use permit fungicides trialed at Hart in 2017 provided good preventative control (less than 10% of plants infected) for ascochyta blight including; chlorothalonil, Aviator Xpro®, Cabrio® and Captan®.

Why do the trial?

Ascochyta blight can be a serious but manageable disease in lentils and chickpeas. For lentils, most current varieties are unlikely to have significant yield losses due to ascochyta blight. However, the disease can infect lentil pods and seed, causing a discolouration that will reduce the marketability and value of affected grain. In chickpeas however, the disease can cause major yield loss if not managed.

A virulence change in ascochyta blight in chickpeas was observed in southern Australia in 2015 and 2016. This change resulted in all current chickpea varieties being rated as susceptible or moderately susceptible. In response a number of new fungicides and emergency use permits have become available for growers to use. *See Pulse Australia for further details on minor use permits* *http://www.pulseaus.com.au/growing-pulses/crop-protection-products*. Many of these products have limited information for the management of ascochyta blight in lentils and chickpeas. This study evaluated the effectiveness of current and new fungicides in reducing ascochyta blight infection and maintaining grain yield and quality in lentils and chickpeas.

How was it done?

Plot size	1.75 m x 10.0 m	**Fertiliser**	MAP (10:22) @ 75 kg/ha at seeding
Seeding date	9th May 2017		

The trials were randomised complete block design. Trial (1) looked at fungicide options in Monarch chickpeas and trial (2) in Flash lentils. These varieties were selected due to their susceptible (S or MS) rating for ascochyta blight to ensure infection occurred. Post seeding lentil stubble infected with ascochyta blight was spread uniformly across the trial area to increase the incidence of infection. The stubble was collected from lentil paddock on the Yorke Peninsula with a low level of ascochyta blight infection in 2016.

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

Lentil (two sprays)	• Mid-vegetative 2nd August • Podding 4th October • Control = fortnightly sprays of chlorothalonil
Chickpea (three sprays)	• Mid-vegetative 2nd August • Early flowering 31st August • Podding 4th October • Control = fortnightly sprays of chlorothalonil

A number of fungicide products with varying active ingredients and groups were trialed (Table 1). The trial was also sprayed with 500 mL/ha carbendazim to prevent botrytis grey mould infection confounding the results. Carbendazim has minimal control of ascochyta blight.

Table 1. Fungicides trialed at Hart in 2017.

Product name example	Active ingredient	Fungicide group
CC Barrack ®	Chlorothalonil	Group M
Aviator XPro®	Prothioconazole and bixafen	Group 3
Amistar Xtra®	Azoxystrobin	Group 11
Cabrio® 400	Pyraclostrobin	Group 11
Captan® 900	Phthalimide	Group M4
Tilt®, Throttle®	Propiconazole	Group 3
PPT + Veritas®	Tebuconazole and azoxystrobin	Group 3 and 11
Prosaro®	Prothioconazole and tebuconazole	Group 3
Various e.g. Dithane®	Mancozeb	Group M3

All plots were assessed for ascochyta blight infection (reported as % plant infection in the entire plot) on the 22nd September. At harvest all plots were assessed for grain yield and lentil plots were scored for seed staining.

Results and discussion

Ascochyta blight in chickpeas

An outbreak of ascochyta blight was observed in the chickpea trial at Hart from late July (Table 2). The highest level of infection was observed in the untreated plots with 36.7% of all plants infected (Table 2). Not surprisingly, this high infection resulted in a lower grain yield of 1.3 t/ha compared to trial average 1.8 t/ha. The disease scores were strongly correlated with relative yield loss observed in the trial.

All fungicide treatments decreased the level of infection compared to the untreated control. The fungicide treatments which provided the greatest prevention (< 10% of plants infected) were fortnightly sprays of chlorothalonil, or three sprays of Aviator XPro® or Cabrio®. These three treatments along with Amistar Xtra® and Veritas® gave similar yields at 1.8 – 2.0 t/ha.

Taking into account the seed treatment and fungicide costs plus the resulting plant infection and grain yield, the treatments which provided best net return were Veritas® (treatment cost $59/ha) closely followed by Aviator Xpro® ($99/ha) and Cabrio® ($161/ha).

The low season rainfall in 2017 most likely limited the spread of ascochyta blight. Efficacy of the individual fungicides may differ in a wetter, longer season since rainfall spreads this disease.

Table 2. Chickpea ascochyta blight (AB) infection (measured as % of plot infected) and grain yield (t/ha) from fungicide treatments trialed at Hart, 2017. Cost of fungicide application based on seed treatment + three fungicide applications in season.

Fungicide treatment	AB infection	Grain yield	Cost of fungicide	Net return**
	%	t/ha	$/ha	$/ha
Untreated control	36.7[a]	1.31[d]	0	523
PPT + *Fortnightly chlorothalonil @ 2.0 L/ha	2.3[f]	2.03[a]	255	772
PPT + Aviator XPro® @ 600 mL/ha	6.7[def]	1.94[ab]	102	863
PPT + Amistar Xtra® @ 600 mL/ha	15.0[cd]	1.80[abc]	66	803
PPT + Cabrio® 400 mL/ha	5.0[ef]	1.97[ab]	164	823
PPT + Captan® 900 @ 1.1 kg/ha	16.7[bc]	1.76[bc]	46	794
PPT + Propiconazole 500 mL/ha	25.0[b]	1.55[cd]	21	675
PPT + Veritas® @ 750 mL/ha	13.3[cde]	1.81[abc]	59	818
LSD fungicide (P≤0.05)	8.5	0.26		

*Fortnightly sprays = nine applications from late June to early September.

**Net return based on production costs of $392/ha + fungicide application and returns on grain of $700/t.

Ascochyta blight in lentils

Similar to the chickpea trial above, a significant outbreak of ascochyta blight was observed in lentils at Hart (Table 3). Plant infection ranged from 1.7% for the fortnightly sprays of chlorothalonil to 38.3% in the untreated control. In addition to the fortnightly chlorothalonil, fungicide treatments Captan® and Aviator XPro® resulted in low levels of infection (<10%).

Despite high levels of disease there was no effect of fungicide application on lentil grain yield, averaging 2.1 t/ha. The lack of yield loss in lentils is not uncommon however, seed quality can be downgraded from the infection causing seed staining. In 2017 there were low levels of seed staining in all treatments, including the untreated control, due to few rainfall events during podding (Table 3).

Despite lack of seed downgrading it is well known that ascochyta blight infection can lead to yield loss, reduce marketability of resultant stained and distorted seeds. The fungicide treatments which provided good control (<10% plants infected) and were cost effective were Captan® ($29/ha) and Aviator XPro® ($66/ha). For the remaining fungicide treatments there was small variation between plots and majority reduced infection to less than 20%.

As stated above, efficacy of the individual fungicides may differ in a wetter, longer season since rainfall spreads this disease.

Table 3. Lentil ascochyta blight infection (measured as % of plot infected) and grain yield (t/ha) from fungicide treatments trialed at Hart, 2017. Cost of application based on seed treatment + two fungicide applications in season.

Fungicide treatment	AB Infection	Grain yield	Seed staining*	Cost of fungicide	Net return**
	%	t/ha		$/ha	$/ha
Untreated control	38.3[a]	2.0	0.7	0	923
PPT + ***Fortnightly chlorothalonil @ 2.0 L/ha	1.7[f]	2.0	0.0	255	661
PPT + Chlorothalonil @ 1.0 L/ha	17.7[c]	1.9	0.7	31	863
PPT + Mancozeb 750 @ 2.0 kg /ha	25.0[b]	2.1	0.3	39	923
PPT + Amistar Xtra @ 600 mL/ha	10.0[de]	2.2	0.4	45	1015
PPT + Prosaro @ 600 mL/ha	16.7[c]	2.1	0.1	91	917
PPT + Captan 900 @ 1.1 kg/ha	5.7[ef]	2.0	0.6	32	878
PPT + Veritas @ 750 mL/ha	13.3[cd]	2.4	0.3	41	1109
PPT + Aviator XPro @ 600 mL/ha	6.0[ef]	2.2	0.2	69	1005
PPT + Veritas @ 750 mL/ha + Mancozeb @ 1 kg/ha	11.7[cde]	2.2	0.2	59	963
LSD (P≤0.05)	6.4	NS	NS		

*Seed staining was assess using a categorical scale of 0-5; 0 = no staining and 5 = ≥ 25% seed coverage.
**Net return based on production costs of $275/ha + fungicide application and returns on grain of $600/t.
***Fortnightly sprays = nine applications from late June to early September.

Summary

Good disease management is critical to maximise the yield and quality of lentils and chickpeas. Applying the appropriate preventative fungicide early and prior to canopy closure can minimise disease pressure and reduce losses. The current study has shown there are a number of fungicide options (current and minor use permits) which provided good preventative control of ascochyta blight including; chlorothalonil, Aviator Xpro®, Cabrio® and Captan®, although this research needs to be repeated across different seasons.

While the current study focused on fungicide applications it is important to keep in mind there are a number of management options that can be used to reduce your risk of ascochyta blight infection including: crop rotation and paddock selection, regular crop monitoring, strict hygiene on and off farm and variety selection.

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