

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 farming 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 farming 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

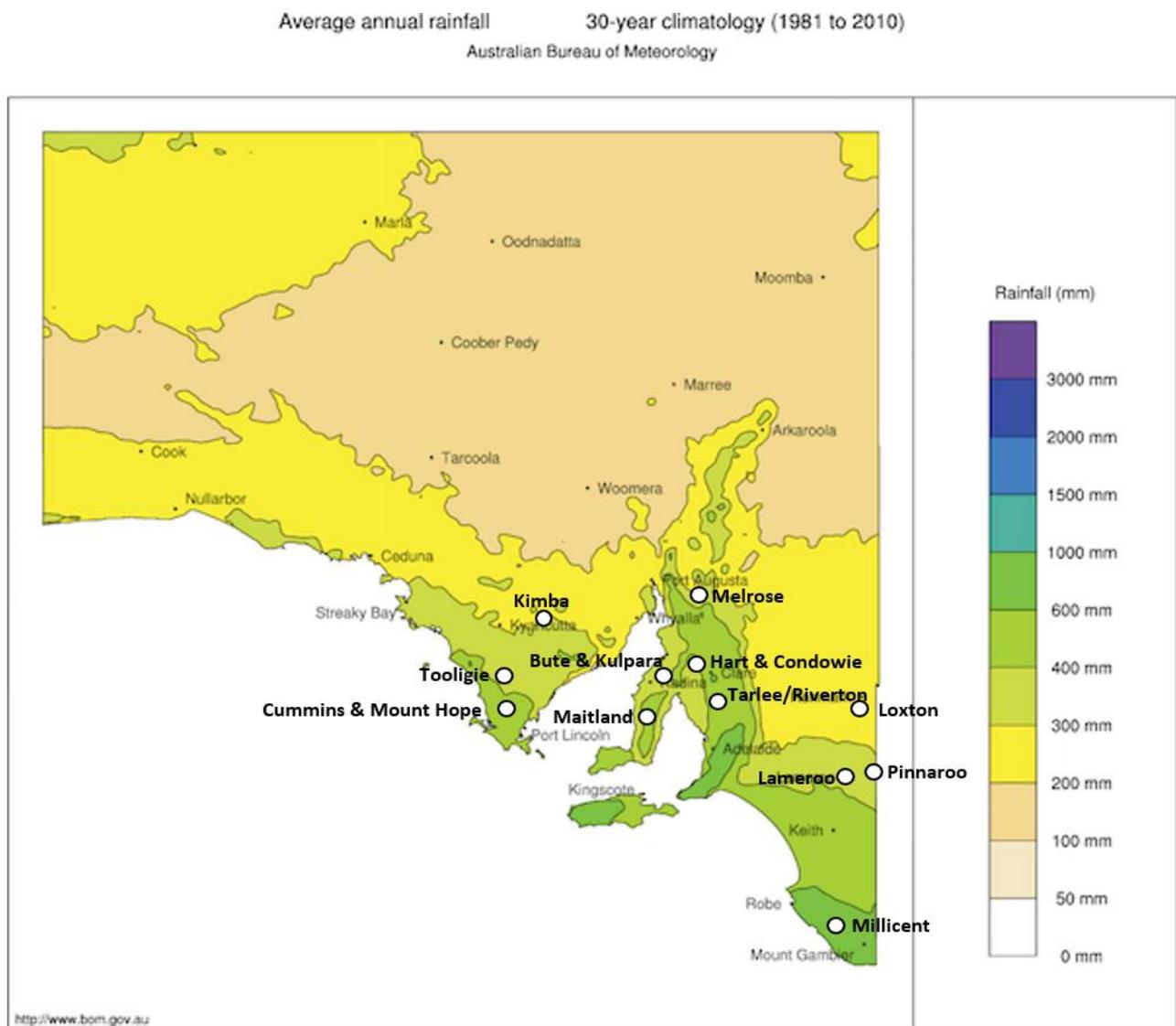


Figure 1. Trial locations for SA Grain Legume hub and spoke sites in 2021, selected by collaborators to represent the range of environments and soil types across the state’s legume cropping regions.

CUMMINS

SITE SUMMARY

Cummins is in the medium rainfall zone on the lower Eyre Peninsula. Above average rainfall during late spring and into harvest 2020, followed by below average rainfall in March/ April 2021 saw soil moisture levels approximately at 50% of plant available water capacity at the end of April at the Cummins site, 2021. Season breaking rainfall did not occur until 26 May 2021. Trials were sown on 29 May. Rainfall received during June and July at the site was above average for that period (Figure 2). Rainfall was below average in August and much below average in September, followed by a wetter than average finish to the growing season. Both maximum and minimum temperatures were below long-term averages from August to the end of October, providing cool temperatures for crops to mature at Cummins in 2021 (Figure 3). Pulse grain yields averaged 1.5 t/ha for lentil, 1.8 t/ha for faba bean, 2.1 t/ha for lupin and 1.2 t/ha for vetch across the site.

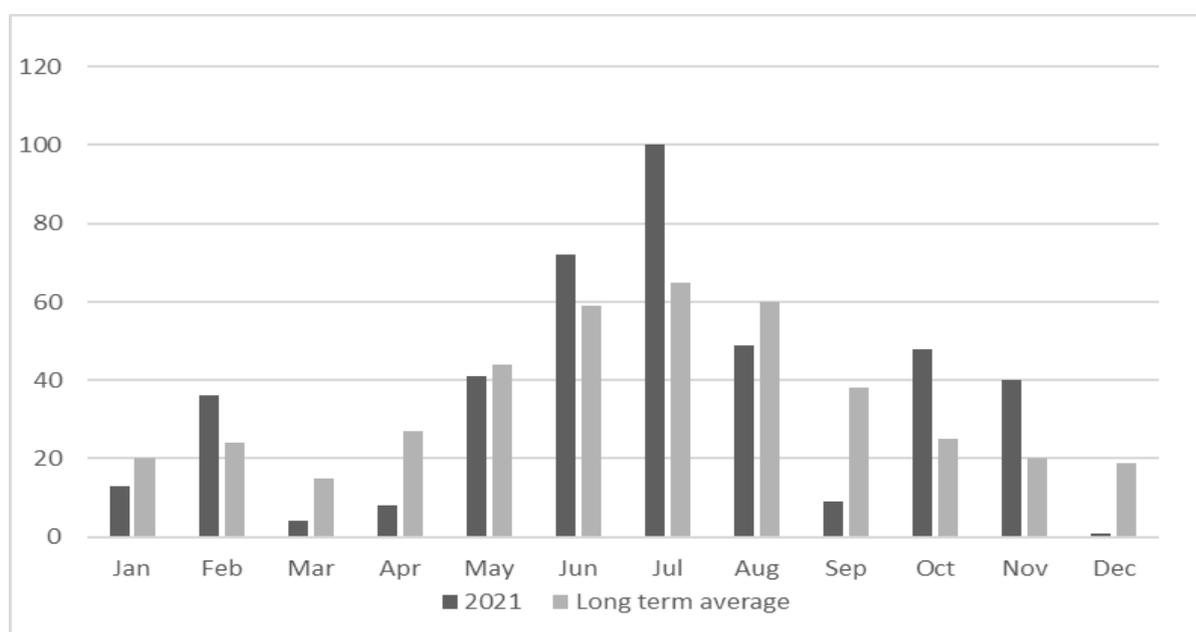


Figure 2. Monthly rainfall recorded at Cummins in 2021 compared to the long-term average rainfall from the Cummins Aero Bureau of Meteorology weather station, 2021 (#18217).

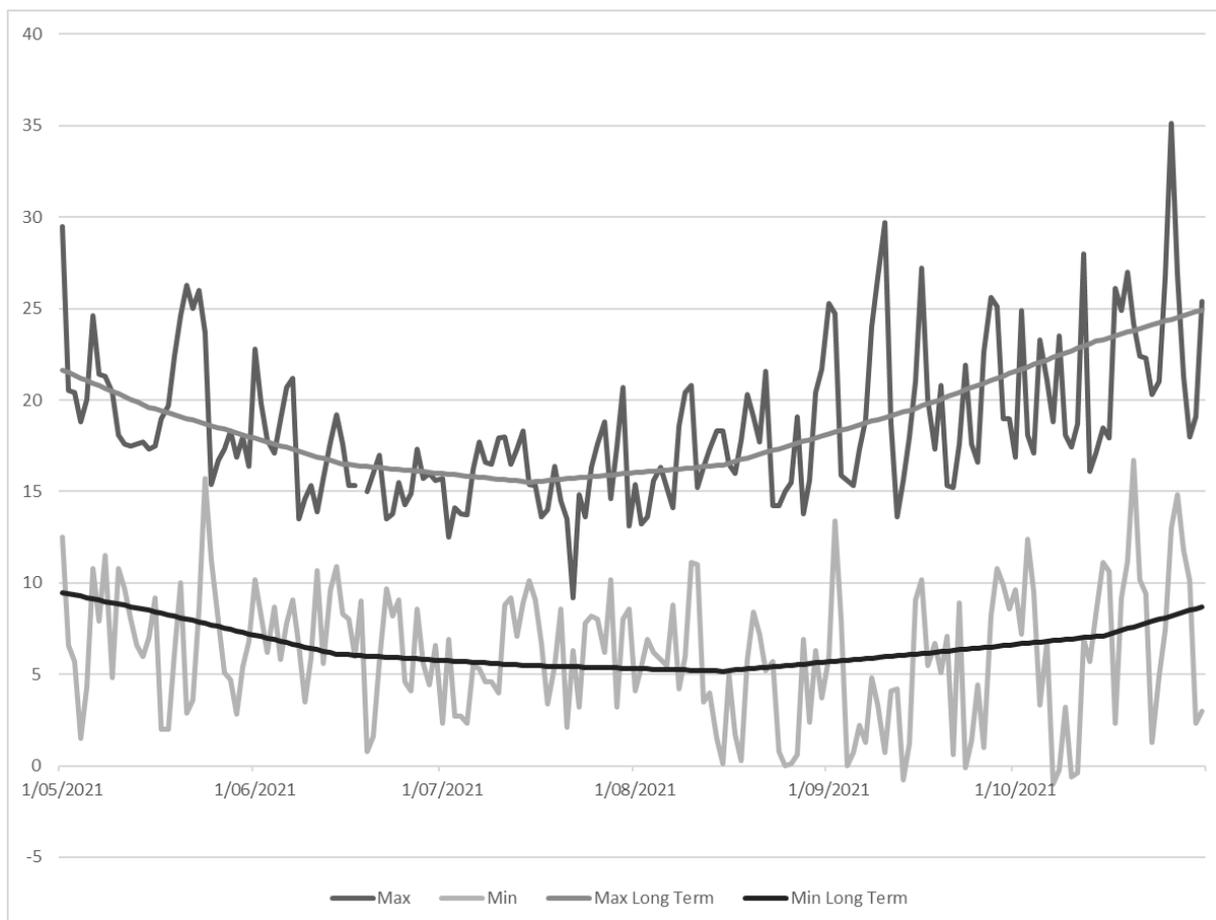


Figure 3. Long term average, minimum and maximum temperature (°C) recorded during the growing season at Cummins Aero Bureau of Meteorology weather station, 2021 (#18217).

Table 1. Soil test results for Cummins trial site, Eyre Peninsula, 2021.

Depth (cm)	NH3-N	NO3-N	Cow. P (mg/kg)	PBI + Col P	Sulfur (S)	OC (%)	Texture mg/kg	pH (H ₂ O)	pH (CaCl ₂)
0-10	3.2	15	23	25.0	7.2	1.42	S	7.33	6.92
10-30	<1	3.8			6.7		C	8.40	7.70
30-60	<1	2.9			18		CL	9.18	8.14
60-100	<1	1.7			54		CL	9.56	8.34

Depth (cm)	B	Fe	Mn (mg/kg)	Cu	Zn	Salinity EC dS/m	Ece dS/m
0-10	0.37	38	3.6	0.31	7.4	0.26	5.9
10-30	2.6					0.28	1.6
30-60	5.3					0.31	2.7
60-100	6.2					0.54	4.7

PULSE LEGACY TRIAL

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Aim: Over the last 30 years the lower Eyre Peninsula has grown large areas of canola. This is due to its widespread adaptability to the soils and the lower EP environment as well as the high returns it has provided. Pulse crops have been grown in the region but have, by large, been restricted to heavier alkaline soils or lupins on sandier soils, which generally provide lower returns. Increasing the viability of pulse crops on the lower Eyre Peninsula needs to demonstrate their capacity to produce across a range of soil types found in the region and to compare favourably in terms of profitability to canola.

Methodology:

To answer the question of how valuable pulse crops are, trials were established on a sandy soil at Yeltukka, 15 km north-west of Cummins. The paddock where the trials were located had no history of ever growing a pulse crop (Table 2). Sowing occurred 29 May. The trial received 100 kg/ha MAP fertiliser at seeding and a foliar trace element spray of 3 L/ha Smart Trace Triple®. Weed and insect management was in accordance with Best Management Practice for each crop type. No seed dressing fungicides were used at this site. 500 ml/ha carbendazim was applied to lentil and faba bean in mid-August. Vetch brown manure plots were sprayed with 2 L/ha glyphosate in early October.

Faba bean (cv PBA Bendoc) was sown at 30 plants/m², lentil (cv PBA Hurricane XT) was sown at 120 plants/m², lupin (cv Wonga) was sown at 55 plants/m², vetch (cv Timok) was sown at 50 plants/m² and canola (cv Pioneer 44Y94 CL) was sown at 45 plants/m².

Despite reasonably effective pre-emergent herbicides being applied, the site had some capeweed emerge in plots that may have influenced crop grain yield.

Each crop was managed as per best practice for that crop. All pulse crops were inoculated. Grain yields were collected with hand cuts, due to differences in maturity. This trial will be sown with wheat in 2022 to determine legacy effects.

Data was analysed using ANOVA in Genstat 19th Edition

Varieties:

Faba bean: PBA Bendoc

Vetch: Timok

Lentil: PBA Hurricane XT

Canola: Pioneer 44Y94 CL

Lupin: Wonga

Table 2. Trial details, including sowing and harvest date, Yeltukka, 2021.

Trial design	RCBD
Replicates	4
Sowing date	29/5/21
Plant density	As per treatments
Row spacing	25 cm
Fertiliser	100 kg/ha MAP
Harvest date	17/11/21

Key messages

- Gross margins of crops such as lentil were comparable to canola in 2021.
- Lentil grain yields on sandy soils at the demonstration site and field trials were approximately 1 t/ha, much lower than was observed on heavier soils.

Results and Discussion:

The legacy trial reinforced findings from the demonstration site that relative yields of lentil do have the ability to match canola in terms of gross margin (Table 3). Improving both lentil grain yield and yield stability in these soil types, where they haven't been traditionally grown, will be explored over the next few years. This trial will be planted to wheat in 2022 to assess the legacy effects.

Table 3. Biomass (October and harvest), grain yield and gross margin of pulse and canola crops grown at Yeltukka, 2021. Different letters in the same column indicate a significant difference between treatments.

Crop	October biomass (t/ha)		Harvest biomass (t/ha)		Grain yield (t/ha)		Variable** cost (\$/ha)	Grain price **(\$/t)	Gross margin (\$/ha)
Canola	7.14	cd	6.11	c	1.93	b	756	900	980
Faba Bean	2.41	ab	3.01	abc	1.80	b	504	550	484
Lentil	2.52	ab	2.68	a	1.53	b	461	1000	1073
Lupin	4.10	bc	4.32	abc	2.08	b	379	410	472
Vetch	3.90	ab	2.87	ab	1.24	ab	361	700	509
Vetch BM*	1.46	a	2.36	a	0.00	a	361	0	-361

*BM = brown manure.

** source: 2022 Farm Gross Margin and Enterprise Guide (PIRSA).