SA Grain Legume Development and Extension Project

Summary of 2021 Field Trial Results

Trengove Consulting

Acknowledgements

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Project management

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Project Investment

Grains Research and Development Corporation: project UOA2105-013RTX "Development and extension to close the economic yield gap and maximise faming systems benefits from grain legume production in South Australia"

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Cover image: Melrose salt tolerant lentil variety trial, 10 September 2021

INTRODUCTION

The project aims to deliver local development and extension to close the economic yield gap and maximise faming systems benefits from grain legume production in South Australia.

Over the lifeline of the project (2021-2025), the proposed investment will:

- Address the current yield gap in grain legumes and drive its closure through supporting increased technical efficiency of growers with extension of best practice grain legume agronomy;
- Support grain growers and their advisers (100 per hub, 20 per spoke) in the target regions (Figure 1) to maximise system profitability by incorporating grain legumes in rotation;
- Drive and support sustainable expansion of the area grown to grain legumes; and
- A targeted 45% of growers adopt or intend to adopt new and novel practices emerging from linked proof-of concept and innovation research

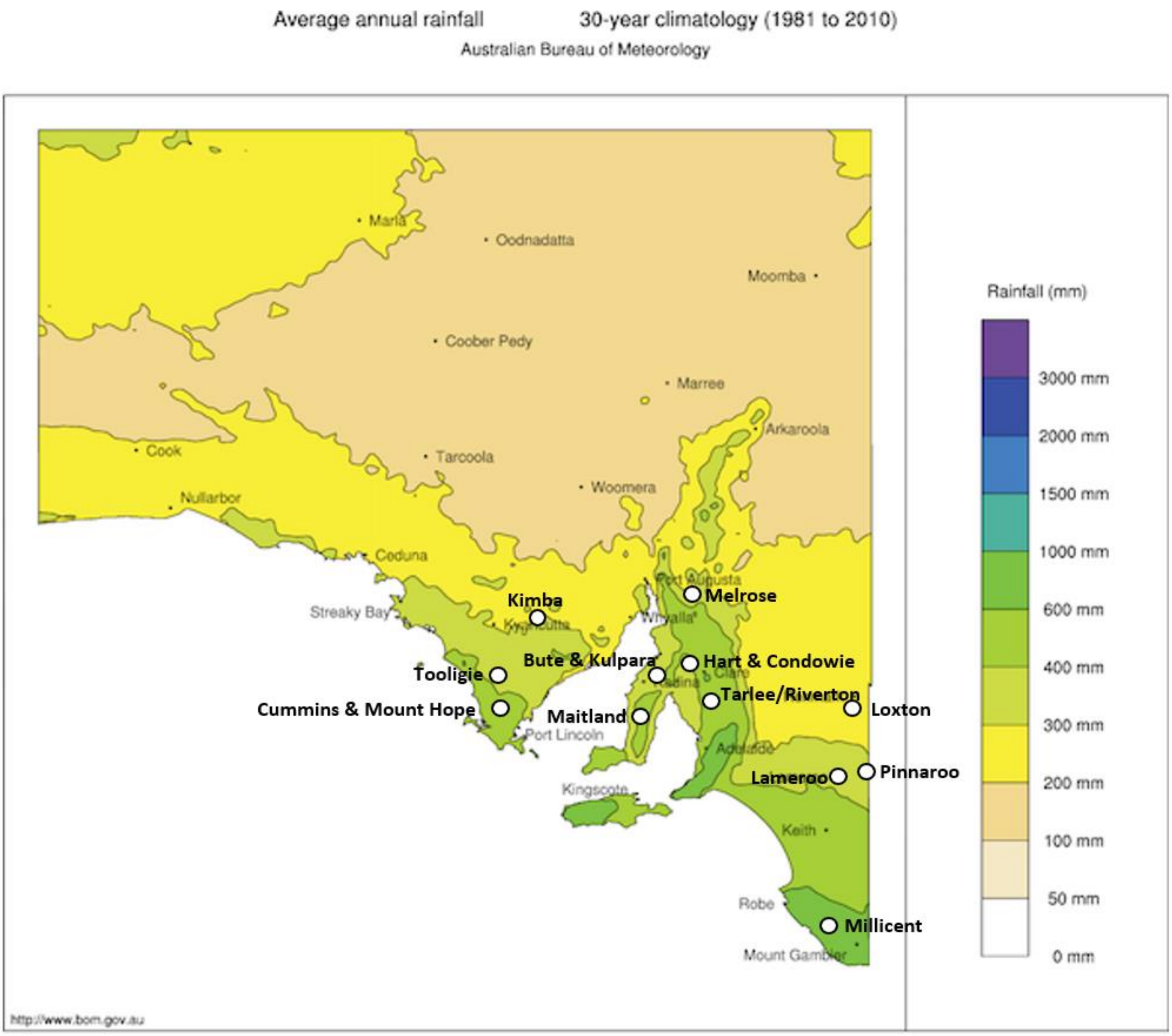

Figure 1. Trial locations for SA Grain Legume hub and spoke sites in 2021, selected by collaborators to represent the range of environments and soil types across the state's legume cropping regions.

MILLICENT

SITE SUMMARY

January to April rainfall (156 mm) at the Millicent spoke site was slightly above the long-term average (140 mm), providing an ideal start at sowing (Figure 2). May rainfall was below average, but winter rainfall (June to August) far exceeded the long-term average. This did not cause any waterlogging issues due to the free-draining and highly fertile organosol soil at the trial site. The soil profile maintained good moisture content throughout spring (September to November), despite below average rainfall. Broad beans produced large canopies that were able to out-compete weeds. However, weeds were uncontrolled in faba bean plots due to staff being unable to travel to the site from Victoria as per tight border restrictions during the pandemic. The total annual rainfall in 2021 (740 mm) was in line with the long-term average (746 mm).

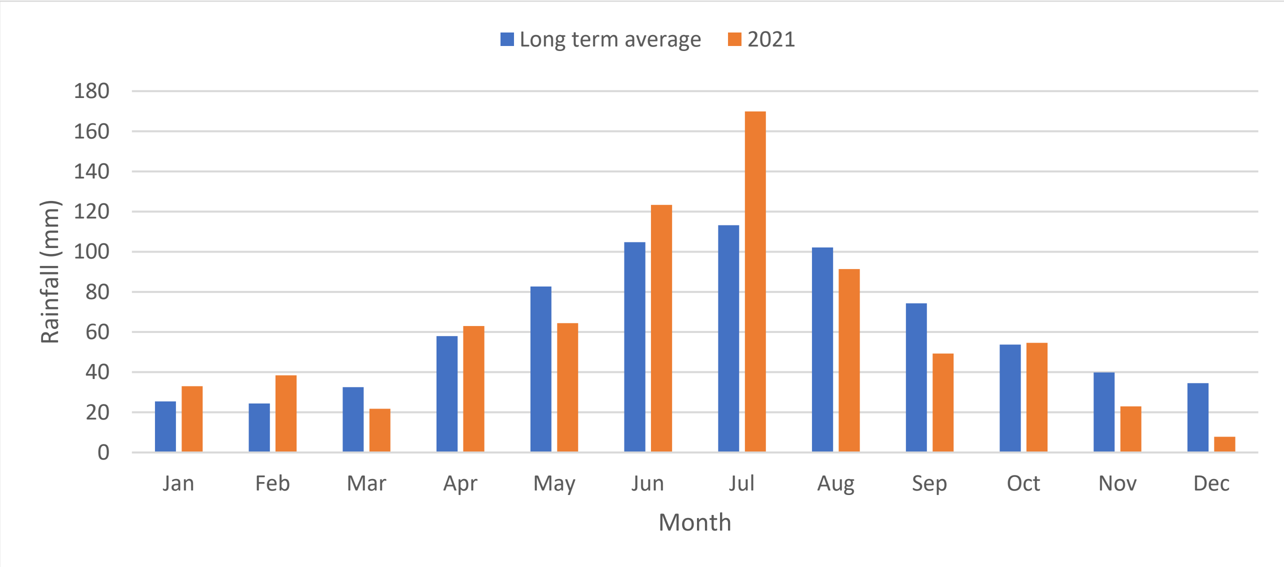

Figure 2. Monthly rainfall at Millicent in 2021 compared to the long-term average. Data from Millicent BOM weather station (#026018).

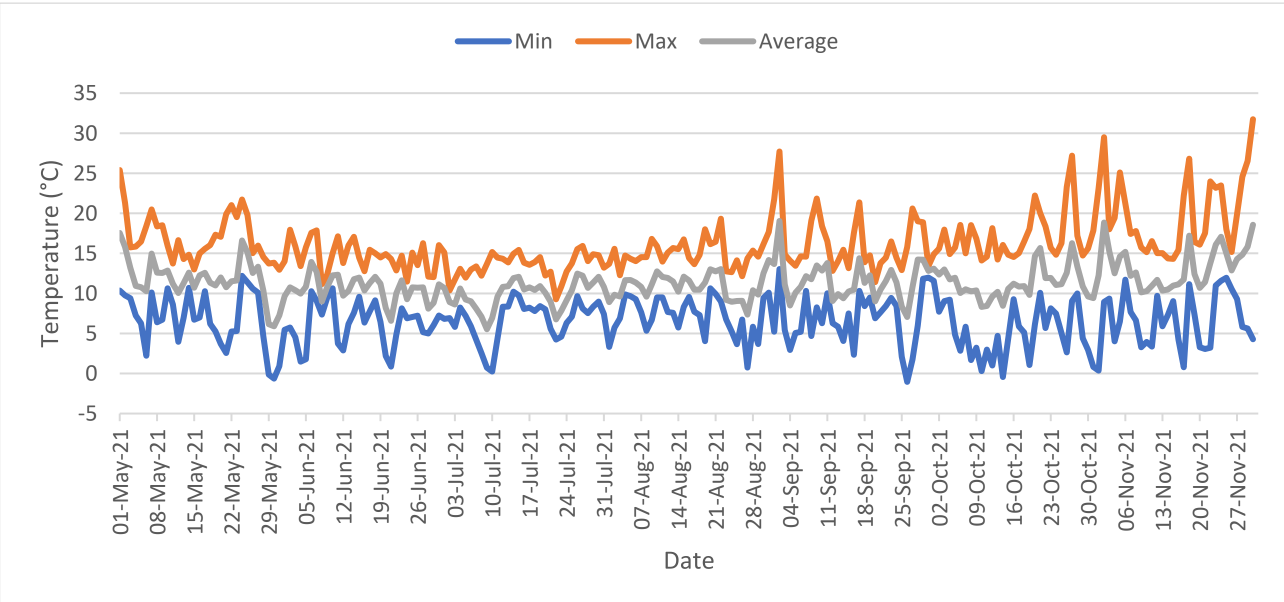

Figure 3. Daily minimum, maximum and average temperatures recorded at the Millicent spoke site in 2021.

Table 1. Soil analysis at the Millicent spoke site (0-10 cm) in 2021, sampled 1 June.

NO_3-N	P	K	S	Cu	OC	EC	pH	pH	
		(ppm)			(%)	(dS/m)	($CaCl_2$)	(H_2O)	
133	56	508	50	1.1	9.7	0.47	7.7	8.2	
B	**Fe**	**Mn**	**Zn**	**Ca**	**Exc Ca**	**Exc Mg**	**Exc K**	**Exc Na**	**Exc Al**
		(ppm)					**(meq/100g)**		
1.8	9	0.9	3.4	7509	37.54	2.00	1.30	0.4	0.07

FABA BEAN DISEASE MANAGEMENT

Max Bloomfield, Kenton Porker, Nick Poole, Kat Fuhrmann, Aaron Vague, Darcy Warren, Tracey Wylie. ***FAR***

Objective: Evaluate the potential to manage disease more sustainably in faba beans through improving management guidelines that dissect the interaction between fungicide application timing and improved genetic resistance.

Treatments: Seven fungicide treatments (Table 2) were applied to two faba bean cultivars, PBA Amberley and PBA Bendoc.

Table 2. Fungicide regimes, products, and targeted application timings in faba beans (actual application dates in parentheses), sown 8 May at Millicent, SA.

Fungicide treatment	4 Node (24 June)	1st Flowers (26 August)	1st Flower +14 days (15 September)	1st Flower +28 days (19 October)
Untreated				
1 Fungicide				Veritas
2 Fungicide			Chlorothalonil + Carbendazim	Veritas
3 Fungicide		Mancozeb	Chlorothalonil + Carbendazim	Veritas
4 Fungicide	Tebuconazole	Mancozeb	Chlorothalonil + Carbendazim	Veritas
2 Fungicide $$$			Miravis Star	Veritas
Flexible			Veritas	

Table 3. Fungicide product details including rate, active ingredient and concentration, as used at Millicent 2021.

Product	Active Ingredient (concentration)	Rate (mL or g/ha)
Carbendazim	Carbendazim (500 g/L)	500
Miravis® Star	Fludioxonil (150 g/L) + Pydiflumetofen (100 g/L)	750
Tebuconazole	Tebuconazole (430 g/L)	145
Mancozeb	Mancozeb (750 g/kg)	2000

Key messages:

- PBA Bendoc visually suffered from pale lime green leaves compared to PBA Amberley.
- PBA Amberley retained more green leaf in the lower layer of the canopy at late flower.
- 3 fungicide, 4 fungicide, and the 2 fungicide $$$ regimes significantly increased harvest dry matter.

There were no significant differences in the two-way interaction between cultivar and fungicide regime for disease at late flower (6 October; Figure 4 & Figure 5) or late pod fill (12 November; Figure 6 & Figure 7). PBA Amberley was more susceptible to chocolate spot (*Botrytis fabae*) in the upper layer of the canopy at late flowering, while PBA Bendoc was more susceptible to Ascochyta leaf spot (*Ascochyta fabae*) in the middle and upper layers of the canopy. The 3 fungicide regime significantly reduced chocolate spot severity in the upper canopy at late pod fill compared to the untreated, 1 fungicide, 2 fungicide, and 1 fungicide (weather) regimes. The 2 fungicide, 3 fungicide, 4 fungicide and 2 fungicide $$$ (expensive) regimes significantly reduced loss of green leaf area in the middle layer of the canopy at late pod fill compared to the untreated and 1 fungicide treatments.

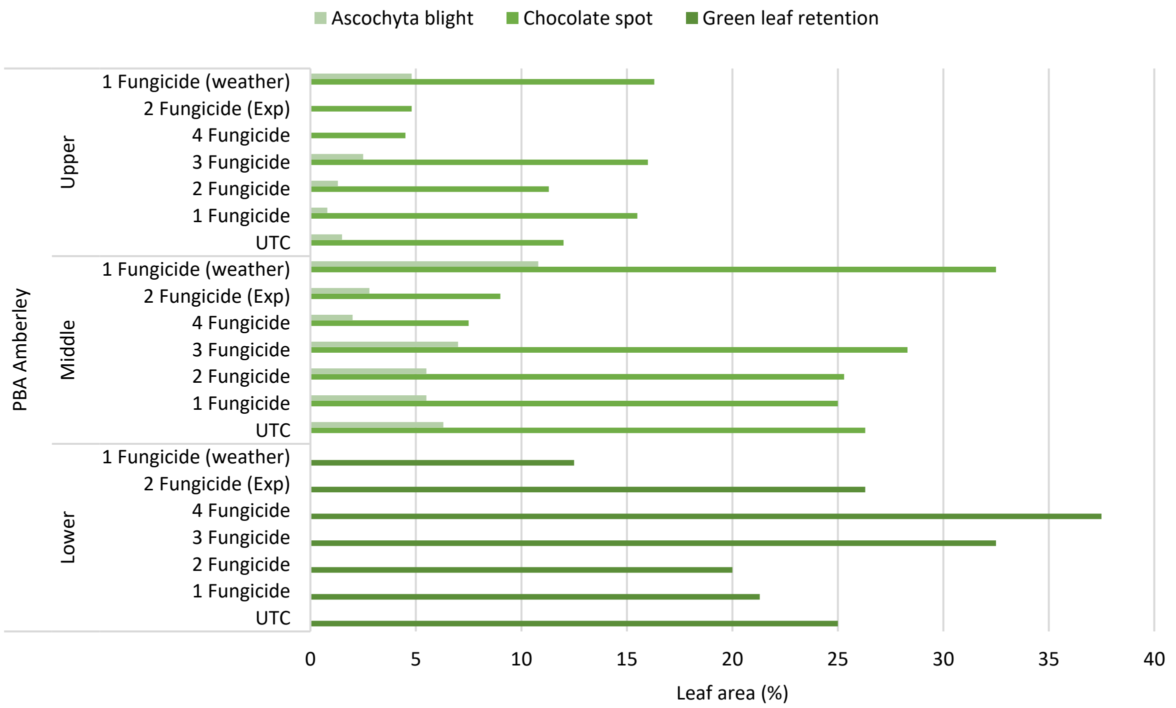

Figure 4. Effect of fungicide treatment on Ascochyta blight and chocolate spot infection (% LAI) in the middle and upper layer of the canopy, and green leaf retention (% LAI) in the lower layer of the canopy in PBA Amberley at late flower on 6 October 2021.

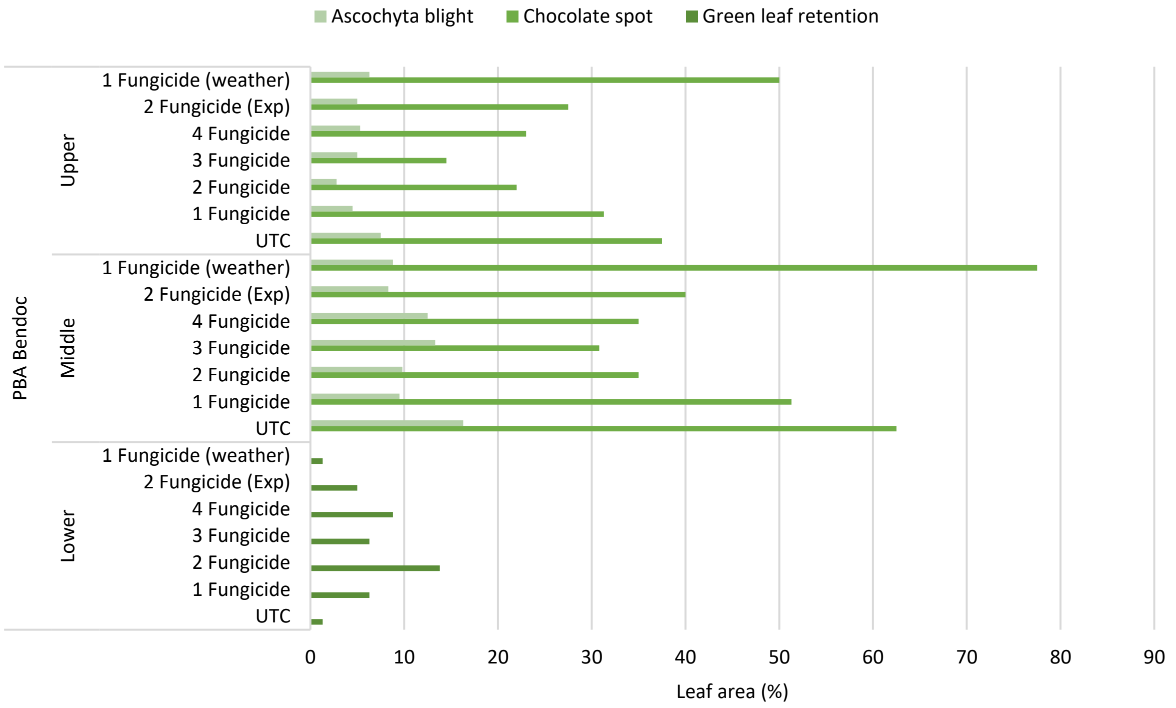

Figure 5. Effect of fungicide treatment on Ascochyta blight and chocolate spot infection (% LAI) in the middle and upper layers of the canopy, and green leaf retention (% LAI) in the lower layer of the canopy in PBA Bendoc at late flower on 6 October 2021.

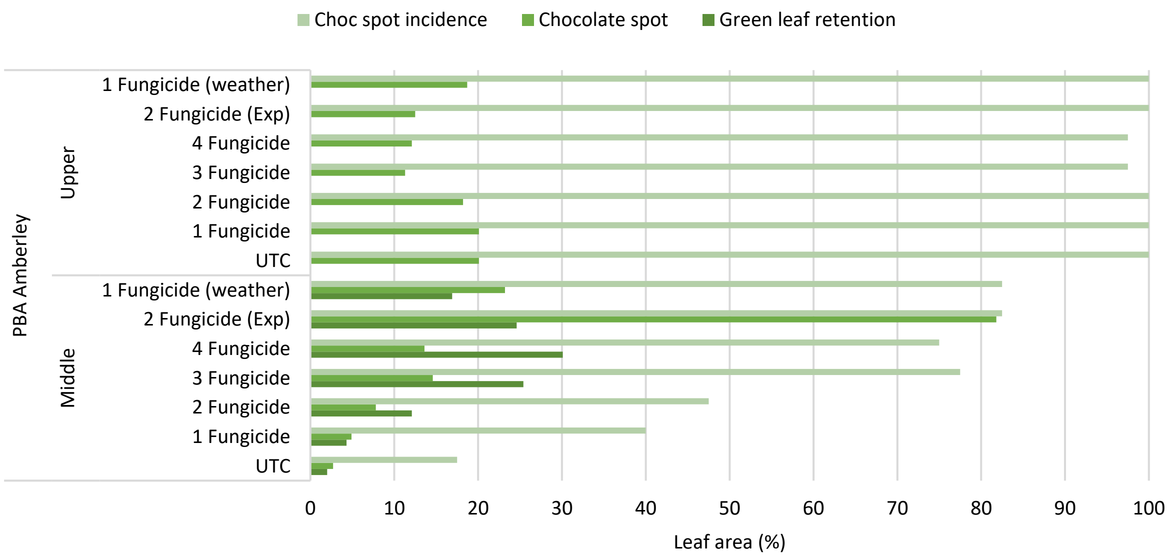

Figure 6. Effect of fungicide treatment on chocolate spot infection (% LAI) and incidence (% incidence) in the middle and upper layers of the canopy, and green leaf retention (% LAI) in the middle layer of the canopy in PBA Amberley at late pod fill on 12 November 2021.

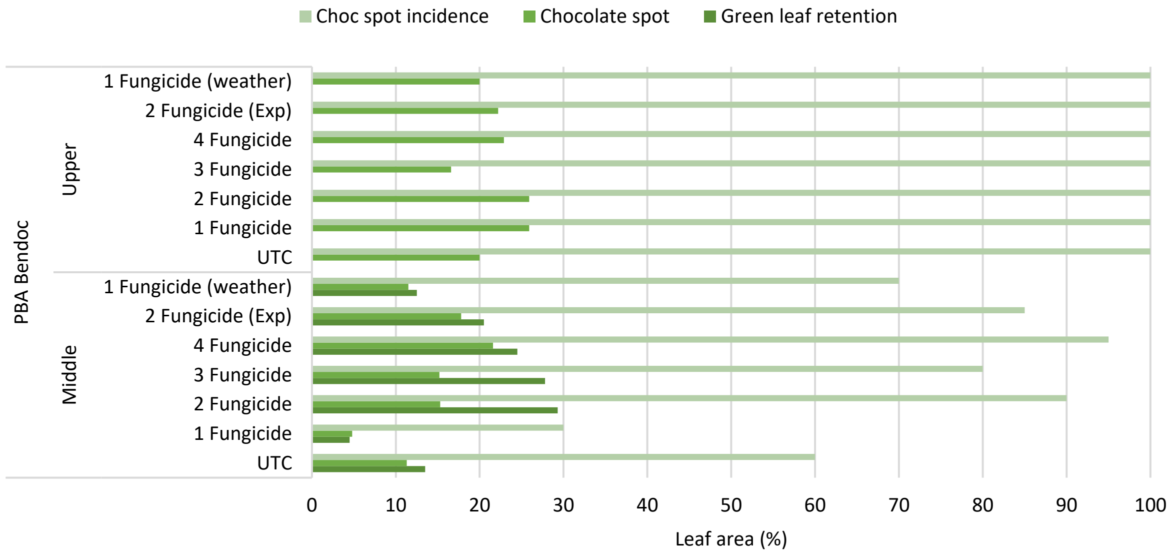

Figure 7. Effect of fungicide treatment on chocolate spot infection (% LAI) and incidence (% incidence) in the middle and upper layers of the canopy, and green leaf retention (% LAI) in the middle layer of the canopy in PBA Bendoc at late pod fill on 12 November 2021.

Mean harvest dry matter varied from 11.2 and 7.1 t/ha (untreated control) to 18.1 and 16.1 t/ha (3 fungicide) in PBA Amberley and PBA Bendoc, respectively (Figure 8), but statistically significant differences in the two-way interaction between cultivar and fungicide regime were not observed. There were no significant differences between cultivars either, but the 3 fungicide, 4 fungicide and 2 fungicide $$$ regimes significantly increased harvest dry matter compared to the untreated control.

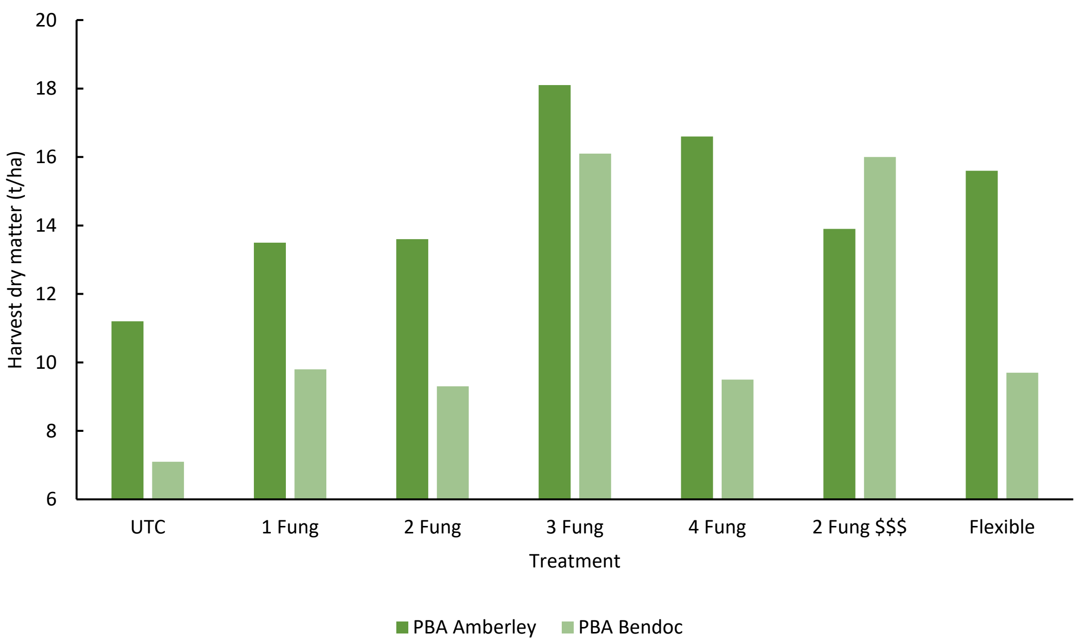

Figure 8. Effect of fungicide treatment and cultivar on harvest dry matter (t/ha). LSD (P = 0.05) = 5.4 (treatment x cultivar).

Preliminary results of harvested grain yield were not significant between UTC and 2 fungicide $$$, although there were large differences in yields of untreated controls (Figure 9). Yield results for the other treatments were not yet available at the time of writing.

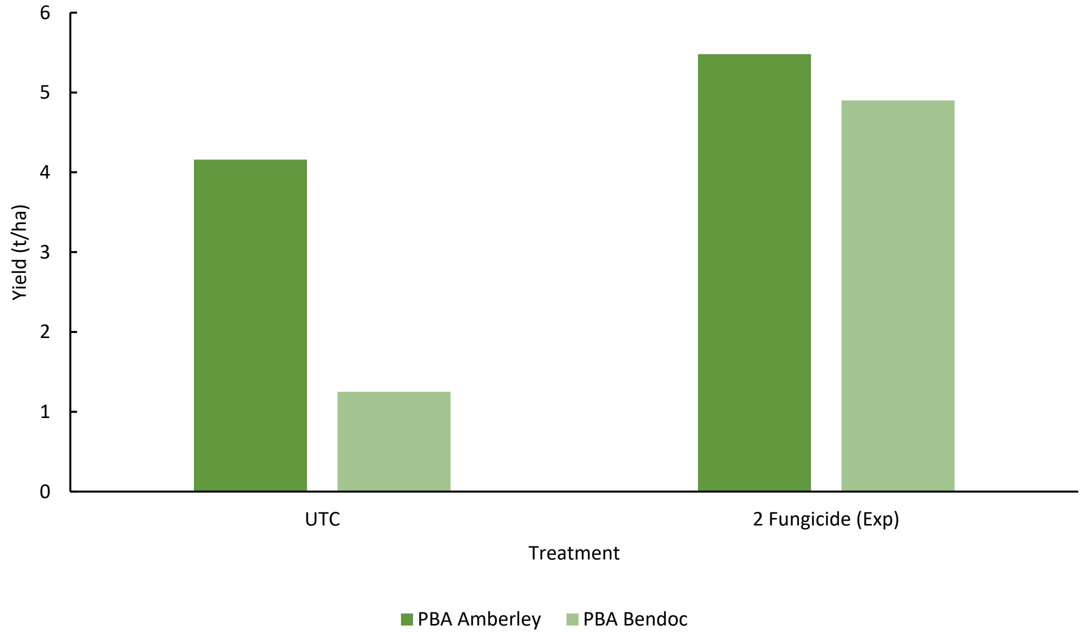

Figure 9. Effect of fungicide treatment and cultivar on grain yield (t/ha). LSD (P = 0.05) = 5.95 (treatment x cultivar).