L9 Disease Management, MRZ Yorke Peninsula (Maitland), South Australia

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Aim

To test under field conditions, the susceptibility and disease reactions of commercial lentil varieties and advanced breeding lines when inoculated with *ascochyta lentis* isolate collected from PBA Flash in a high intensity lentil growing region in SA.

Inoculation with *Ascochyta lentis* isolate under field conditions

The *Ascochyta lentis* isolate tested in the field study was sourced from infected PBA Flash lentil stubble collected from Balaklava, SA in 2016. The stubble was collected into large mesh bags and incubated outside under the weather conditions until Pseudothecia maturation was reached. Pseudothecia maturation was determined by monitoring the night temperatures and noting the period when temperatures reached 10 °C or lower. Once the spore maturation was reached, the trial was inoculated by spreading the infected stubble adjacent to the lentil seedlings at the 4 node growth stage. The trial consisted of two treatments namely; a fortnightly Chlorothalonil (2 L/ha) and control treatment which consisted of unsprayed plots, herein referred to as Nil or unprotected. The first fortnightly Chlorothalonil was sprayed at the time of spreading the AB infected stubble. Follow on applications of fortnightly Chlorothalonil were conducted ahead of rainfall events.

The varieties/lines tested are presented in Table 1.

Table 1: Agronomic characteristics of selected varieties

Seed type	Variety	Vigour	AB Foliage rating
Small red	Nipper	Poor/Moderate	MR/MS
	PBA Hurricane XT	Moderate	MR
Medium red	PBA Bolt	Moderate/Good	MR
	PBA Flash	Moderate	MS
	PBA Ace	Good	R
	Nugget	Moderate	MR/MS
	PBA Blitz	Moderate/Good	MR
Large red	PBA Jumbo 2	Moderate/Good	R
Medium and large green	PBA Greenfield	Good	MR/MS
	Boomer	Good	MR
Advanced breeding lines	CIPAL1301	*	*
	CIPAL1422	*	*

*R = resistant, MR = moderately resistant, MS = moderately susceptible, * = limited field evaluation*

Table 2: Effect of fungicide application on AB disease severity (%) and grain yield (t/ha) of selected lentil varieties/lines inoculated with *Ascochyta lentis* isolate collected from PBA Flash in Balaklava, SA in 2016.

	AB (% Severity*)		Grain Yield (t/ha)		Grain yield %
Variety	Fortnightly sprayed (#)	Unprotected (Nil)(#)	Fortnightly sprayed (#)	Unprotected (Nil) (#)	Reduction
Boomer	0	0	3.37	**2.97**	***12***
CIPAL1301	0	0	4.04	3.74	*7*
PBA Ace	0	0	3.58	3.23	*10*
PBA Bolt	0	0	3.65	3.60	*1*
PBA Hurricane XT	0	0	3.90	3.66	*6*
PBA Jumbo 2	0	0	4.42	**3.85**	***13***
CIPAL1422	0	1	3.63	3.44	*5*
PBA Blitz	0	2	3.74	3.70	*1*
PBA Greenfield	0	8	3.88	3.55	*8*
Nipper	0	8	3.89	**3.24**	***17***
Nugget	0	9	4.21	**3.69**	***12***
PBA Flash (susceptible check)	3	31	4.23	**2.42**	***43***

* Rated by SARDI Pathologists: Jenny Davidson & Sara Blake

#fortnightly sprays of chlorothalonil all season and 4 sprays of procymidone/carbendazim from canopy closure
Nil - 4 sprays of procymidone/carbendazim from canopy closure

Disease Assessment

Ascochyta disease was assessed visually as a percentage of diseased plants per plot at about 126 days (4 months) after sowing.

Result

- Application of fungicide had a significant effect on disease severity and grain yield over the control, however this was dependent on the variety.
- The application of fortnightly Chlorothalonil controlled AB foliar infection across all varieties apart from on PBA Flash where leaf lesions (3 %) were still observed.
- The level of disease severity in the unprotected (Nil) plots differed among varieties which indicated that there was variation in resistance/susceptibility to the AB isolate between varieties.
- There were no disease symptoms scored in commercial varieties PBA Ace (R), PBA Jumbo 2 (R), Boomer (MR/MS), PBA Bolt (MR) and PBA Hurricane XT (MR) in unprotected (Nil) plots which indicated a higher level of resistance to the AB isolate under investigation, while PBA Blitz (MR) and CIPAL1422 scored 2% and 1% disease each.
- Lower AB disease reactions were observed on commercial varieties Nugget (9%), PBA Greenfield (8 %) and Nipper (8%) indicating that these varieties have partial resistance and rated as MR/MS to the AB isolate.
- The highest disease reaction was scored in the moderately susceptible check, PBA Flash (31 %) in the unprotected plots, indicating a low level of resistance to the AB isolate. Continuous protection of leaf foliage through application of fortnightly Chlorothalonil ahead of rain was shown to be effective in controlling disease in this variety (Table 2).
- Grain yield was significantly improved from fungicide application over unprotected plots especially in varieties that had a lower genetic resistance to the AB isolate such as PBA Flash. The relative yield increase in PBA Flash was 75 % in fortnightly Chlorothalonil plot over the unprotected plot.
- Interestingly, varieties which showed no disease symptoms and currently rated as having foliar resistance to AB such as PBA Ace and PBA Jumbo 2, still showed a fungicide response to the fungicide treatments. An application of fortnightly Chlorothalonil improved grain yields by 11 % in PBA Ace and 15 % in PBA Jumbo 2 which indicated that apart from controlling disease, the fungicide may have had other growth enhancing benefits to the crops.

Conclusion

- The AB isolate caused a moderately susceptible disease reaction in unprotected (Nil) plots on varieties which are currently rated as being MR (PBA Blitz) and MR/MS (Nipper, Nugget and PBA Greenfield) which indicates a change in virulence of the AB isolate resulting in a loss of foliar AB resistance in these varieties.
- Research conducted by SARDI Pathology group and reported elsewhere (*Pulse Diseases 2017, GRDC Updates 2017 proceedings*) has shown that the AB isolate tested in the current trial, caused susceptible reactions in PBA Hurricane XT and disease reactions in PBA Ace and PBA Bolt when tested under controlled environmental conditions. This results were however not confirmed under field conditions in the current trial.
- The current results suggest that there is a change of virulence in the AB pathogen which may be causing a loss in foliar resistance on varieties currently rated as being relatively resistant. The AB isolate tested was collected from the high intensity lentil producing area in the Yorke Peninsula region in SA.
- Protection of the plant foliage through application of fortnightly Chlorothalonil significantly increased yield in the most susceptible variety, PBA Flash (76 %) over unprotected (Nil) plots.
- Grain yields were also improved in varieties that had moderate disease reactions together with those varieties that showed no disease symptoms, indicating the importance of fungicide sprays in not only controlling disease but also enhancing plant growth.
- All commercial lentil varieties should be managed as having potential for risk from foliar AB especially under favourable conditions that promote disease. Varieties will need close monitoring for disease during the growing season and strategic fungicide sprays will be required in all varieties even in the absence of disease symptoms particularly in varieties rated as having foliar resistance to AB pathogen.