SA Grain Legume Development and Extension Project

Summary of 2021 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

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Acknowledgements

The research undertaken as part of the GRDC-invested SA Grain Legume Validation project (UOA2105-013RTX) is made possible by the significant contributions of growers through both trial cooperation and the support of the GRDC, and the authors would like to thank them for their continued support. The continued support from industry and breeding organisations for the provision of chemical products and pulse varieties for use in field trials is also gratefully acknowledged and appreciated.

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

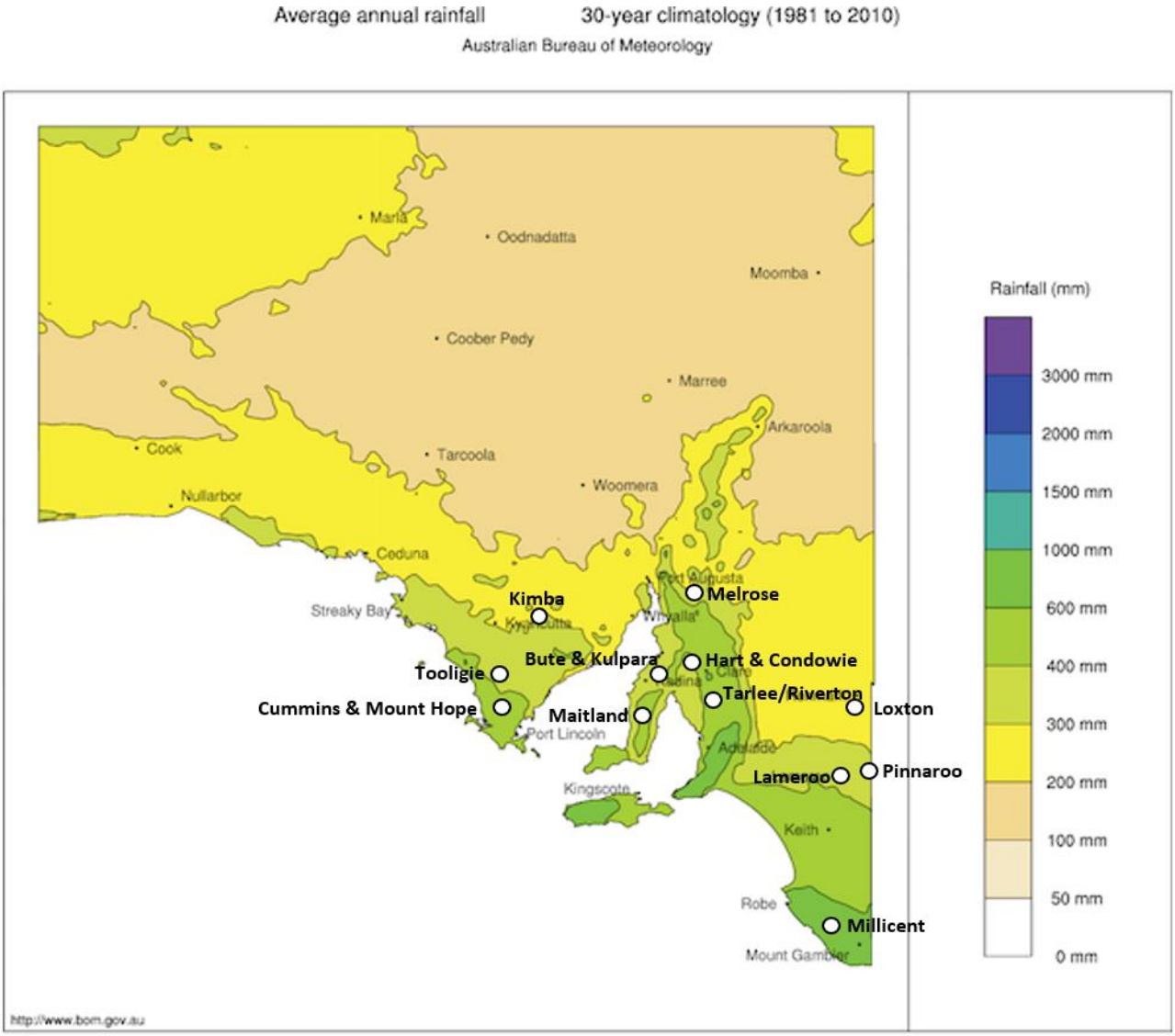

Figure 1. Trial locations for SA Grain Legume hub and spoke sites in 2021, selected by collaborators to represent the range of environments and soil types across the state's legume cropping regions.

TOOLIGIE

SITE SUMMARY

Following above average rainfall in the pre-season, April rainfall was well below-average at Tooligie in 2021 (Figure 2). While May rainfall was above average, of the 34 mm received, 23 mm of this did not fall until late in the month. As a result, trial sowing was delayed until 10th June. Fortunately, germination was not affected by the delay, and June and July rainfall were above average (57 mm and 62 mm respectively) and sufficient for crops to survive on throughout winter. Temperatures did not reach 0°C at any stage during the growing season (Figure 3) and no frosts were recorded; however, crops had poor vigour and canopy closure was not achieved. In the second half of the growing season, August and September rainfall were below average (Figure 2) resulting in moisture stress. Substantial October and November rainfall did not improve the crop condition, and delayed harvest until the 25th of November. No grain cracking was recorded following delayed harvest at Tooligie.

The site soil is a clayey loam interspersed with a sandy loam layer from 10-30 cm, with a neutral-alkaline pH and moderate soil nitrogen and Colwell phosphorus (Table 1). No obvious production constraints were identified from the soil profile analysis.

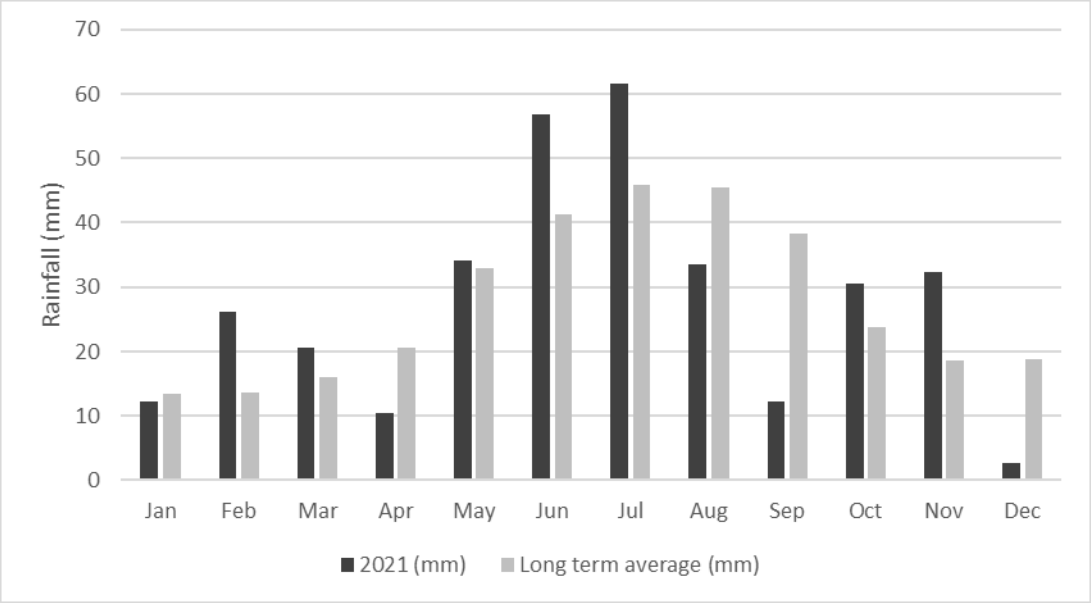

Figure 2. Monthly rainfall at Tooligie in 2021 compared to the long-term average recorded at Murdinga BOM weather station (#018164).

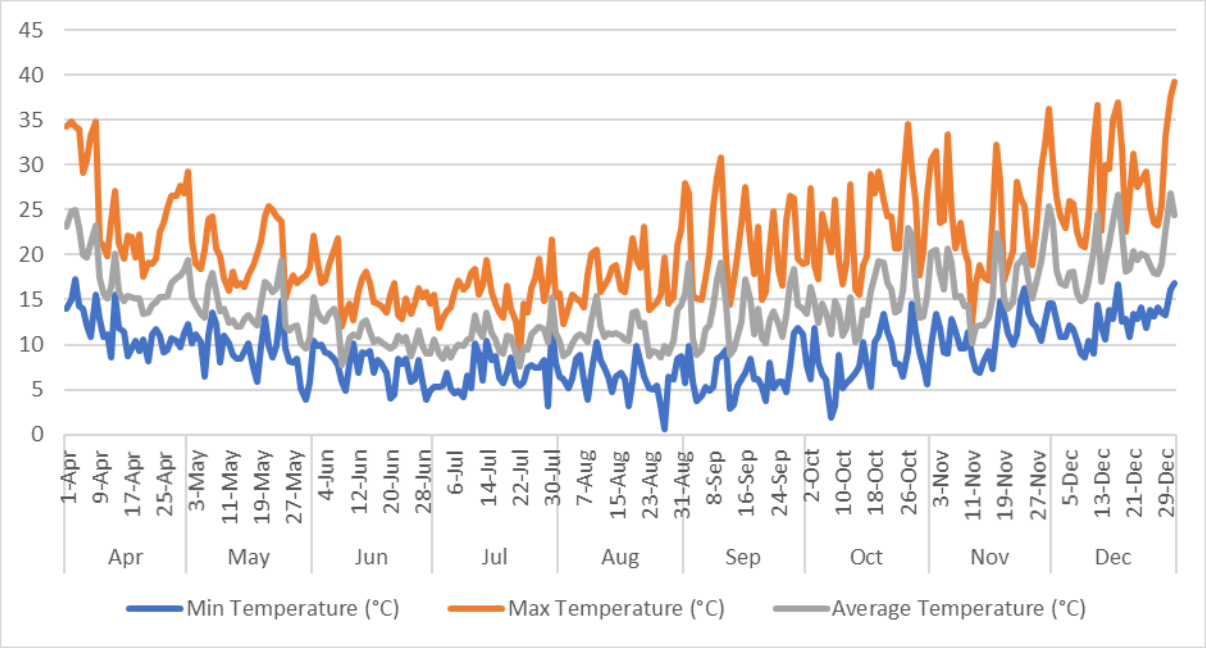

Figure 3. Minimum, maximum and average daily temperatures recorded at Tooligie, 2021.

Table 1. Soil characterisation (clay loam/sandy loam) at Tooligie trial site, 2021.

Depth (cm)	NH_3-N	NO_3-N	P (mg/kg)	K	S	OC (%)	EC (dS/m)	pH ($CaCl_2$)	pH (H_20)
0-10	1	20	30	571	10.3	1.62	0.235	7.3	7.8
10-30	1	11	8	363	33.7	0.78	0.462	8.0	9.1
30-60	<1	8	9	454	57.6	0.54	0.827	8.4	9.8
60-90	<1	5	3	464	80.7	0.33	1.146	8.6	10.1

Depth (cm)	Cu	Fe	Mn (mg/kg)	Zn	B	Exc Ca	Exc Mg	Exc K (meq/100g)	Exc Na	Exc Al
0-10	0.63	13.00	3.08	0.76	4.24	21.75	3.83	1.57	0.76	0.050
10-30	0.49	14.60	1.57	0.31	13.11	15.53	6.67	0.97	2.92	0.060
30-60	0.59	15.30	1.58	0.38	24.18	9.41	9.81	1.17	6.27	0.040
60-90	0.62	12.70	0.93	0.22	27.11	6.60	7.57	1.26	10.65	0.040

LENTIL DISEASE MANAGEMENT IN LOW-RISK ENVIRONMENTS

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Aim: To assess yield and grain quality loss from disease infection in lentil, and to determine the most appropriate strategy for lentil disease management in low-medium rainfall environments.

Methodology:

Trials were established in 2021 (Table 2) and managed as per best practice.

All plots were harvested using an experimental harvester. Total plot grain weight was recorded and used to determine grain yield on a t/ha scale. A sub-sample of grain was retained for grain quality assessments.

Data was analysed using a two-way ANOVA in Genstat 21st Edition.

Treatments

Varieties: PBA Hurricane XT, PBA Hallmark XT, PBA Highland XT, PBA Kelpie XT, PBA Jumbo2.

Fungicides: See Table 3.

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

Trial design	RCBD
Replicates	3
Sowing date	10/06/2021
Plant density	120 plants/m^2
Row spacing	25 cm
Fertiliser	80 kg/ha MAP
Harvest date	08/11/2021

Table 3. Fungicide treatments applied to the trial site at Tooligie in 2021.

Treatment	Application rate(s)	Application date(s)
Untreated control	-	-
Carbendazim (canopy closure) Chlorothalonil (early podding)	500 mL/ha 2L/ha	N/A 12/10/21
Chlorothalonil	2L/ha	12/10/21

Key messages

- Seasonal conditions at Tooligie in 2021 were not conducive for foliar diseases, and canopy closure was not achieved. No foliar disease was recorded in the trial in 2021.
- Fungicide treatments had no effect on grain yield.
- PBA Hallmark XT, PBA Highland XT and PBA Jumbo2 were equal highest yielding varieties at Tooligie, 2021.

Results and Discussion:

Grain yield from plots treated with fungicide applications were not different to the untreated control (P>0.05, data not shown), due to no foliar disease at the site in 2021. Lentil variety selection influenced grain yield (Figure 4). PBA Hurricane XT was lower yielding than PBA Hallmark XT, but equal to PBA Jumbo2 and PBA Highland XT. Whilst soil residue limits were not tested, Imidazolinone (IMI) herbicides had been applied to the site in 2019 and there may have been some residual herbicide activity in the soil affecting PBA Jumbo2. The label of Intercept recommends the minimum re-cropping interval for lentil to be 34 months post-application.

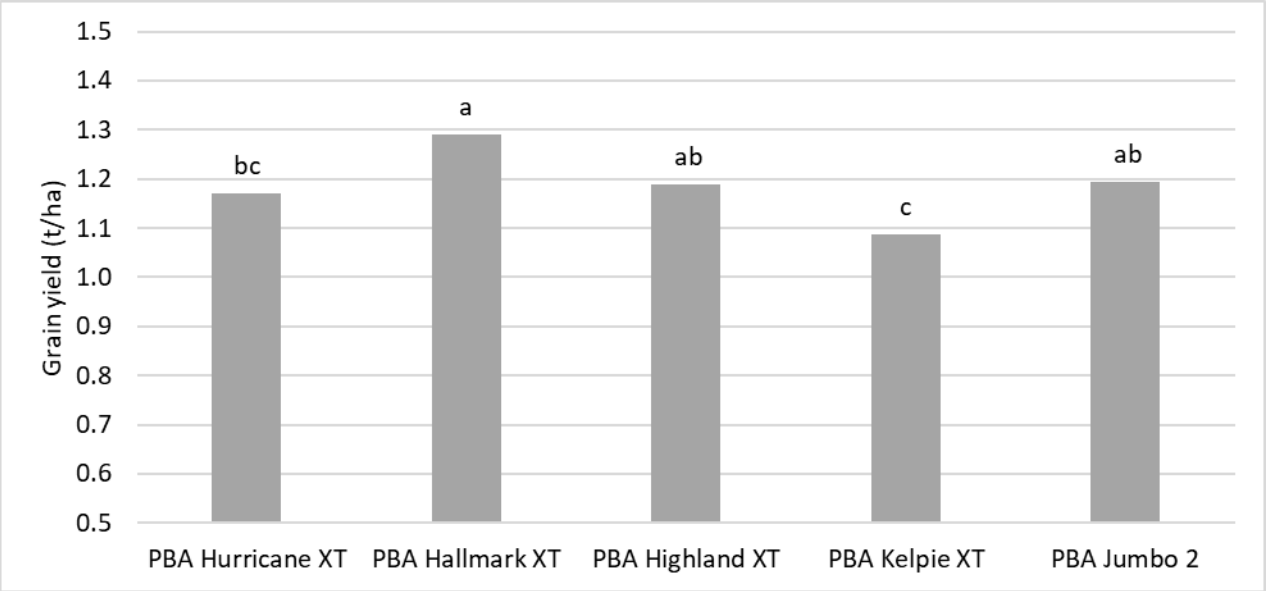

Figure 4. Grain yield (t/ha) of lentil varieties at Tooligie in 2021. Bars labelled with the same letters are not significantly different (P<0.05).