

Chickpea, Disease Management, LRZ Southern Mallee (Curyo), Victoria

Authors

Jason Brand, Mitch Fromm and Tim Nigussie

Aim

To evaluate chickpea varieties and breeding lines against ascochyta blight and their response to foliar fungicide application.

Treatments

Varieties: Refer to Table 3.

Fungicide Treatments: Refer to Table 1 for treatments and application rates. Strategic sprays were applied before rainfall events, at key growth stages, to maximise foliage protection, which were 4th node and late vegetative/ early flowering stage. The full control treatment is a rotation of fungicides applied to ensure minimal to no disease as a control in the experiment.

The Bixafen + Prothioconazole and Nil treatments were inoculated with infected stubble on 19th June 2019.

Table 1. Fungicide treatments and the number of sprays applied for each fungicide spray to assess the control of Ascochyta Blight in chickpea at Curyo during 2019.

Seed Treatment	Rate (g/kg)	In Season Fungicide	Rate (gai/ha)	Timing	Number of applications
Nil		Nil	NA	NA	0
Thiram	0.72	Bixafen	45	Strategically ^A	2
Thiabendazole	0.4	Prothioconazole	90		
Thiram	0.72	Full control ^B			
Thiabendazole	0.4				

^A Strategic fungicide application was done before rainfall events, at key growth stages (4th node and late vegetative / early flowering stage), to maximise foliage protection.

^B The full control treatment is a rotation of fungicides applied to ensure minimal to no disease as a control in the experiment

Table 2. Other Site Details

Curyo	
Sowing Date	06 May
Stubble height (cm)	Standing (15)
Row Spacing (cm)	36
Fertiliser (kg/ha) ¹	60
Plant density (plants/m ²)	35

¹ MAP (9.2, 20.2, 0, 2.7) + Zn (2.5)

Results and Interpretation

- Key Messages: Despite a dry finish, ascochyta blight progressed well, causing stem breakages and significant grain yield losses in most varieties. The new variety, PBA Royal had 45% of the plot with stem infections early in the season but recovered and had little grain yield losses compared to the full control treatment (Table 4). The breeding line CICA1454 had 15% less ascochyta blight infection compared to the closest named variety, offering hope of better ascochyta blight resistance.
- Establishment and Plant Growth: Establishment and plant growth was good due to early and consistent rainfall. Warmer than average temperatures and lower rainfall later in the season resulted in lower yields than expected.
- Plant Disease: Plants developed prominent ascochyta blight infections post inoculation, which progressed to an epidemic during the season. Frequent rainfall throughout the season promoted disease progression leading to total plot death in some susceptible varieties. A drier finish to the season resulted in some varieties recovering from Ascochyta blight, producing higher yields than expected.

The most susceptible variety, PBA Striker had on average 93% of the plot affected by ascochyta blight stem infections (Table 3). The breeding line CICA1454 had only 28% ascochyta blight infection compared to the closest named variety, Kalkee with 44% infection, offering hope of better ascochyta blight resistance. Multiple assessments were undertaken but the ranking of varieties did not change with the results presented in Table 3.

- **Grain Yield and Profitability:** Grain Yield losses varied between 7 and 81% due to ascochyta blight in the absence of any control measures. There was a significant difference detected in grain yield between varieties, and an interaction with ascochyta blight. This would be due to susceptible varieties like PBA Striker and Howzat yielding well in the absence of disease. Bixafen + prothioconazole strategically increased grain yields significantly, however, the full control still had greater grain yields, particularly in susceptible varieties. The new variety PBA Royal had significantly higher grain yield than many other varieties in the Nil treatment, and had the least percentage yield loss, highlighting the benefit its resistance has over other varieties.

Table 3. Percentage (%) of plot affected by ascochyta blight in 15 chickpea varieties at Curyo assessed on the 19th August 2019.

Variety	Treatment ^A			
	Full Control	Bixafen + Prothioconazole	Nil	Mean
CICA1454	0	20	28	16
CICA1551	0	25	40	22
Kalkee	0	28	44	24
CICA1352	0	19	55	25
CICA1552	0	28	48	25
PBA Royal	0	33	45	26
Genesis090	0	25	55	27
Almaz	0	35	61	32
Sonali	0	40	74	38
PBA Slasher	0	50	68	39
CICA1841	1	50	74	42
CICA1521	0	43	90	44
PBA Monarch	0	55	79	45
Howzat	0	65	84	50
PBA Striker	0	75	93	56
Mean	0	40	63	
	P	LSD		
Variety	<0.001	6		
Treatment	<0.001	3		
Variety x Treatment	<0.001	11		

^A The three treatments were: (1) full control, where no AB stubble was applied and fungicides were applied to ensure no disease; (2) Bixafen + Prothioconazole, applied at 4-node and flowering growth stages and inoculated with AB infested stubble at the 4-node stage; and (3) Nil where there was no disease control and the plots were inoculated with AB infested stubble.

Table 4. Grain yield (t/ha) of 15 chickpea varieties inoculated with ascochyta blight and undergoing three different treatment methods to control the disease conducted at Curyo during 2019.

Variety	Treatment ^A			Mean	Yield Loss (%)
	Full Control	Bixafen + Prothioconazole	Nil		
PBA Royal	1.67	1.60	1.56	1.61	7
CICA1552	1.69	1.78	1.39	1.62	18
CICA1454	1.94	1.75	1.59	1.76	18
Kalkee	1.41	1.57	1.13	1.37	20
Genesis090	1.76	1.72	1.39	1.62	21
CICA1551	1.88	1.46	1.35	1.56	28
PBA Slasher	1.79	1.49	1.10	1.46	38
Almaz	1.83	1.66	1.12	1.53	39
CICA1352	1.81	1.71	1.06	1.53	42
CICA1841	1.63	1.27	0.84	1.25	48
Sonali	2.01	1.42	0.79	1.40	61
PBA Monarch	1.94	1.26	0.73	1.31	62
CICA1521	1.89	1.18	0.61	1.23	67
Howzat	1.87	1.09	0.53	1.16	71
PBA Striker	1.97	0.93	0.37	1.09	81
Mean	1.83	1.44	1.02		
	P	LSD			
Variety	<0.001	0.21			
Treatment	<0.001	0.09			
Variety x Treatment	<0.001	0.36			

^A The three treatments were: (1) full control, where no AB stubble was applied and fungicides were applied to ensure no disease; (2) Bixafen + Prothioconazole, applied at 4-node and flowering growth stages and inoculated with AB infested stubble at the 4-node stage; and (3) Nil where there was no disease control and the plots were inoculated with AB infested stubble.

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