Performance of lentil vs faba bean at Ungarra on lower Eyre Peninsula

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Location
Ungarra
Rainfall
Av. Annual: 375 mm
2025 Total: 343 mm
2025 GSR: 331 mm
Paddock history
2024: Wheat
2023: Canola
2022: Faba bean
Soil type
Ironstone and siliceous acidic sand over clays; siliceous sand over alkaline clay

Key points

- **The relative performance of lentil and faba bean depends on soil type.**
- **Large changes in paired comparison between lentil and faba bean.**
- **Weed competition and N fixation are also important considerations for break crop selection.**
- **Faba bean seem to be more tolerant of subsurface acidity than lentil.**

Why do this trial?

On the Lower Eyre Peninsula, as elsewhere on Eyre Peninsula (EP), there has been a significant increase in pulse production- particularly lentil-driven by strong prices and improved agronomic options, especially for weed and disease control. However, lentil are not the only profitable pulse crop option. The area sown to faba bean has also been growing steadily though not quite as high profile as lentil. Although faba bean generally have lower value than lentil, their weed control options have improved substantially with the introduction of imidazolinone (IMI)-tolerant varieties such as PBA Bendoc, combined with the use of the herbicide Overwatch®. Furthermore, faba bean typically produce higher biomass and offer better tolerance to waterlogging compared to lentil, which are notorious for their sensitivity to waterlogging. Faba bean also provide superior weed competition, particularly against annual ryegrass. As part of the SA Drought Hub Pulse Break Crop project, a side-by-side agronomic comparison of these two crops was conducted at Ungarra in 2025. This trial methodology involved transects of paired swaths of lentil and faba bean spanning multiple soil types, looking at agronomic and economic comparisons.

How was it done?

In a grower's 300 hectare paddock at Ungarra sown with faba bean in 2025 after a wheat crop in 2024, a 1.7 km transect was chosen based on a pH map (using the VERIS method) and previous faba bean yield maps to represent 3 different production zones. The monitoring areas were 3 swath widths of 12 m (36 m in total) to align with the controlled traffic line of the seeder, sprayer, and harvester. Soil samples were taken from all 3 zones.

Sampling regions were:

1. Glen West - acidic sandy soil, moderate yield potential
2. Glen Central - acidic sand, low yield potential
3. Glen East - calcareous loam, high yield potential

Initial soil sampling was undertaken prior to seeding to 10 cm, and soil pH was additionally taken in 5 cm sampling increments. Deep soil nitrogen (N) was also sampled.

Bendoc faba bean were sown dry at 100 kg/ha with 75 kg/ha of MAP in anticipation of rain on 28 April with Thunder lentil sown later at 55 kg/ha also with 75 kg MAP/ha on 31 May. Both crops were farmer sown with a JD 1895 single disc.

Both crops received pre-emergence herbicides. Faba bean received 2.5 L/ha of Overwatch plus 400 g/ha of diuron, and the lentil had 750 g/ha Ultra and 400 g/ha of diuron. Both crops received 1 L/ha of 360 g/ha Clethodim and 180 g/ha Factor, as well as best practice insecticide, fungicide and micronutrition management during the growing season. The predominant weed was annual ryegrass, with some capeweed.

Crop growth was measured on 10 July and 20 August with Canopeo® green cover (Table 2) and plant biomass was measured (17 September) with cuts taken just prior to majority of pod fill (Table 3). Grain yield was taken from the grower harvester yields. Yield comparisons were undertaken at the three different monitoring sites across 1.7 km transect and compared with mean yield for total transects using data collected extracted from the grower yield monitor dataset and is shown in Table 4.

Table 1. Soil test results at the three paddock locations at Ungarra in 2025.

Parameter	Unit	Glen West	Glen Central	Glen East
0-5 cm pH	pH $CaCl_2$	6.5	6.4	6.5
5-10 cm pH	pH $CaCl_2$	5.1	4.5	5.1
10-20 cm pH	pH $CaCl_2$	6.4	4.4	nr
Organic Carbon (W&B)	% (40°C)	1.45	1.17	1.21
MIR – Aus Soil Texture	–	Loamy sand	Loamy sand	Sandy loam
MIR – Clay	% w/w	8.9	6.7	13.2
MIR – Sand (+20 µm)	% w/w	79.6	83.9	74
MIR – Silt (2–20 µm)	% w/w	11.4	9.4	12.8
pH $CaCl_2$		5.48	5.41	7.59
Nitrate–N (2M KCl)	mg/kg	28	20	25
Ammonium–N (2M KCl)	mg/kg	2.7	2.1	1.3
Colwell Phosphorus (P)	mg/kg	34	35	26
PBI + Col P	–	39	39	57
DGT–P	µg/L	53	61	31
KCl Sulfur (S)	mg/kg	6.3	7.7	5.4
Exchangeable Calcium (Ca) – AmmAc	mg/kg	1070	800	57
Exchangeable Magnesium (Mg) – AmmAc	mg/kg	91	50	31
Exchangeable Potassium (K) – AmmAc	mg/kg	170	76	394
Exchangeable Sodium (Na) – AmmAc	mg/kg	32.9	14.5	40.6
Ca:Mg Ratio	–	7.1	9.7	9.2
K:Mg Ratio	–	0.58	0.47	0.43
ECR	%	8.7	5.5	4.8
ECEC	cmol/kg	6.64	4.66	24.9

Table 2 . Canopeo (% green area) over time at the three paddock locations at Ungarra in 2025. (https://canopeoapp.com/)

Date 2025	Location	Crop	Mean	SE	Change in 41 days	Daily Rate of Change
10 July	Glen Central	Bean	17	0		
20 August	Glen Central	Bean	84	4	66.3	1.62
10 July	Glen East	Bean	13	1		
20 August	Glen East	Bean	84	2	70.3	1.71
10 July	Glen West	Bean	17	1		
20 August	Glen West	Bean	64	4	46.55	1.14
10 July	Glen Central	Lentil	5	1		
20 August	Glen Central	Lentil	21	2	15.69	0.38
10 July	Glen East	Lentil	4	0		
20 August	Glen East	Lentil	43	4	38.35	0.94
10 July	Glen West	Lentil	7	1		
20 August	Glen West	Lentil	29	3	21.9	0.53

What happened?

Table 1 shows soil results from the 0-10 cm sampling from the locations, and also pH in 5 cm sampling increments as soil acidity can be a big production factor when growing lentil and faba bean. While the sites have good surface pH, particularly Glen East, pH was at toxic levels for species like faba bean and lentil below 5 cm, which wasn't apparent in the 0-10 cm testing (Table 1). There are also some key differences in the texture in Glen East, though the total clay differences weren't large. There were differences in soil cation exchange capacity (ECEC) again in the Glen East zone.

The faba bean sown early and dry on 28 April were just emerging when the lentil were being sown on 31 May, with very little rainfall in the previous month. There was little difference in emergence of beans across the 3 zones, (20, 20 & 25 plant/m^2 West to East) and there was only a slight reduction in emergence in lentil (133,109 & 139 plants/m^2 West, Central, East), but plant numbers were still acceptable.

The trend in crop performance for both crops across the three zones were similar with Glen East having the highest spring biomass and highest grain yield in both lentil and faba bean. Growth was lowest in Glen West. This was the same as previous yield trends in faba bean for the site from discussions with the farmer and also suggested from soil data particularly the CEC, clay contents, and soil pH.

The comparison in Table 4 shows that determining which break crop (lentil or faba bean) can be challenging with significant in-paddock variation in yield and therefore economic return.

Glen East, while having a high yield potential of 3.93 t/ha on a calcareous sandy loam, saw lentil yield 85% of the yield of faba bean, even when the faba beans had a month longer growing season. However, Glen Central, even though biomass and Canopeo measurements were similar (Tables 2 and 3) to Glen West, these two pulses really struggled to yield (Table 4). This would have been in part due to the acidity both restricting root growth which is needed to finish grain, as well as nutrient imbalance, and the higher amount of gravel in this soil compared to Glen West. During root inspections in July, all crops were well nodulated, but in October, crops in the Glen Central site seemed already stressed, and stunted, while not being particularly water logged.

Table 3. Plant biomass (kg/ha) for lentil and faba bean in Glen paddock at Ungarra on 17 September 2025.

Location	Lentil (kg/ha)	Faba bean (kg/ha)
Glen West	747	1857
Glen Central	720	1731
Glen East	1163	2553

Table 4. Grain yield (t/ha) comparisons at the three different monitoring sites across 1.7 km transect compared with mean yield for total transects Standard Error shown.

	Lentil yield (t/ha)	% of Glen East	Number of yield monitor points	SE	Faba bean yield (t/ha)	% of Glen East	Number of yield monitor points	SE
Glen East	3.35	100	103	0.630	3.93	100	73	0.036
Glen Central	0.86	26	34	0.017	2.48	63	43	0.044
Glen West	1.82	54	81	0.066	3.70	94	43	0.064
Total Transect	1.3				2.87			

What does this mean?

This paddock-scale paired comparison highlights the distinct niches occupied by each crop type across the transect. Consistent with the experiences of many farmers on Lower Eyre Peninsula (EP), faba bean generally outperform lentil on more challenging soil types, particularly acidic sands even after a robust multi-year liming program.

However, lentil demonstrated strong resilience in a short season like 2025, achieving competitive yields even under limited growing conditions. The yield differences on the Glen East soil type between faba bean and lentil was minimal, suggesting lentils may be the preferable option for this soil type due to their comparable performance combined with typically lower input risks or better market consistency in some seasons. Across the rest of the transect, however, the results favour faba bean as the superior choice. Faba bean delivered higher yields, stronger crop competition (e.g. better weed suppression), and likely greater nitrogen fixation all driven by substantially higher biomass production. Glen West, while still having some acidity, was not as acidic at depth as Glen Central, and the lentil yields here reflect this. At 1.8 t/ha the yield was still economic. However, the soil type wasn't as conducive to lentil production, whereas faba bean yield here was almost as high as the Glen East zone. This is in spite of the fact that the soil in Glen East could be seen as more fertile, maybe there was more moisture in the Glen West zone being lower down in the catchment which may have been a benefit in a dry spring.

Economic comparisons between the two crops fluctuate significantly from season to season. Lentil prices have varied by around 50% since the previous season, while faba bean prices have shown much larger swings (250–300%). These price volatilities can dramatically shift the relative profitability of each crop. A more detailed economic analysis of these trial results is planned as part of the ongoing project.

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