Chickpea, Disease Management (Novel), MRZ Wimmera (Horsham), Victoria

Aim

To evaluate potential new foliar fungicide spray strategies and varieties for management of aschochyta blight in chickpeas

Treatments

Varieties: PBA Striker and Genesis 090

Fungicide Treatments: Refer to Table 1

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. Post infection sprays were applied when the first ascochyta blight lesions were observed, with trials inspected at least weekly. Due to late rainfall, all treatments had a podding Chlorothalonil fungicide applied to protect the pods and seed quality.

The trial was inoculated with infected stubble on 18th July 2018.

Table 1. Fungicide treatments and the number of sprays applied for each fungicide spray to assess the control of Ascochyta Blight in chickpea at Horsham during 2018.

Seed Treatment	Rate (g/kg)	In Season Fungicide	Rate (gai/ha)	Timing	Number of Sprays
Thiram Thiabendazole	0.72 0.4	Captan	1000	Strategically	2+1[A]
Thiram Thiabendazole	0.72 0.4	Propiconazole[B]	125	Strategically	2+1 [A]
Thiram Thiabendazole	0.72 0.4	Chlorothalonil	1080	Strategically	3
Thiram Thiabendazole	0.72 0.4	Tebuconazole Azoxystrobin	200 120	Strategically	2+1[A]
Thiram Thiabendazole	0.72 0.4	Bixafen Prothioconazole	45 90	Strategically	2+1[A]
Thiram Thiabendazole	0.72 0.4	Tebuconazole + Azoxystrobin	200 120	Post Infection	1+1[A]
Thiram Thiabendazole	0.72 0.4	Bixafen Prothioconazole	45 90	Post Infection	1+1[A]
Fluxapyroxad	0.5	Bixafen Prothioconazole	45 90	Post Infection	1+1[A]
Thiram Thiabendazole	0.72 0.4	Chlorothalonil	1080	Fortnightly	7

[A] This was a final podding spray of Chlorothalonil (1080 gai/ha) due to a late rainfall event

[B] Please note Propiconazole was not under permit during 2018

Other Site Details

Sowing Date	22 May
Stubble (height cm)	Standing (20)
Row Spacing (cm)	36
Fertiliser (kg/ha)[1]	80
Plant density (plants/m^2)	35

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

- **Key Messages:** Significantly more ascochyta blight infection and lower grain yields were observed in PBA Striker (rated S) than Genesis090 (MS). Captan and Propiconazole treatments were also less effective in controlling ascochyta blight than the tebuconazole + Azoxystrobin and Bixafen + Prothioconazole, but both the Captan and Propiconazole treatments had less disease than the untreated plots. This did not equate to significantly different grain yields due to the dry season with low grain yields overall.

- **Establishment and Plant Growth:** Plant growth and establishment was late with reduced rainfall throughout the season. Numerous small rainfall events were observed but equated to little plant growth with the soil drying quickly. Warmer than average temperatures and decreased rainfall limited yield at the site.

- **Plant Disease:** Ascochyta blight infection started well at the site post inoculation, with symptoms progressing well. Despite fog throughout August, with frequent small rainfall events, the warmer conditions and lack of significant rainfall meant that it was drier and therefore there was limited disease progress past this time. Multiple assessments were undertaken but the disease did not progress further than the results presented in Figure 1. This meant that the susceptible variety PBA Striker had only 70% plot area affected during 2018.

- **Treatment Comparison:** In an analysis of variance, variety, treatment and the interaction between the two were significant ($P<0.05$). Significantly more infection was observed in PBA Striker (rated S) than Genesis 090 (rated MS). Captan and Propiconazole treatments were also less effective that tebuconazole + Azoxystrobin and Bixafen + Prothioconazole, but they did have less disease than the untreated plots.
- Late rainfall events meant that a late Chlorothalonil application was sprayed over all treatments except the nil. This resulted in significant levels of pod infection across the trial with an assessment undertaken and presented in Figure 2. Variety was not significant as there is no pod resistance to ascochyta blight, however, there was a significant difference in fungicide treatments. All fungicide treatments had significantly less pod infection than the untreated plots. The Captan and Propiconazole treatments also appeared to have more pod infection than the other fungicides and the Chlorothalonil fortnightly treatment had the least. This trend followed the same trend as the plot infection, probably as more ascochyta was present in the plots to infect the pods. This highlights the importance of in season control of ascochyta blight to also protect the pods.

- **Grain Yield and Profitability:** Grain yields were low, with yields averaging between 0.18 and 0.65 t/ha (Table 2). There was a significant difference detected in grain yield between fungicide treatments, and varieties, but no significant interaction between them. There were very little differences between treatments, with all fungicide treatments yielding higher than the untreated. The moderately susceptible (MS) variety Genesis 090 also yielded higher than the susceptible variety PBA striker. The Captan and Propiconazole treatments ranked lower for grain yield but this was not significantly different to some of the other fungicide treatments.

- **Grain Quality:** There was a significantly ($P<0.001$) higher grain weight in the Kabuli variety Genesis 090 compared to the Desi variety PBA Striker as expected with the 100 grain weights 32.3 g and 25.7 g, respectively. Table 3 shows the seed size distribution and seed size index between the 10 different treatments for the Kabuli chickpea variety Genesis 090. The only two size categories that showed significant ($P<0.05$) differences between fungicide treatments were the 7-8 mm and 9-10 mm categories (Table 3). These results indicated the untreated and Propiconazole treated plots had a lower percentage in the 7-8mm category (approx. 3-5%) and a higher percentage (approx. 1%) in the 9-10 mm category (Table 3).

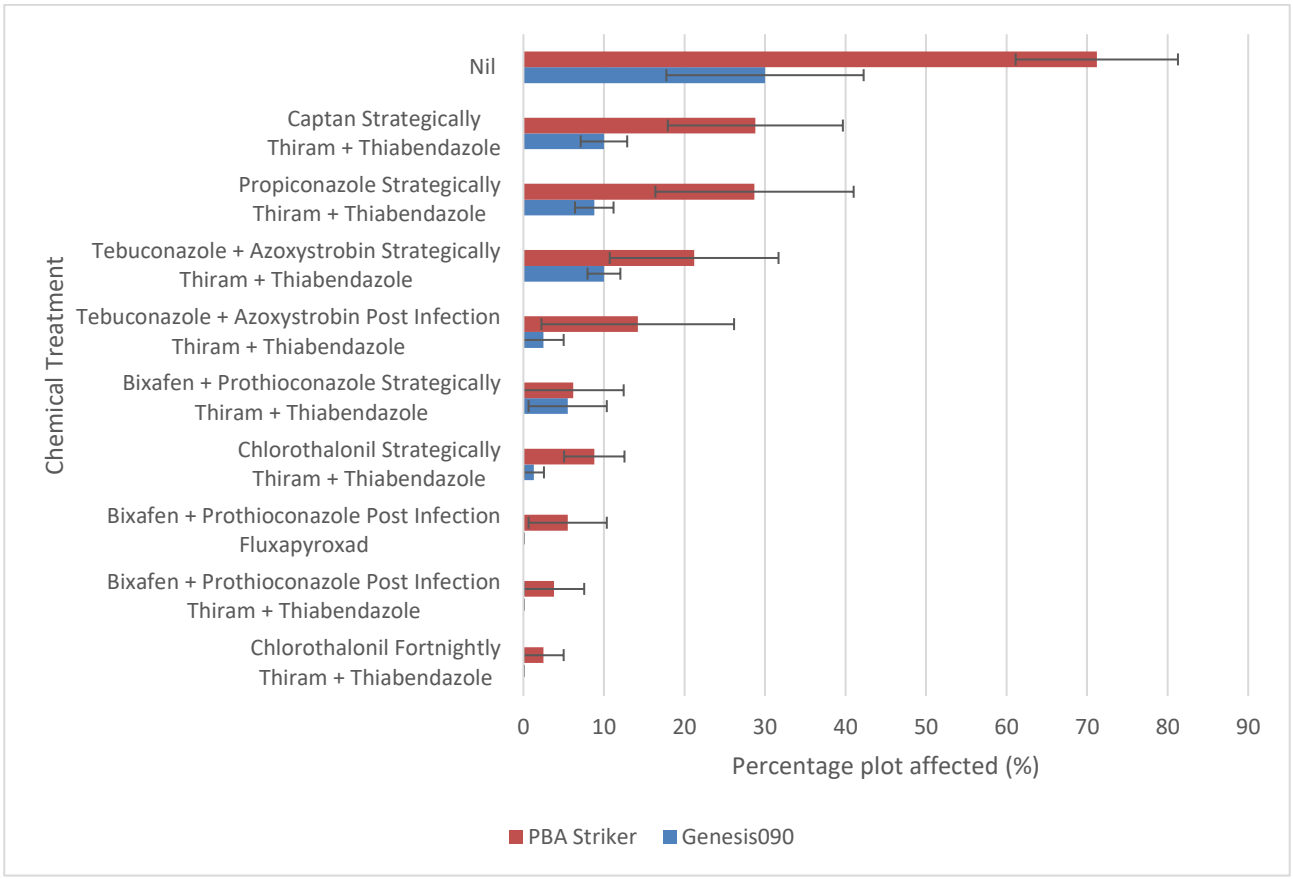

Figure 1. Percentage (%) of plot affected by ascochyta blight in the varieties Genesis 090 and PBA Striker untreated (nil) and treated with nine different fungicide strategies at Horsham assessed on the 24th September 2018. P values (LSD); variety==<0.001 (5.2), treatment =<0.001 (11.7), treatment x variety=0.041 (16.5).

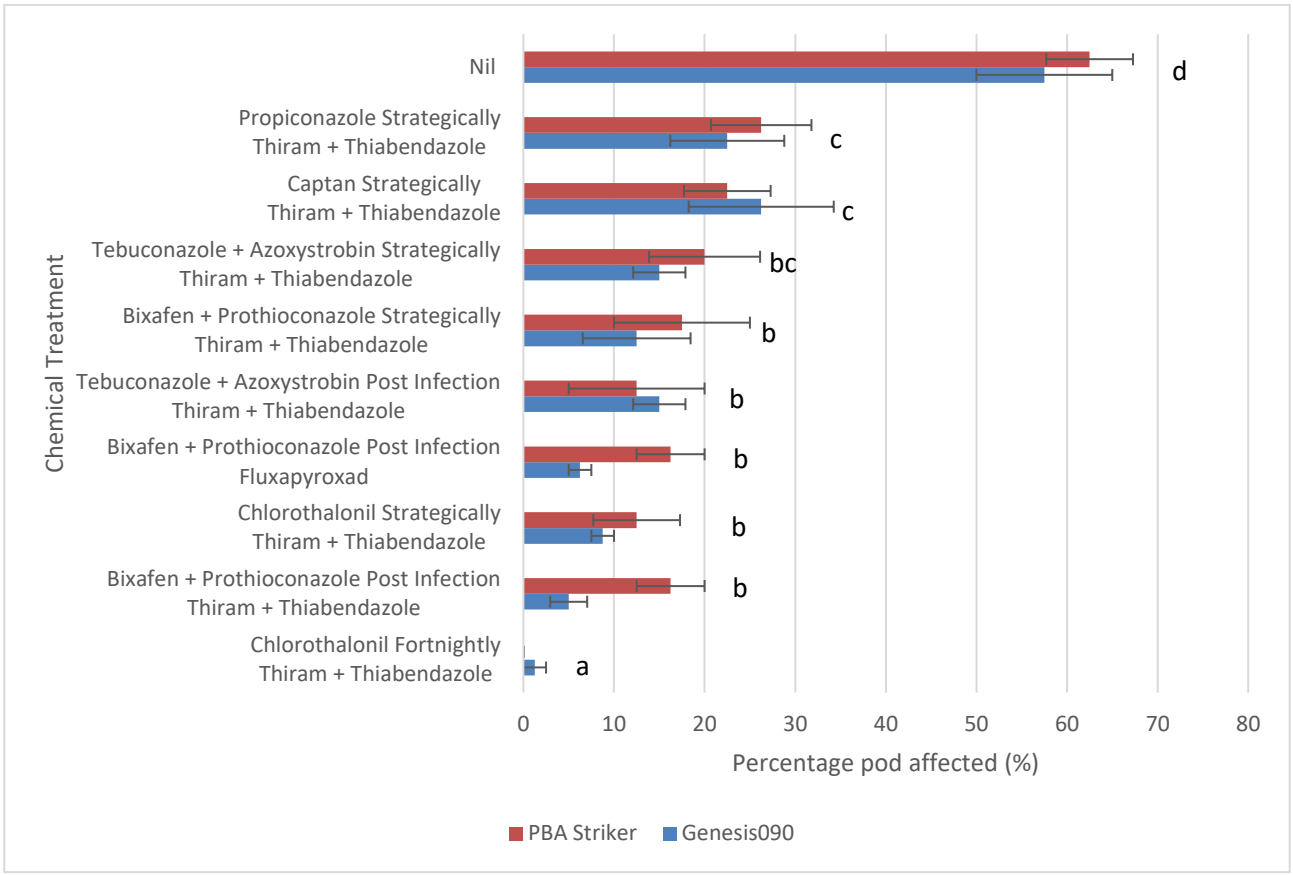

Figure 2. Percentage (%) of pods affected by ascochyta blight in the varieties Genesis 090 and PBA Striker untreated (nil) and treated with nine different fungicide strategies at Horsham assessed on the 29th September 2018. P values (LSD); variety=0.069 (*n.s.*), treatment =<0.001 (8.7), treatment x variety=0.758 (*n.s.*). [A] Different letters indicate a significant pairwise difference between fungicide treatments in ascochyta blight pod infection (P<0.05).

Table 2. Grain yield of Genesis090 and PBA Striker chickpeas treated with 10 fungicide treatments at Horsham during 2018. Different letters indicate pairwise significance where the variety, treatment or interaction were significant (P<0.05).

Seed Treatment	In Season Fungicide	Grain Yield (t/ha)		
		Genesis 090	PBA Striker	Average
Nil	Nil	0.42	0.18	0.30 a [A]
Thiram + Thiabendazole	Captan Strategically	0.53	0.41	0.47 b
Thiram + Thiabendazole	Propiconazole Strategically	0.54	0.43	0.48 bc
Thiram + Thiabendazole	Chlorothalonil Strategically	0.50	0.49	0.49 bc
Thiram + Thiabendazole	Tebuconazole + Azoxystrobin Strategically	0.61	0.39	0.50 bc
Thiram + Thiabendazole	Bixafen + Prothioconazole Strategically	0.58	0.52	0.55 bcd
Thiram + Thiabendazole	Tebuconazole + Azoxystrobin Post Infection	0.60	0.50	0.55 bcd
Thiram + Thiabendazole	Bixafen + Prothioconazole Post Infection	0.60	0.51	0.56 bcd
Fluxapyroxad	Fluxapyroxad on seed Bixafen + Prothioconazole Post Infection	0.63	0.51	0.57 cd
Thiram + Thiabendazole	Chlorothalonil Fortnightly	0.65	0.60	0.62 d
	Mean	0.57	0.45	
		P	**LSD**	
Variety		**<0.001**	**0.042**	
Treatment		**<0.001**	**0.093**	
Variety x Treatment		**0.303**	***n.s.***	

[A] Different letters indicate a significant pairwise difference between average grain yields (P<0.05)

Table 3. Seed size index and percentage of grains in each size category of the Kabuli chickpea variety Genesis 090 inoculated with ascochyta blight and undergoing 10 different treatment methods to control the disease conducted at Horsham during 2018.

Seed Treatment	In Season Fungicide	Seed Size Index	Seed Size (mm)					
			6	6-7	7-8	8-9	9-10	10-11
Nil	Nil	7.29	1.3	10.6	49.3 a	36.0	2.9 cd	0
Thiram + Thiabendazole	Bixafen + Prothioconazole, Post Infection	7.19	1.2	9.8	58.5 c	30.0	0.6 a	0
Thiram + Thiabendazole	Bixafen + Prothioconazole, Strategically	7.22	1.4	9.2	57.8 c	29.7	2 bcd	0
Thiram + Thiabendazole	Captan, Strategically	7.24	1.0	8.9	57.1 c	31.1	1.8 bcd	0
Thiram + Thiabendazole	Chlorothalonil, Fortnightly	7.29	0.9	8.0	53.7 abc	35.8	1.6 ab	0
Thiram + Thiabendazole	Chlorothalonil, Strategically	7.28	1.0	8.7	53.7 abc	34.9	1.8 abc	0
Thiram + Thiabendazole	Propiconazole, Strategically	7.32	1.0	8.9	50.4 ab	36.7	2.9 d	0
Thiram + Thiabendazole	Tebuconazole + Azoxystrobin, Post Infection	7.22	1.3	8.8	58.1 c	30.5	1.3 ab	0
Thiram + Thiabendazole	Tebuconazole + Azoxystrobin, Strategically	7.28	0.9	7.9	55.7 bc	33.8	1.8 bc	0
Fluxapyroxad	Bixafen + Prothioconazole, Post Infection	7.22	1.1	9.3	57 c	31.4	1.2 ab	0
Mean		7.25	1.1	9	55.1	33.0	1.79	0
P		**0.054**	**0.666**	**0.317**	**0.032**	**0.125**	**0.01**	
LSD		***n.s.***	***n.s.***	***n.s.***	**5.961**	***n.s.***	**1.135**	