SA Grain Legume Development and Extension Project

UOA2105-013RTX

2022 South East Field Trial Results

GRDC Grains Research & Development Corporation

The University of Adelaide

Government of South Australia, Department of Primary Industries and Regions

SARDI Research and Development Institute

Frontier Farming Systems

FAR Australia

EPAG Research

Trengove Consulting

agcommunicators.

Mallee Sustainable Farming

UNFS Upper North Farming Systems

HART SA's premier cropping field site

AIR EP Ag Innovation & Research Eyre Peninsula

Mid North High Rainfall Zone

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: Hart Field Day Site pulse varieties demonstration, 20 September 2022.

CONTENTS

MILLICENT

SITE SUMMARY

Below average rainfall in Autumn did not negatively affect sowing or germination at Millicent in 2022 (Figure 1). The trial was an in-crop set up with the paddock sown into Aquadulce broad beans by host farmer Brett Gilbertson on 21 May 2022. Rainfall was close to average during winter and continued above average throughout spring. Temperatures were mild throughout the year and the crop was harvested on 1 February 2023. The season proved to be a tough year for beans across the entire region with low yields being reported by all nearby farmers. This was attributed to above average spring rainfall and in turn very high disease pressure. Statistical significance was hard to come by as the crop struggled to respond to treatments.

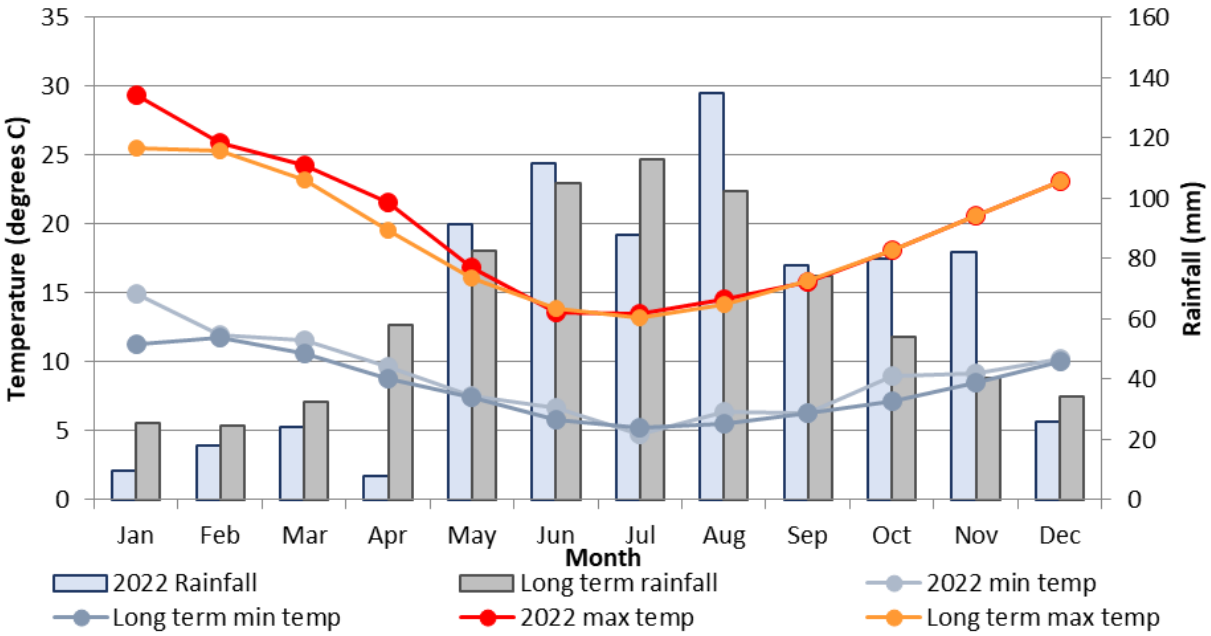

Figure 1. 2022 annual season rainfall and long-term rainfall recorded at Millicent (1877-2022) and long-term min and max temperatures recorded at Mount Gambier Aero (1941 to 2022) for the growing season (April to November). Rainfall April to November = 674 mm.

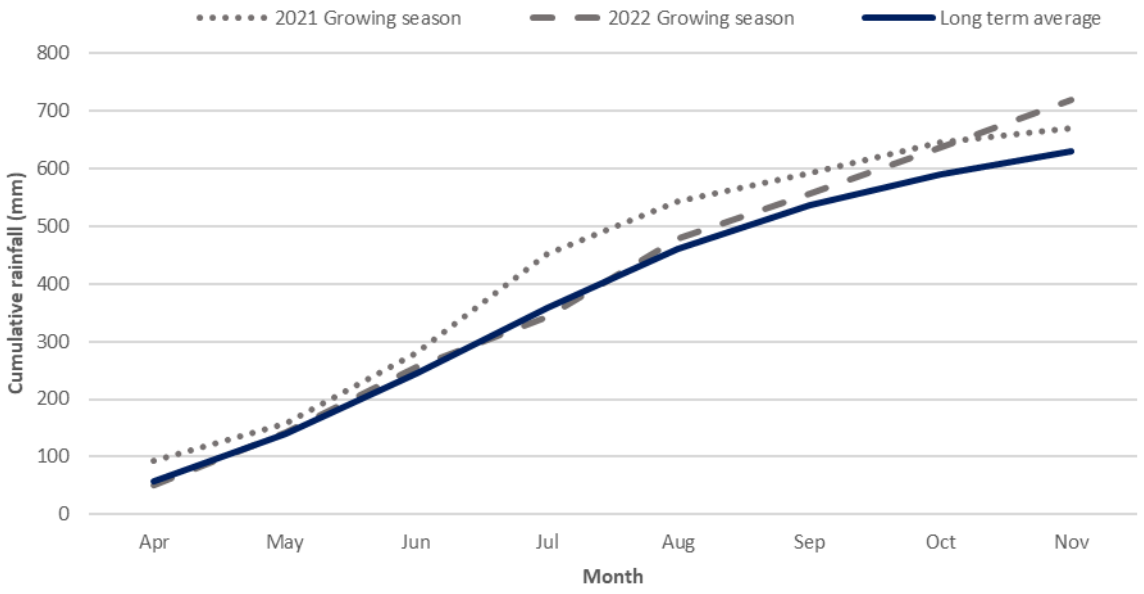

Figure 2. Cumulative growing season rainfall for 2021, 2022 and the long-term average for the growing season (April-December).

Table 1. Soil characterisation (peaty dark grey clay) for Millicent trial site, 2022.

Depth (cm)	NH_3-N	NO_3-N	P (mg/kg)	K	S	OC (%)	EC (dS/m)	pH ($CaCl_2$)	pH (H_20)	Soil Type
0-10	2.6	29	46	97	33	5.3	1.5	7.7	8.4	Clay
10-30	1.2	32	24	46	98	3.8	2.1	8.0	8.7	Clay

Depth (cm)	Cu	Fe	Mn (mg/kg)	Zn	B	Exc Ca	Exc Mg	Exc K (meq/100g)	Exc Na	Exc Al
0-10	1.10	21.0	4.0	3.4	3.3	36.0	1.6	0.25	0.55	<0.1
10-30	0.57	12.0	1.3	1.5	2.4	31.0	1.4	0.12	0.91	<0.1

IMPROVED DISEASE AND NUTRITION MANAGEMENT FOR HIGH YIELDING BROAD BEANS

Authors: Max Bloomfield, Aaron Vague, Daniel Bosveld, Nick Poole

Aims: These trials aim to test the efficacy of different fungicide regimes and nutrition to maximise yield in broad beans in a high yield potential environment.

Treatments: See Table 2 and Table 3

Table 2. Fungicide treatments and application dates for the disease management trial, Millicent 2022.

Tmt	4- node (21 July 2022)	1st Flower (3 October 2022)	1st Flower + 14 Days (2 November 2022)	1st Flower + 28 Days (17 November 2022)
1				
2				Chlorothalonil 2.3 L/ha Carbendazim 0.5 L/ha
3			Chlorothalonil 2.3 L/ha Carbendazim 0.5 L/ha	Chlorothalonil 2.3 L/ha Carbendazim 0.5 L/ha
4		Mancozeb 2 kg/ha Procymidone 240 g/ha	Chlorothalonil 2.3 L/ha Carbendazim 0.5 L/ha	Chlorothalonil 2.3 L/ha Carbendazim 0.5 L/ha
5	Tebuconazole 145 mL/ha	Mancozeb 2 kg/ha Procymidone 240 g/ha	Chlorothalonil 2.3 L/ha Carbendazim 0.5 L/ha	Chlorothalonil 2.3 L/ha Carbendazim 0.5 L/ha
6			Miravis® Star 750 mL/ha	Veritas® 750 mL/ha
7			Miravis® Star 750 mL/ha	Veritas® 750 mL/ha
8	Tebuconazole 145 mL/ha	Mancozeb 2 kg/ha Procymidone 240 g/ha	Miravis® Star 750 mL/ha	Veritas® 750 mL/ha

Table 3. Nutrition treatments and application timings for the nutrition trial, Millicent 2022.

Treatments	Description	Application timing
1	Untreated	----
2	50 kg P/ha + 100 kg N/ha	P at sowing, N on 7-Sep
3	4 T pig manure/ha	At sowing
4	50 kg P/ha	At sowing
5	100 kg N/ha	7-Sep
6	100 kg N/ha + Rapisol Fe trace element spray	7-Sep

Key messages

- Grain yields were reduced in 2022 by disease pressure (primarily chocolate spot), exacerbated by above average spring rainfall and mild temperatures.
- Three to four fungicide applications were typically required to increase grain yields.

Results and Discussion:

Plots for the two trials were marked out in-crop in a paddock of Aquadulce broad beans sown by the grower on 21 May 2022. Plots were harvested on 1 Feb 2023.

Above average rainfall in the later months of the growing season combined with mild temperatures meant that disease pressures in broad beans were exacerbated. This resulted in poor grain yields in all the trials, regardless of fungicide inputs.

Grain yields in the disease management trial were highest when early fungicide applications were made and then followed up with regular applications (treatments 4, 5 and 8), with the exception of treatment 7 that consisted of a single later application of a more expensive but effective SDHI chemistry.

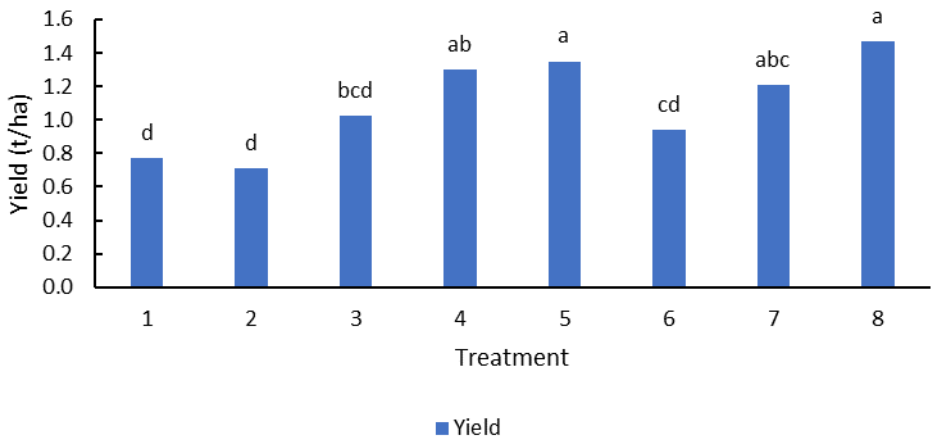

Figure 3. Effect of fungicide regime on grain yield (t/ha; p < 0.05). See Table 2 for treatment details. Grain yield bars labelled with the same letters indicate no significant difference in grain yield between treatments (P<0.05).

Grain yields in the nutrition trial were not significantly different (Figure 4), however, the untreated and 100 kg N/ha + foliar Fe trace element spray had the highest harvest index.

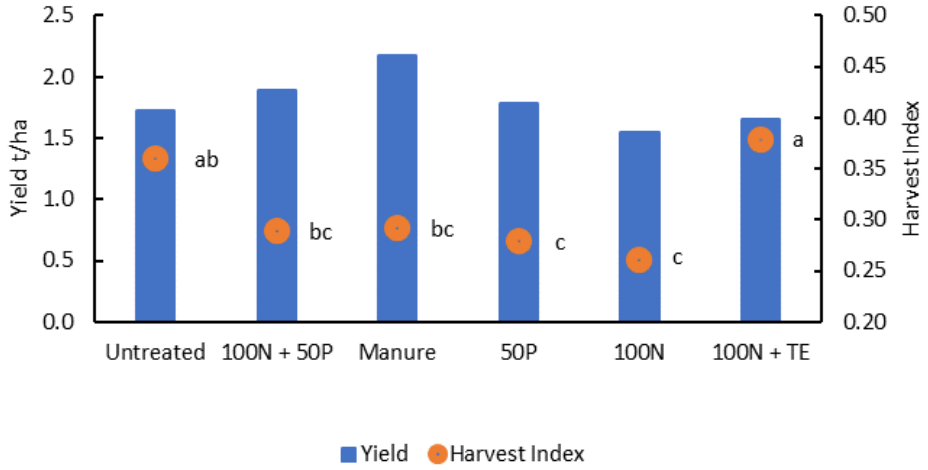

Figure 4. Effect of nutrition on grain yield (t/ha; p > 0.05) and harvest index (p < 0.05). See Table 3 for treatment details. Harvest index circles labelled with the same letters indicate no significant difference in harvest index between treatments (P<0.05).

CANOPY MANAGEMENT FOR HIGH YIELDING BROAD BEANS

Authors: Max Bloomfield, Aaron Vague, Daniel Bosveld, Nick Poole

Aim: To test the efficacy of novel canopy interventions to maximise yield in broad beans in high yield potential environment.

Treatments: See Table 4**.**

Table 4. Canopy management treatments and application dates for the canopy management trial, Millicent 2022.

Treatments	Description	Date
1	Untreated	----
2	Early defoliation (mechanical)	24/08/22
3	Late defoliation (mechanical)	11/10/2022
4	Early PGR	6/09/2022
5	Late PGR	3/10/2022
6	Early chemical defoliation	6/09/2022

Results and Discussion:

Plots were marked out in-crop in a paddock of Aquadulce broad beans sown by the grower on 21 May 2022. Plots were harvested on 1 Feb 2023.

Above average rainfall in the later months of the growing season combined with mild temperatures meant that disease pressures in broad beans were exacerbated. This resulted in poor grain yields in all the trials, regardless of fungicide inputs.

Chemical canopy management interventions had no significant effect on yield or harvest dry matter. However, mechanical defoliation significantly reduced yield and harvest dry matter (Figure 5). These treatments will be explored again in 2023.

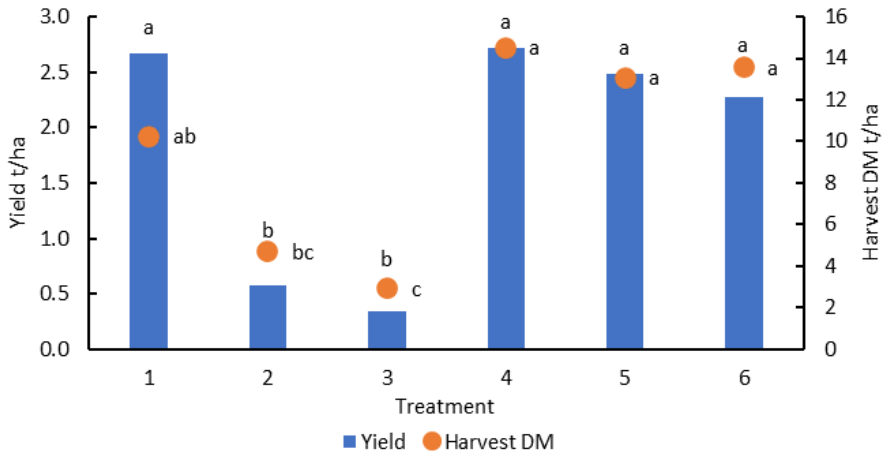

Figure 5. Effect of novel canopy management on grain yield (t/ha) and harvest dry matter (t/ha) in broad beans at Millicent, 2022. Grain yield bars labelled with the same letters indicate no significant difference in grain yield between treatments (P<0.05). Harvest index circles labelled with the same letters indicate no significant difference in harvest index between treatments (P<0.05).