Manildra site attributes

2024

Background

The Manildra site was a well-drained brown clay loam soil with excellent available water at sowing time and followed a wheat crop in 2023. There was 332 mm of rainfall between December 2023 and sowing 2024 which was above average, and aside from a drier than average September and October, all growing months had above average rainfall. There were minimal frost events or days of extreme high temperature that would have significantly impacted the trial.

Weather data

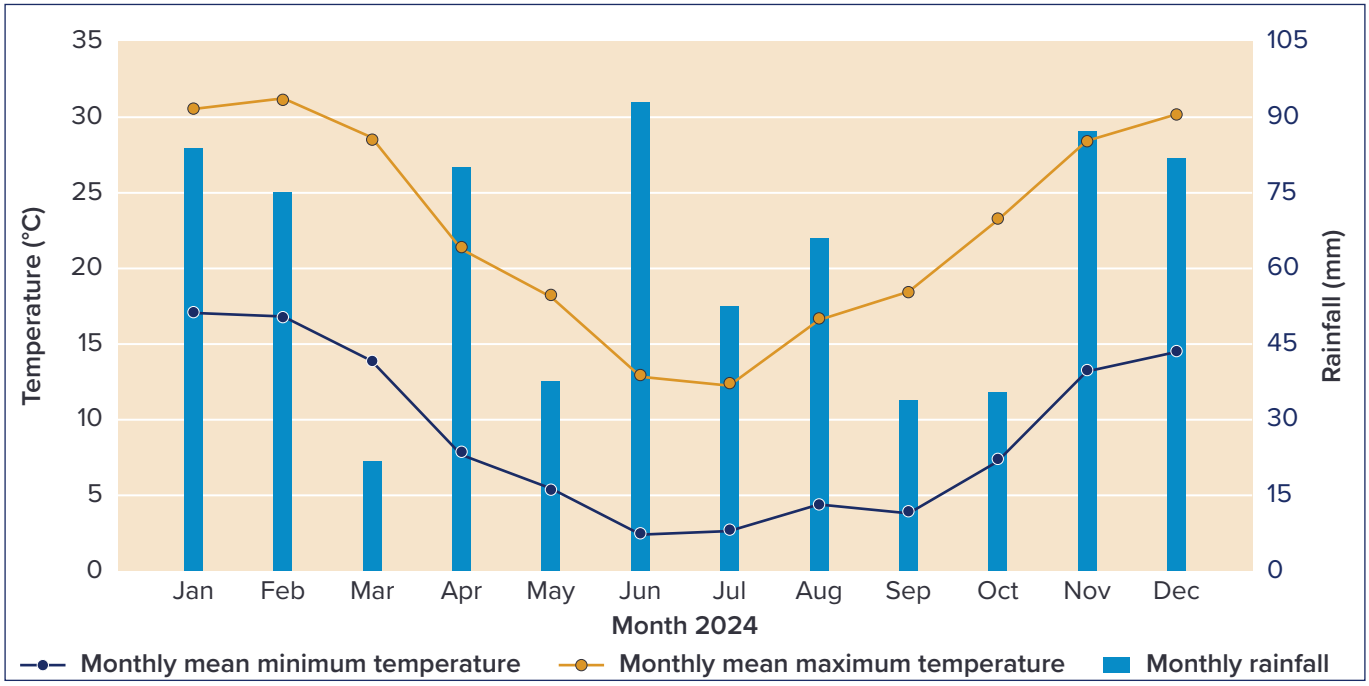

Figure 1: *Monthly rainfall and mean minimum and maximum temperature at the Manildra site in 2024.*

Crop sequence and key management dates

Crop sequence	
Year	Crop
2023	Cereal
2022	Canola
2021	Pasture
2020	Pasture

Key management 2024		
Activity	Date	Comments
Sowing	29 April	Vetch variety
		Sowing date 1 (SD1) species and N fixation
	28 May	Sowing date 2 (SD2) species and N fixation
Harvest	15 November	Hand harvest lentils in species and N fixation
	20 November	Desiccant application
	27 November	Machine harvest all in species and N fixation

Starter fertiliser (MAP; 10% nitrogen, 21.9% phosphorus, 1.5% sulphur, 1.6% calcium) was applied @ 50 kg/ha with the seed. Weeds, insect pests and fungal diseases were managed through the season with the timely application of herbicide, insecticide and/or fungicide.

Soil characteristics

The soil was a well-drained brown clay loam. The main limitation for pulse growth was marginally acidic pH in the 10–30cm layer, indicating a need for segmented testing. Soil phosphorus and potassium levels were adequate, and there was no salinity or sodicity evident in any layer. There was no chickpea Ascochyta blight or Phytophthora root rot detected in the Predicta® B test.

Table 1: *Soil characteristics at Manildra pulse site, sampled 28 March 2024.*

Characteristic	Unit	Soil depth (cm)			
		0–10	10–30	30–60	60–90
pH (1:5 $CaCl_2$)		5.3	5	6.6	7.4
Organic carbon (W&B)	%	1.04	0.35	0.23	<0.15
Phosphorus (Colwell)	mg/kg	58	12	<5.0	6.6
Potassium (Amm-acet.)	cmol(+)/kg	1.2	0.67	0.79	1.1
Nitrate (NO_3) N	mg/kg	40	7.6	5.1	3.9
Ammonium (NH_4) N	mg/kg	1.1	0.61	<0.60	<0.60
EC (1:5 water)	dS/m	0.12	0.04	0.06	0.08
Cation exchange capacity (CEC)	cmol(+)/kg	7.22	6.13	16.4	16.1
Exchangeable calcium (Ca)	%	77	75	61	58
Exchangeable magnesium (Mg)	%	7.5	14	32	34
Exchangeable potassium (K)	%	16	11	4.8	6.7
Exchangeable sodium (Na)	%	<1	<1	1.9	2
Exchangeable aluminium (Al)	%	<1	<1	<1	<1

Pulse trial site at Manildra on 17 September 2024

GRDC GRAINS RESEARCH & DEVELOPMENT CORPORATION

FAR AUSTRALIA

BRILLAG AGRONOMY & RESEARCH

FRONTIER FARMING SYSTEMS

AgGrow AGRONOMY + RESEARCH

goa GRAIN ORANA ALLIANCE

Pulse species: sowing date comparison

Manildra 2024

Key findings

Peak biomass/dry matter

- Each species produced more biomass from the early sowing date (SD1: 29 April) than the late sowing date (SD2: 28 May).
- SD1 faba beans (PBA Nasma$^{\Phi}$ 13.6 t/ha), field peas (PBA Taylor$^{\Phi}$ 12.9 t/ha), albus lupins (Luxor$^{\Phi}$ 11.7 t/ha) and vetch (Studenica$^{\Phi}$) produced the most dry matter (DM), while chickpea (CBA Captain$^{\Phi}$) and lentils (PBA Hallmark XT$^{\Phi}$) produced the lowest.
- SD2 faba beans (7.7 t/ha) and field peas (8.9 t/ha) produced the most DM, and there was no DM difference between the remaining species.

Grain yield

- Faba beans, chickpeas and lupins sown at SD1 yielded significantly higher than at SD2, whereas lentil, field pea and vetch yielded the same from both sowing dates.
- Within SD1, PBA Nasma$^{\Phi}$ faba beans yielded the highest at 3.98 t/ha. Luxor$^{\Phi}$ lupins also yield above 3 t/ha. Studenica$^{\Phi}$ vetch was the lowest yielding species at 1.9 t/ha.
- Within SD2, field peas, faba beans and lentils (hand cut) all yielded from 2.5–3 t/ha. CBA Captain$^{\Phi}$ chickpeas were the lowest yielding at 1.85 t/ha.

Trial details

One variety of each of six pulse species were sown on two dates to determine the grain yield, above ground dry matter production at peak biomass, and the atmospheric N fixation in the southern Orana region.

- Each species was sown at two times of sowing (SD) (Table 10)
- SD1 was near optimal for faba bean, lupin, and vetch, making SD2 ‘late’ for these species

Pulse species time of sowing and N fixation trial at Manildra on 29 August 2024

- SD2 was near optimal for the chickpea, field pea, and lentils, making SD1 'early' for these species
- Peak biomass was assessed at approximately 80% flowering
- Aboveground dry matter samples will be analysed to quantify nitrogen (N) fixation for each treatment.

Table 1: *Treatments included in the pulse species comparison trial at Manildra in 2024.*

Treatment	Variety	Target plant density (plant/m^2)
Species		
Chickpea	CBA Captain$^{\phi}$	35
Faba bean	PBA Nasma$^{\phi}$	20
Field pea	PBA Taylor$^{\phi}$	30
Lentil	PBA Hallmark XT$^{\phi}$	110
Lupin	Luxor$^{\phi}$	35
Vetch	Studenica$^{\phi}$	35
Sowing date		
SD1	29 April	
SD2	28 May	

Pulse species time of sowing and N fixation trial at Manildra on 17 September 2024

Results

Table 2: *Above ground dry matter at peak biomass and grain yield of six pulse species at Manildra in 2024.*

Species	Variety	Dry matter (t/ha)		Yield t/ha	
		SD1: 29 April	SD2: 28 May	SD1: 29 April	SD2: 28 May
Chickpea	CBA Captain	8.73	5.71	2.44	1.85
Faba bean	PBA Nasma	13.62	7.73	3.98	2.93
Field pea	PBA Taylor	12.92	8.85	2.66	2.94
Lentil	PBA Hallmark XT	8.56	5.71	2.17*	2.58*
Lupin	Luxor	11.74	5.44	3.29	2.17
Vetch	Studenica	11.24	5.58	1.91	2.06
l.s.d. (P = 0.05) variety x SD		1.67		0.44	

* Lentil yield determined using hand cuts, all other species yield determined from machine harvest

Acknowledgements

We gratefully acknowledge the investment support of the GRDC for BRA2105-001RTX, '*Development and extension to close the economic yield gap and maximise farming systems benefits from grain legume production in New South Wales*'.

Thanks to farm co-operator Terry Cotton, Manildra and agronomist Greg Paul.

Contributors

Josiah May – Grain Orana Alliance
josiah.may@grainorana.com.au