Chickpeas

C1 Disease management, LRZ Southern Mallee (Curyo), Victoria

C2 Disease management, MRZ Wimmera (Rupanyup), Victoria

Aim

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

Treatments

Varieties: are shown in Table 1 and 2.

Fungicide treatments: No fungicide ('nil') was compared to fortnightly application (7 times) of chlorothalonil (2L/ha).

P-Pickel T® fungicide seed treatment was applied to `fortnightly` treatment at 200ml/100kg seed (360 g/L Thiram and 200 g/L Thiabendazole).

Trials was inoculated with ascochyta on July 18 and Aug 4 at Rupanyup and 21 July at Curyo using spore suspension

Other Site Details

	Trial Site	
	Curyo	**Rupanyup**
Sowing Date	4 May	16 May
Stubble (height cm)	Standing(15)	Standing(30)
Row Spacing (cm)	36	36
Plant Density (plant/m^2)	35	35
Fertiliser (kg/ha)[1]	60	80

1. MAP (9.2, 20.2, 0, 2.7) + Zn (2.5)

Results and Interpretation

- Key Messages: The virulence of the new isolate of ascochyta blight in chickpea was assessed at Curyo and Rupanyup and confirmed to cause significant symptoms (including stem breakages) on all varieties and breeding lines.
  Grain yield loss in the most susceptible varieties and breeding lines was up to 100%, however the level of resistance in a number of kabulis including Gensis090, means that the disease can be proactively managed with fungicides to produce profitable grain yields.

- Plant Growth and Disease: Establishment and growth at both trial sites throughout the season was excellent due to good opening rains and warm conditions following sowing. This vigorous early and rapid canopy development lead to conditions conducive for disease when combined with the high rainfall experienced from July onwards. Continued rainfall, in the absence of major frost and heat events resulted in very high biomass production, but in some cases flowering and pod set was poor due to the cool conditions.

  In late July a significant outbreak of ascochyta blight was observed at Curyo, with symptom assessment indicating that this isolate of ascochyta was the same as observed in 2015, having virulence on resistant lines such as Genesis090 and PBA Slasher. Symptoms were assessed four times throughout the season and some variation in the relative ranking of varieties was noted. Similarly at Rupanyup ascochyta blight was first noted in early August, but not initially as widespread as observed at Curyo. Rather the traditional 'hotspots' were noted, particularly in more susceptible varieties, like Howzat. Symptoms were assessed three times throughout the season and similar to Curyo relative ranking of varieties changed slightly throughout the season. In this report figures for the 'nil' treatment are only presented as the fortnightly fungicide regime almost completely controlled the disease.

  In this report, the detailed trends of each variety/breeding line are not discussed, rather the scores recorded 25 October focussed on. At Curyo, stem breakages were observed in all varieties, with symptoms scores ranging from 4.8 for CICA1454 to 9.0 for PBA Striker and Howzat (i.e. plots dead; Table 1). Genesis090 was moderately susceptible with a score of 6.3. At Rupanyup, a similar trend was

observed, although symptoms were commonly slightly lower.

At both sites, it was also noted that most of the susceptible to very susceptible varieties and breeding lines were desi seed type, while the relatively better resistant varieties and breeding lines were Kabuli type (Table 1). In terms of growth and flowering, the plots with disease infection flowered later and had lower biomass than the fortnightly treatments, which ultimately contributed to the relative yield responses outlined below. Due to the long growing season, any plots that were not completely killed, were able to recover and produce some grain yield. Of the new breeding lines, several showed improved early vigour and in many cases ability to recover from early infection.

Table 1. Ascochyta blight disease scores (0=no symptom; 9=complete infestation) recorded at various times grown at Curyo and Rupanyup in the 'nil' fungicide treatment in 2016. *Varieties ranked according to average percentage reduction in grain yield across the two trial sites.*

	CURYO				RUPANYUP		
Variety[1]	**3 Aug**	**16 Aug**	**1 Sept**	**25 Oct**	**8 Aug**	**1 Sept**	**25 Oct**
CICA1454	2.3	3.8	2.8	4.8	2.0	3.3	2.8
Kalkee	3.0	5.5	4.8	6.8	2.5	3.3	4.3
CICA1551	3.3	4.5	3.5	5.5	2.4	3.5	2.9
CICA1552	3.0	3.8	3.3	6.3	3.0	3.5	3.5
Almaz	4.5	6.3	6.0	7.0	3.0	4.0	4.8
Genesis090	4.0	5.0	5.0	6.3	2.8	4.8	4.0
CICA1352	3.5	4.8	4.3	6.3	2.4	2.8	3.9
CICA1156	3.8	6.0	5.3	6.8	2.5	4.0	3.8
CICA1541	4.3	6.5	6.8	7.0	2.8	4.5	4.0
CICA1452	5.0	7.0	7.3	8.3	2.7	5.8	5.6
CICA1442	2.3	4.8	5.5	8.5	3.0	5.5	6.3
PBA Monarch	5.3	7.5	7.3	8.5	2.5	6.0	5.8
Neelam	3.8	6.3	6.8	8.3	1.8	4.0	4.8
PBA Slasher	6.0	7.3	7.3	8.0	2.8	6.0	5.5
PBA Maiden	5.3	7.0	7.0	8.5	3.5	6.5	7.3
Ambar	3.5	5.8	6.5	8.0	2.3	4.8	5.8
Sonali	5.3	6.5	6.8	8.8	2.5	5.3	7.0
PBA Striker	5.5	7.5	7.8	9.0	3.0	6.0	7.8
Howzat	6.0	8.0	8.3	9.0	2.8	6.3	7.8
CICA1007-038					2.3	6.5	8.8
CICA1007-081					3.3	6.8	8.8
CICA1007-077					3.5	7.5	8.8
LSD (P<0.05)	*1.6*	*1.5*	*1.6*	*0.7*	*NS*	*1.7*	*1.2*
CV	*19.0*	*13.4*	*11.9*	*5.3*	*6.7*	*28.8*	*10.5*

1. Underlined varieties at Desi types; no underline are kabuli's

- Grain Yield: Analysis of variance showed statistically significant interaction between the varieties/breeding lines, and fungicide treatments at Curyo and Rupanyup. At Rupanyup, grain yield in the fortnightly treatment ranged from 3.36 for CICA1454 to 2.25 t/ha in CICA1007-077 compared to 0.18 in CICA1007-077 to 2.79 t/ha in CICA1454 without application of fungicide (Table 2). The commercial varieties Howzat, PBA Striker and new breeding lines CICA1007-038, CICA1007-077 and CICA1007-081 showed high susceptibility to ascochyta blight with a yield loss of 64 to 92%. The breeding lines CICA1454, CICA1452 and CICA1541 showed relatively better resistance to ascochyta blight with grain yield of 2.39 - 2.79t/ha under the nil treatment, and a fortnightly application of chlorothalonil increased yield of these lines by 17, 21 and 33%, respectively. Under the fortnightly fungicide spray treatment, CICA1541, CICA1454, CICA1552, Ambar, PBA slasher and PBA Monarch were among the high yielding lines and varieties.

  Due to the observed higher level of disease infestation, the grain yield of Chickpea at Curyo was generally less than Rupanyup in both the 'nil' and 'fortnightly' fungicide treatments. At Curyo, the yields in the fortnightly fungicide treatment were lower than expected given the rainfall, ranging from 2.06 t/ha for Neelam to 0.99 t/ha for Kalkee (Table 2). This is likely to be related to the excessive biomass that was produced prior to flowering and the ongoing cold conditions during the reproductive phase,

which meant many flowers and pods were aborted. In the nil treatment grain yields ranged from 1.48 t/ha for CICA1454 to zero for Howzat and PBA Striker. All desi varieties and breeding lines suffered yield loss greater than 70%, except CICA1541 at 25%. Conversely, many kabuli's showed no statistically significant loss, although for all varieties/breeding line, except Kalkee and CICA1454, yields were less in the nil compared with fortnightly fungicide treatment.

It could be expected in a season with a dryer and/or warmer finish to the season yield losses could be larger as plots affected by disease would not have been able to recover from disease. Further is ongoing to investigate more cost effective disease management strategies and understand the impact of ascochyta blight on seed quality.

Table 2. Grain Yield of chickpeas grown at Curyo and Rupanyup in 'nil' fungicide treatment in comparison to fortnightly fungicide application (7 sprays) in 2016. *Varieties ranked according to average percentage reduction in grain yield across the two trial sites.*

	CURYO			RUPANYUP		
Variety[1]	**Fortnight**	**Nil**	***% Red***	**Fortnight**	**Nil**	***% Red***
CICA1454	1.35	1.48	*-10*	3.36	2.79	*17*
Kalkee	0.99	1.10	*-11*	2.41	1.81	*25*
CICA1551	1.44	1.38	*4*	3.22	2.29	*29*
CICA1552	1.48	1.31	*12*	3.34	2.30	*31*
Almaz	1.31	1.12	*15*	3.08	2.04	*34*
Genesis090	1.69	1.38	*19*	3.12	2.15	*31*
CICA1352	1.49	1.21	*19*	3.18	2.19	*31*
CICA1156	1.71	1.18	*31*	2.79	2.09	*25*
CICA1541	1.53	1.14	*25*	3.59	2.39	*33*
CICA1452	1.29	0.37	*72*	3.20	2.52	*21*
CICA1442	1.66	0.46	*72*	2.52	1.71	*32*
PBA Monarch	1.20	0.54	*55*	3.45	1.44	*58*
Neelam	2.06	0.54	*74*	3.04	1.82	*40*
PBA Slasher	1.98	0.60	*70*	3.44	1.67	*51*
PBA Maiden	1.61	0.36	*77*	2.99	1.63	*45*
Ambar	1.99	0.43	*78*	3.32	1.46	*56*
Sonali	1.79	0.24	*87*	2.90	1.25	*57*
PBA Striker	1.55	0	*100*	2.64	0.96	*64*
Howzat	1.69	0	*100*	2.63	0.85	*68*
CICA1007-038				2.59	0.44	*83*
CICA1007-081				2.38	0.25	*89*
CICA1007-077				2.25	0.18	*92*
LSD (P<0.05)		*0.41*			*0.69*	
CV		*8.9*			*17.5*	

1.Underlined varieties at Desi types; no underline are kabuli's