

Barellan site attributes 2022

Soil characteristics

Sampled February 2022		Soil depth (cm)	
Characteristic	Unit	0–10 cm	10–60 cm
Texture		sandy loam	
Colour		brown	
pH (1:5 CaCl ₂)		5.2	
Organic carbon	%	1.3	
Nitrate N	ppm	18	6
Ammonium N	ppm	1	1
Phosphorus (Colwell)	ppm	44	
Sulphur (MCP)	ppm	6	
Manganese (DTPA)	ppm	29.2	
Boron (CaCl ₂)	ppm	0.6	
Copper (DTPA)	ppm	0.4	
Iron (DTPA)	ppm	16	
Zinc (DTPA)	ppm	0.2	
CEC	meq/100g	7.13	
K base saturation	%	17.7	
Mg base saturation	%	13.3	
Ca base saturation	%	66.9	
Na base saturation	%	0.3	
Al base saturation	%	1.7	
Chloride	ppm	45	



Albus lupins, November 2022



Barellan pulse trial site, 31 August 2022

Rainfall

Table 26: Monthly rainfall for 2022 and long-term average (LTA, 1878–2021) at Barellan Post Office and total annual and growing season (GSR, April–October) rainfall.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	GSR
2022	163.4	9.2	83.2	63.5	79.0	22.2	27.9	80.7	76.3	107.0	81.3	14.0	807.7	456.6
LTA	38.3	34.3	37.9	34.6	37.6	40.3	36.7	38.1	35.1	42.9	34.3	31.7	441.6	265.3

Crop sequence and key management dates

Crop sequence			Site management		
Year	Crop	Cultivar	Activity	Date	Comments
2021	Wheat	Beckom [®]	Sowing	6 May	All trials
2020	Wheat	Beckom [®]	Harvest	20 December 2022	Variety screen trial (except chickpeas) Rhizobia trial
2019	Canola	InVigor T 4510			Phosphorus management trial
2018	Barley	La Trobe [®]			
2017	Wheat	Beckom [®]		2 January 2023	Variety screen trial – chickpeas



Barellan field day, 18 October 2022

Pulse species and variety comparison

Barellan 2022

Key findings

- **Chickpeas:** CBA Captain[Ⓢ] had the highest grain yield (1.9 t/ha), and PBA HatTrick[Ⓢ] (13.4 t/ha) had the highest peak biomass. Genesis™090, a Kabuli type, produced the largest seed (33.6 g).
- **Faba beans:** Very high yield and peak biomass. FBA Ayla[Ⓢ] had both the highest grain yield (5.0 t/ha) and peak biomass (15.0 t/ha). PBA Amberley[Ⓢ] had the lowest grain yield (3.2 t/ha) and peak biomass (10.3 t/ha). FBA Ayla[Ⓢ] had smaller seed (58.5 g/100 seeds) than both PBA Nasma[Ⓢ] (68.2 g/100 seeds) and PBA Samira[Ⓢ] (68.6 g/100 seeds), which may be a useful attribute for seeding logistics and practicalities.
- **Field peas:** Sturt[Ⓢ] was the highest yielding (3.5 t/ha), with PBA Wharton[Ⓢ] the lowest (1.8 t/ha). PBA Wharton[Ⓢ] also had the lowest peak biomass (8.5 t/ha), with the highest biomass produced by PBA Butler[Ⓢ] (11.3 t/ha) and PBA Taylor[Ⓢ] (11.7 t/ha). PBA Butler[Ⓢ] produced the largest seed (18.2g/100 seeds).
- **Lentils:** Yield of the four varieties was similar, averaging 2.4 t/ha. PBA Kelpie XT[Ⓢ] had the highest peak biomass (8.6 t/ha) and GIA Leader[Ⓢ] the lowest (6.3 t/ha). PBA Highland XT[Ⓢ] produced smaller seed (3.1 g/100 seeds) than all other varieties.
- **Lupins:** Yield of the albus lupins Murringgo[Ⓢ] (5.5 t/ha) and Luxor (5.3 t/ha) were higher than both the narrowleaf lupin varieties, Mandelup[Ⓢ] and PBA Bateman[Ⓢ]. Lupins produced very high quantities of biomass, with an average of 15.1 t/ha, similar for all varieties.
- **Vetch:** The highest yielding varieties were Rasina[Ⓢ] (5.28 t/ha) and Timok[Ⓢ] (4.77 t/ha), higher than both Studenica[Ⓢ] (3.5 t/ha) and Presto (3 t/ha). Rasina had lower peak biomass (7.79 t/ha) than Presto (10.21 t/ha), Timok[Ⓢ] (10.66 t/ha) and Studenica[Ⓢ] (11 t/ha).

Trial details

Soil moisture profiles were full coming into the 2022 cropping season, from a wet 2021 and above average fallow rain. Wet weather continued at sowing, with June and July the only months having below average rainfall. Some minor frosts were experienced mid-July. Wet conditions then persisted for the remainder of the 2022 season. Conditions in 2022 were conducive for high disease pressure. The site received 3 fungicide applications.

Six separate pulse variety trials were sown at the site, therefore statistical comparisons between species (chickpeas, faba beans, field peas, lentils, lupins and vetch) cannot be made. Measurements conducted on each included peak biomass (related to nitrogen fixation), grain yield and seed size. Peak biomass and seed from one variety from each trial will be further analysed to determine total N fixation and N removal.

Table 27: Trial management and pulse species by variety assessed at Barellan in 2022.

Management					
Pre-sow herbicides	3 May: glyphosate 450 @ 1.5 L/ha + Reflex® (240 g/L fomesafen, not registered for use in albus lupins) @ 1 L/ha				
Sowing date	6 May				
Starter fertiliser	MAP @ 80 kg/ha (phosphorus 21.9%, nitrogen 10%, sulphur 1.5%, calcium 1.6%)				
Fungicide	Due to multiple species at one site, fungicide application was off-label. Contact trial manager for more information				
Insecticide	Trojan® (150 g/L gamma-cyhalothrin) @ 30 mL/ha + wetter 1000 @ 0.2%				
Harvest	20 December, chickpeas 2 January 2023				
Species	Target plant population (plant/m ²)	Variety			
Lentils	100	GIA Leader [Ⓛ]	PBA Highland XT [Ⓛ]	PBA Hallmark XT [Ⓛ]	PBA Kelpie XT [Ⓛ]
Vetch	40	Presto	Rasina [Ⓛ]	Studenica [Ⓛ]	Timok [Ⓛ]
Field Pea	40	PBA Butler [Ⓛ]	PBA Taylor [Ⓛ]	PBA Wharton [Ⓛ]	Sturt [Ⓛ]
Lupin	30–40	PBA Bateman [Ⓛ]	Mandelup [Ⓛ]	Luxor	Murringo [Ⓛ]
Chickpea	40	CBA Captain [Ⓛ]	Genesis™090	PBA HatTrick [Ⓛ]	PBA Slasher [Ⓛ]
Faba bean	20	PBA Amberley [Ⓛ]	FBA Ayla [Ⓛ]	PBA Nasma [Ⓛ]	PBA Samira [Ⓛ]

**Field peas (left) and faba beans had great early vigour**

Results

Peak biomass

Table 28: Peak biomass (t/ha) of each pulse species and variety at Barellan in 2022.

Variety	Dry matter (t/ha)	Variety	Dry matter (t/ha)	Variety	Dry matter (t/ha)
Chickpeas		Faba Beans		Lentils	
CBA Captain	12.4	PBA Amberley	10.3	GIA Leader	6.3
Genesis 090	9.5	FBA Ayla	15.0	PBA Hallmark XT	7.7
PBA HatTrick	13.4	PBA Nasma	12.9	PBA Highland XT	6.7
PBA Slasher	8.7	PBA Samira	13.0	PBA Kelpie	8.6
Mean	11.0	Mean	12.8	Mean	7.3
I.s.d. ($P = 0.05$)	1.97	I.s.d. ($P = 0.05$)	2.91	I.s.d. ($P = 0.05$)	1.33
Lupins		Field Peas		Vetch	
Luxor	15.0	PBA Butler	11.3	Presto	10.2
Murringo	14.3	PBA Taylor	11.7	Rasina	7.8
Mandelup	15.0	PBA Wharton	8.5	Studenica	11.0
PBA Bateman	16.0	Sturt	10.2	Timok	10.7
Mean	15.1	Mean	10.4	Mean	9.9
I.s.d. ($P = 0.05$)	not significant	I.s.d. ($P = 0.05$)	1.85	I.s.d. ($P = 0.05$)	1.15



Grain yield

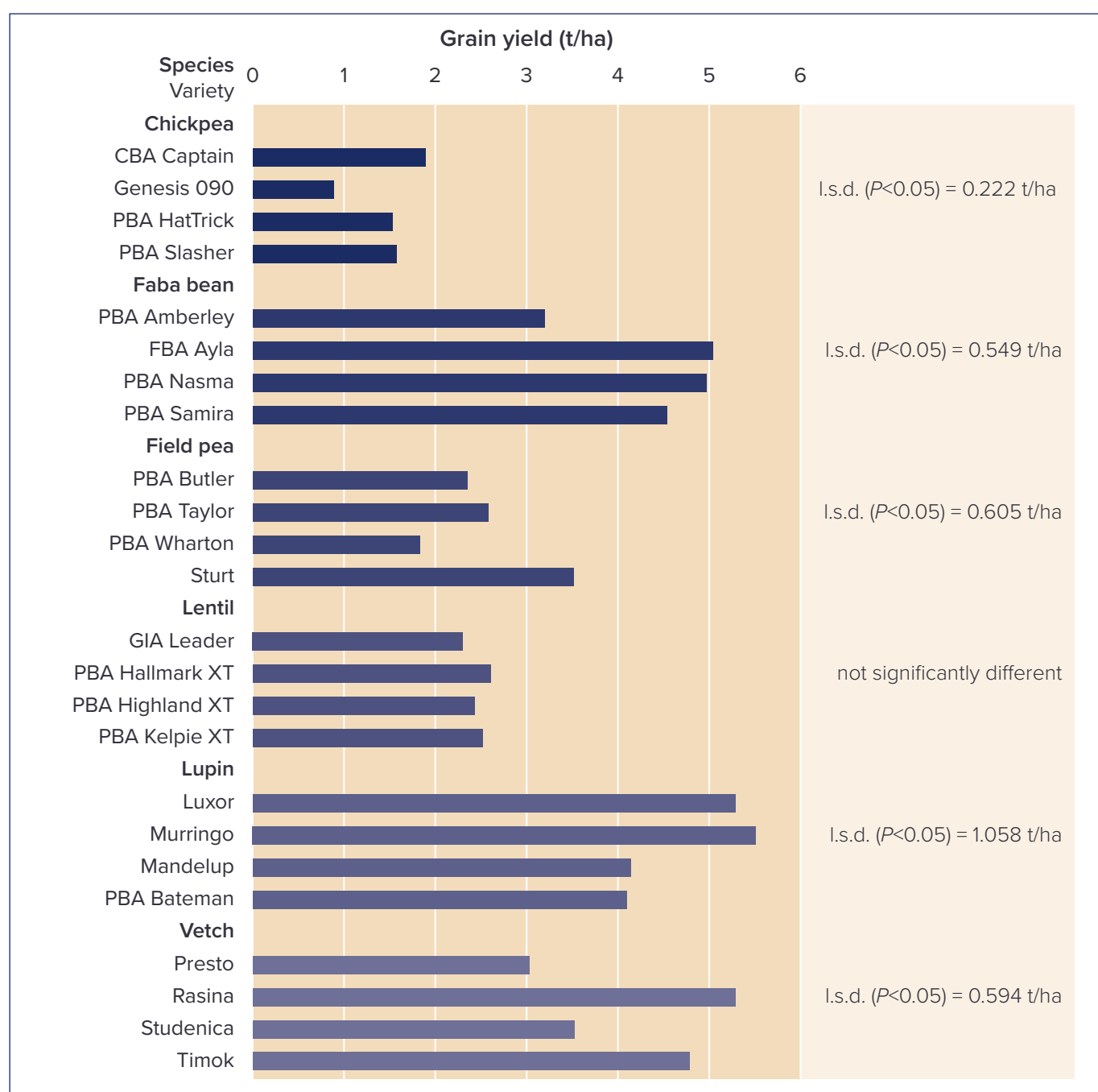


Figure 9: Grain yield of each pulse species by variety at Barellan in 2022.

Seed size

Table 29: Seed size (g/100 seeds) of each pulse species and variety at Barellan in 2022.

Variety	Seed size (g/100 seeds)	Variety	Seed size (g/100 seeds)	Variety	Seed size (g/100 seeds)
Chickpeas		Faba Beans		Lentils	
CBA Captain	24.3	PBA Amberley	55.4	GIA Leader	3.9
Genesis 090	33.6	FBA Ayla	58.5	PBA Hallmark XT	3.6
PBA HatTrick	22.3	PBA Nasma	68.2	PBA Highland XT	3.1
PBA Slasher	22.8	PBA Samira	68.6	PBA Kelpie	3.8
Mean	25.7	Mean	62.7	Mean	3.6
I.s.d. ($P = 0.05$)	1.22	I.s.d. ($P = 0.05$)	3.39	I.s.d. ($P = 0.05$)	0.34
Lupins		Field Peas		Vetch	
Luxor	35.3	PBA Butler	18.2	Presto	7.5
Murringo	39.3	PBA Taylor	16.9	Rasina	7.4
Mandelup	16.0	PBA Wharton	15.7	Studenica	6.9
PBA Bateman	16.9	Sturt	16.7	Timok	7.4
Mean	26.9	Mean	16.9	Mean	7.3
I.s.d. ($P = 0.05$)	1.62	I.s.d. ($P = 0.05$)	0.61	I.s.d. ($P = 0.05$)	0.30



Chickpeas produced excellent biomass, seen here at the field day, 18 October 2022