Arumpo site attributes

2024

Background

The site was located on Petro Station, approximately 60 km north east of Mildura, Victoria, with a sandy loam soil, a soil type commonly used for pulse crop production in the southwest NSW Mallee region.

The trial site had been ripped (30 cm depth) post harvest 2023 and had variable stubble loads in places which provided challenges for sowing. At TOS 1 (19 April) establishment was variable due to drying conditions (there was a 5 mm rain event approximately 7 days prior to sowing), particularly in larger seeded crops like faba bean. Parts of plots germinated on the available moisture (where there was more stubble), while other dryer parts (particularly on rip lines) germinated at the same time as TOS 2 (5 May). Establishment in TOS 2 was much more uniform than TOS 1, responding to an 8 mm rain event in mid May. Due to that rain event TOS 3 (20 May) establishment was the most consistent. Growth throughout the season was slow due to the cold and ongoing dry conditions. Growing season rainfall (April–September) was 96 mm (October rainfall not included as post maturity for all crops). There was some damage from the frosts in September.

Weather data

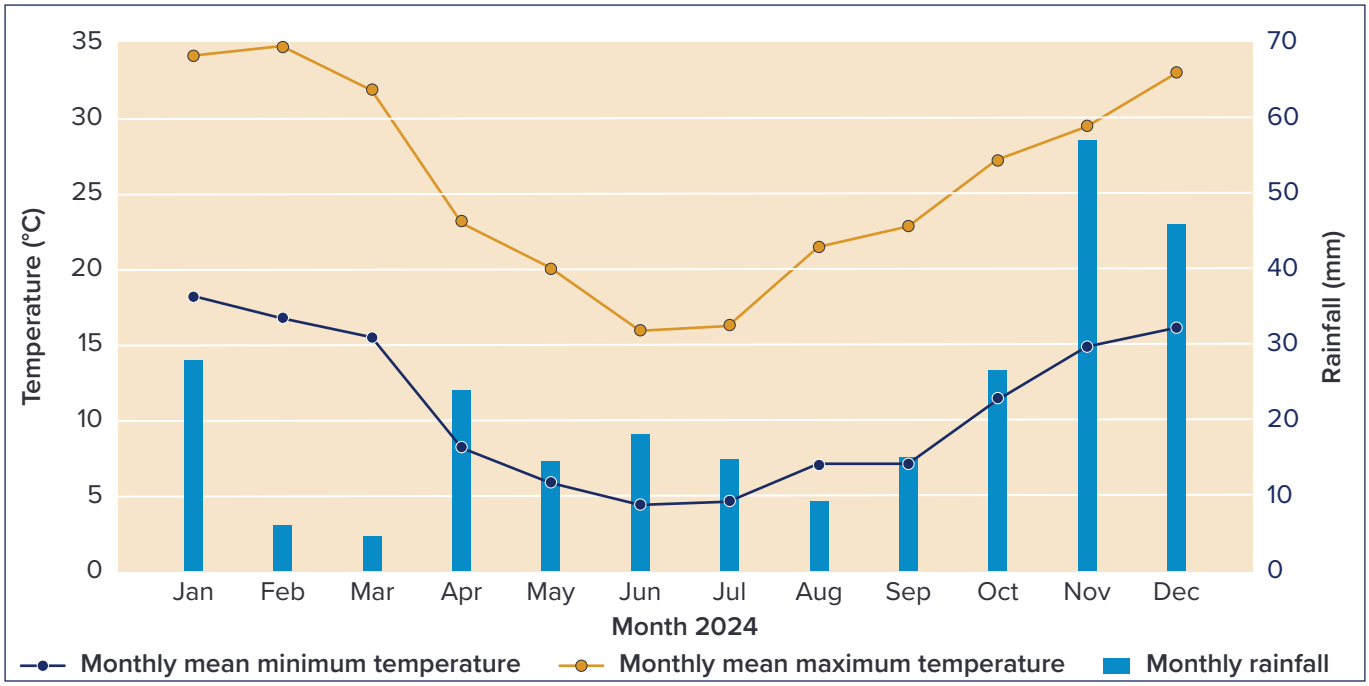

Figure 1: *Monthly rainfall at Parangi and mean minimum and maximum temperature at Mildura in 2024.*

Crop sequence and key operation dates

Crop sequence		
Year	Crop	Cultivar
2023	Wheat	Scepter(ϕ)
2022	Lentil	PBA Hallmark XT(ϕ)
2021	Wheat	

Site operations 2024		
Activity	Date	Comments
Sowing	19 April	TOS 1 – all crops
	5 May	TOS 2 – all crops
	20 May	TOS 3 – all crops
Harvest	23 & 24 October	All trials except chickpeas

Soil characteristics

Table 1: *Soil characteristics at Petro pulse site, sampled prior to sowing in 2024.*

Characteristic	Unit	Soil depth (cm)			
		0–10	10–40	40–70	70–100
pH [1:5 $CaCl_2$]		7.76	7.78	8.07	8.22
Organic carbon	%	0.63			
NO_3 N (ppm)	mg/kg	8.3	4.8	2.3	2.7
NH_4 N (ppm)	mg/kg	1.2	<1.0	<1.0	<1.0
Phosphorus [Colwell]	mg/kg	34			
Sulphur (S)	mg/kg	3.0	3.1	5.0	32
Calcium (Ca)	%	82.6	78.4	65.4	61.1
Magnesium (Mg)	%	11.3	18.3	26.6	25.4
Potassium (K)	%	5.9	2.3	1.4	1.6
Sodium (Na)	%	0.2	1.1	6.6	12.0
ECe	dS/m	1.5	1.1	2.1	3.7
Boron (B)	mg/kg	1.3	1.8	7.5	18.0
Texture					
Sand	%	72.8	54.5	48.1	49.3
Silt	%	15.0	17.1	20.8	20.2
Clay	%	12.2	28.4	31.1	30.5

Pulse species and variety x sowing date comparison

Arumpo 2024

Key findings

Lentil variety x sowing date

- GIA Thunder(Φ) produced the highest grain yield in the trial sown mid-April (1.01 t/ha). There was no difference in grain yield for lentils sown mid-April to early May, however delaying sowing to mid-May reduced grain yield by 36% (0.44 t/ha).
- The grain yield of GIA Thunder(Φ) was 15% higher than PBA Hallmark XT(Φ) and similar to ALB Terrier(Φ).
- Peak biomass of lentils sown mid-April was 2.83 t/ha. Delaying sowing until early May reduced biomass by 13% and by 40% from mid-May sowing.

Field pea variety x sowing date

- Field pea produced the highest grain yield of all pulse crops with up to 1.15 t/ha for APB Bondi(Φ) from a mid-April sowing time and 1.20 t/ha from an early May sowing time.
- Grain yield was similar in the first two sowing dates but reduced by 18–25% where sowing was delayed to mid-May. The varieties all yielded similarly within sowing date.
- Peak biomass of field peas sown mid-April and early May was 3.07 t/ha and 2.90 t/ha, respectively. This was more than 0.92 t/ha higher than the field pea biomass produced from the mid-May sowing.

Vetch variety x sowing date

- Volga(Φ) consistently produced the highest grain yield at all 3 sowing dates, with a maximum of 1.08 t/ha when sown in mid-April. Timok(Φ) produced an average of 9% lower grain yield, while Studenica(Φ) was 15% lower.
- Peak biomass averaged across varieties was between 3.11 and 3.23 t/ha sown mid-April to early May. Delaying sowing to mid-May reduced biomass by more than 1 t/ha (40–43%).
- Biomass was also measured at the start of podding to determine dry matter at the growth stage when vetch would be cut for hay. Vetch sown mid-April had ‘hay cut’ dry matter of 2.48 t/ha, which halved to 1.24 t/ha when sown mid-May.

Faba bean variety x sowing date

- Faba bean biomass and grain yield was the lowest of all crops at the site in 2024. Yield and biomass differences were negligible between varieties and across sowing dates.

Chickpea variety x sowing date

- The highest chickpea grain yield of 0.81 t/ha was PBA Striker$^{\phi}$ sown mid-April. The desi type varieties PBA Striker$^{\phi}$ and CBA Captain$^{\phi}$ were generally 20% higher yielding than the kabuli type Genesis™ 090.
- Varieties showed a similar trend for biomass to grain yield. The mid-April sowing date produced 1.92 t/ha of dry matter, which decreased by 0.30 and 0.34 t/ha for early May and mid-May sowing, respectively.

Trial details

The series of trials was conducted to compare pulse species and varieties sown at different times on a sandy loam soil, typical of the soil type pulses are grown on in the Mallee.

Five separate pulse variety trials (chickpea, faba bean, field pea, lentil, vetch), each with three cultivars and three sowing dates (mid-April, early May and mid-May) were conducted on Petro Station, 60 km north east of Mildura in 2024. Measurements taken on each trial included peak biomass and grain yield. In addition, biomass samples were taken from the vetch trial at the start of podding of to equate with a hay cut.

Table 1: *Trial management of the pulse species varieties x sowing time trials at Arumpo in 2024.*

Management	2024
Sowing dates	Time of sowing 1: 19 April Time of sowing 2: 5 May Time of sowing 3: 20 May
Starter fertiliser	SuPerfect® (8.8% phosphorus, 11% sulphate sulphur, 19% calcium) @ 70 kg/ha
Sowing rate	Calculated from seed size for target plant population, see Table 102

Table 2: *Varieties and target plant population for each pulse species x sowing date trial at Arumpo in 2024.*

Trial	Target plant population (plant/m²)	Variety		
Chickpea	35	CBA Captain$^{\phi}$	Genesis™ 090	PBA Striker$^{\phi}$
Faba bean	20	PBA Bendoc$^{\phi}$	PBA Marne$^{\phi}$	PBA Samira$^{\phi}$
Field pea	40	APB Bondi$^{\phi}$	PBA Butler$^{\phi}$	PBA Twilight$^{\phi}$
Lentil	120	PBA Hallmark XT$^{\phi}$	ALB Terrier$^{\phi}$	GIA Thunder$^{\phi}$
Vetch	50	Studenica$^{\phi}$	Timok$^{\phi}$	Volga$^{\phi}$

Results

Lentil variety x sowing date

Table 3: *Grain yield (t/ha) and peak biomass (t/ha) of selected varieties of lentils sown on 19 April, 5 May and 20 May at Arumpo in 2024.*

Variety	Grain yield (t/ha)			Peak biomass (t/ha)		
Sowing date	19 April	5 May	20 May	19 April	5 May	20 May
PBA Hallmark XT	0.87	0.88	0.51	2.97	2.39	1.69
ALB Terrier	0.91	0.93	0.65	2.62	2.40	1.77
GIA Thunder	1.01	0.97	0.62	2.90	2.56	1.60
l.s.d. (P<0.05) sowing date	0.05			0.25		
l.s.d. (P<0.05) variety	0.07			n.s.		
l.s.d. (P<0.05) variety × sowing date	n.s.			n.s.		

n.s. = not significantly different

Field pea variety x sowing date

Table 4: *Grain yield (t/ha) and peak biomass (t/ha) of selected varieties of field pea sown on 19 April, 5 May and 20 May at Arumpo in 2024.*

Variety	Grain yield (t/ha)			Peak biomass (t/ha)		
Sowing date	19 April	5 May	20 May	19 April	5 May	20 May
APB Bondi	1.15	1.20	0.92	2.95	3.18	1.99
PBA Butler	1.11	1.16	0.89	3.18	2.71	2.03
PBA Twilight	1.05	1.19	0.90	3.09	2.80	1.92
l.s.d. (*P*<0.05) sowing date	0.21			0.25		
l.s.d. (*P*<0.05) variety	n.s.			n.s.		
l.s.d. (*P*<0.05) variety × sowing date	n.s.			n.s.		

n.s. = not significantly different

Vetch variety x sowing date

Table 5: *Grain yield (t/ha) and peak biomass (t/ha) of selected varieties of vetch sown on 19 April, 5 May and 20 May at Arumpo in 2024.*

Variety	Grain yield (t/ha)			Peak biomass (t/ha)		
Sowing date	19 April	5 May	20 May	19 April	5 May	20 May
Studenica	0.72	0.72	0.52	3.26	2.77	1.73
Timok	0.77	0.74	0.57	3.26	3.20	1.81
Volga	0.93	0.75	0.62	3.19	3.36	2.08
l.s.d. (*P*<0.05) sowing date	n.s.			1.07		
l.s.d. (*P*<0.05) variety	0.05			n.s.		
l.s.d. (*P*<0.05) variety × sowing date	n.s.			n.s.		

n.s. = not significantly different

Table 6: *Potential hay biomass (t/ha) at the start of podding for selected varieties of vetch sown on 19 April, 5 May and 20 May at Arumpo in 2024.*

Variety	Sampling date (start of podding)			Hay biomass (t/ha)		
Sowing date	19 April	5 May	20 May	19 April	5 May	20 May
Studenica	22 Aug	29 Aug	29 Aug	3.26	2.77	1.73
Timok	2 Sep	2 Sep	9 Sep	3.26	3.20	1.81
Volga	29 Aug	29 Aug	2 Sep	3.19	3.36	2.08
l.s.d. (*P*<0.05) sowing date				1.07		
l.s.d. (*P*<0.05) variety				n.s.		
l.s.d. (*P*<0.05) variety × sowing date				n.s.		

n.s. = not significantly different

Faba bean variety x sowing date

Table 7: *Grain yield (t/ha) and peak biomass (t/ha) of selected varieties of faba bean sown on 19 April, 5 May and 20 May at Arumpo in 2024.*

Variety	Grain yield (t/ha)			Peak biomass (t/ha)		
Sowing date	19 April	5 May	20 May	19 April	5 May	20 May
PBA Bendoc	0.21	0.22	0.18	1.30	1.61	1.35
PBA Marne	0.25	0.25	0.21	1.21	1.40	1.43
PBA Samira	0.29	0.29	0.24	1.07	0.99	1.25
l.s.d. (*P*<0.05) sowing date	0.04			n.s.		
l.s.d. (*P*<0.05) variety	n.s.			n.s.		
l.s.d. (*P*<0.05) variety × sowing date	n.s.			n.s.		

n.s. = not significantly different

Chickpea variety x sowing date

Table 8: *Grain yield (t/ha) and peak biomass (t/ha) of selected varieties of chickpea sown on 19 April, 5 May and 20 May at Arumpo in 2024.*

Variety	Grain yield (t/ha)			Peak biomass (t/ha)		
Sowing date	19 April	5 May	20 May	19 April	5 May	20 May
CBA Captain	0.70	0.77	0.65	2.02	1.66	1.71
Genesis 090	0.64	0.59	0.45	1.78	1.47	1.60
PBA Striker	0.81	0.70	0.56	1.96	1.72	1.43
l.s.d. (*P*<0.05) sowing date	n.s.			0.24		
l.s.d. (*P*<0.05) variety	0.06			n.s.		
l.s.d. (*P*<0.05) variety × sowing date	n.s.			n.s.		

n.s. = not significantly different

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