

# Taking South Australian canola profitability to the next level

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## Location

Yeltukka (15 km NW Cummins)  
Michael Treloar

## Rainfall

Av. Annual: 424 mm  
Av. GSR: 324 mm  
2020 Total: 431 mm  
2020 GSR: 365 mm  
2021 Total: 421 mm  
2021 GSR: 377 mm  
2022 Total: 539 mm  
2022 GSR: 406 mm

## Yield

Potential: Canola 4.8 t/ha (Modified French/Schultz, 14 kg/mm)

Actual: 6.1 t/ha

## Paddock history

2022: Canola  
2021: Wheat  
2020: Wheat

## Soil type

Sand over clay loam with calcrete in sub-soil

## Soil test

0-10 cm pH 6.25

## Plot size

10 m x 2 m x 4 reps  
Split plot x RCBD

## Yield limiting factors

Some broadleaved weeds in Yeltukka trial

## Location

Coomunga (15 km NW Port Lincoln)  
Peter Russell

## Rainfall

Av. Annual: 616 mm  
Av. GSR: 499 mm  
2020 Total: 681 mm  
2020 GSR: 563 mm  
2021 Total: 700 mm  
2021 GSR: 554 mm  
2022 Total: 850 mm  
2022 GSR: 585 mm

## Yield

Potential: Canola 7.3 t/ha (Modified French/Schultz, 14 kg/mm)

Actual: 6.9 t/ha

## Paddock history

2022: Canola  
2021: Lupins  
2020: Wheat

## Key messages

- **Having high nitrogen (N) levels in the soil prior to seeding was the biggest driver of canola yield in 2022 compared to a range of other nutritional and rotational treatments.**
- **Canola yield was not influenced by the previous crop (wheat compared to pulse) where adequate N nutrition was present.**
- **Higher rates of trace elements and sulphur did not have any impact on canola yields above district practice in a situation where soil and plant tissue tests met current critical values.**
- **The 2022 wheat crop grown on a pulse in (2020) (canola in 2021), yielded higher than wheat (2020).**

## Why do the trial?

Practices such as early sowing, matching cultivar phenology and sowing time to critical flowering period, the development of high yielding hybrid varieties and fungicide use to control blackleg have added to improvements in canola yield in recent years. After these practices have been adopted, what is the scope to further improve canola yields?

These trials were designed to determine the relative significance of key canola yield drivers once disease and phenology are optimised, primarily targeting crop sequences and nutrition packages in highly productive systems. This will provide information to better target and refine input costs and improve the profitability.

## How was it done?

The trials are being run over two growing seasons at two sites on the lower Eyre Peninsula:

- Site 1: Coomunga (15 km NW Port Lincoln) on an ironstone duplex loamy sand soil.
- Site 2: Yeltukka (15 km NW Cummins) on a sand over clay loam soil.

In 2021 blocks of wheat and lupin (Coomunga) and wheat and faba bean (Yeltukka) were grown in preparation for canola in 2022. In each block, separate treatments of high rates of nitrogen (N), phosphorous (P), sulphur (S), and trace elements (TE) were applied to create differences for the canola to be sown into in 2022.

In 2022 Pioneer 44Y94CL canola treated with Saltro seed dressing was sown on 5 May at both sites, targeting establishment of 45 plants/m<sup>2</sup>.

In 2022 each site was sown with 150 kg/ha 19:13:0 and flutriafol 500 @ 200 mL/ha. A total of 148 kg/ha N (district practice) was applied to each site prior to early flowering. Weeds were controlled with propyzamide @ 1 L/ha, clethodim @ 500 mL/ha, and Lontrel Advanced @ 50 mL/ha. Aviator Xpro @ 600 mL/ha was applied at 30% bloom to control upper canopy blackleg. Pyrinex Super @ 500 mL/ha was applied post-sowing and alpha-cypermethrin @ 100 mL/ha was applied during grain fill to prevent insect damage.

Additional nutrition was applied during 2021 and 2022 as detailed in Table 1 to increase levels of individual nutrients in the soil.

**Soil type**

Sand loam over ironstone clay loam

**Soil test**

0-10 cm pH 5.3

**Plot size**

10 m x 2 m x 4 reps

Split plot x completely randomised block design

**Yield limiting factors**

Nil

Phosphorous was applied at sowing in 2020 and nitrogen was applied as urea at stem elongation in 2021.

The “TE High” and “Everything High” treatments also received 1.7 kg/ha zinc, 5 kg/ha calcium, 2.6 kg/ha manganese, 1 kg/ha copper, 40 g/ha boron, 2 g/ha molybdenum, and 1.35 kg/ha iron in 2020, through streaming nozzles. These treatments also received 120 g/ha Zn, 150 g/ha Mn, 40 g/ha Cu, 50 g/ha Ca and 6

g/ha Mo applied as a foliar spray at early bloom in 2021.

Chicken manure at 20 t/ha (Chook) was applied to high input plots to determine if grain yield could be further increased through high rates of organic fertiliser.

Single superphosphate at 200 kg/ha (+Fert) was applied to four replicates of the High P treatment, early post-seeding 2022.

Gypsum at 500 kg/ha was applied to four replicates of the High S treatment early post seeding 2022.

Yields presented are hand cut yields, collected at 80% seed colour change, as this represents the most accurate method of determining canola yield in small plot trials (John Kirkegaard pers comm).

These trials were replicated in adjacent paddocks where pulse or wheat was planted in 2020, followed by canola in 2021. In 2022 the 2021 trials were over-sown with wheat to determine if there were any residual effects of the treatments imposed.

**What happened?****Site 1: Coomunga**

2021 Results:

Sown on 12 May 2021, wheat (cv Scepter) yielded 4.0 t/ha and lupin (cv Wonga) yielded 2.4 t/ha.

**Site 2: Yeltukka**

In the set-up year sown 13 May 2021, Scepter wheat yielded 4.2 t/ha and Bendoc faba beans yielded 2.4 t/ha.

**Table 1. Rates (kg/ha) of nitrogen (N), phosphorous (P) and trace elements (TE) applied to each treatment at Coomunga and Yeltukka in 2021 and 2022.**

Fertiliser applied	Year	Treatment				
		District practice	P high	N high	TE high	Everything high
Nitrogen	2021	9 (+125)*	9 (+125)	159 (+125)	9 (+125)	159 (+125)
	2022	100	100	100	100	100
	Total	109 (+125)	109 (+125)	259 (+125)	109 (+125)	259 (+125)
Phosphorus	2021	18	36	18	18	36
	2022*	22	22 (+18)	22	22	22 (+18)
	Total	40	58 (+18)	40	40	58 (+18)

\*() figure = extra nitrogen (kg/ha) applied to all wheat plots in 2020. Lupin/faba bean plots did not receive this.

**Table 2. Results of soil tests taken at Coomunga 2022, prior to canola being sown.**

2021 Treatment	Total mineral N 0-100 cm (kg/ha)	Organic carbon (%)	Colwell P (mg/kg)
Wheat - Everything High	219	1.99	30
Wheat - District Practice	77	1.94	35
Lupins - Everything High	195	1.96	30
Lupin - District Practice	76	2.21	27

**Table 3. Grain yield (t/ha) of canola 2022 at Coomunga following the different 2021 crops.**

2021 Crop	Yield (t/ha)
Lupin	6.28
Wheat	6.23
LSD (P = 0.05)	ns

**Table 4. Grain yield (t/ha) and oil content (%) of canola 2022 at Coomunga as a result of treatments applied.**

Treatment	Yield (t/ha)	Oil (%)
District Practice	5.91	46.3
Everything High+Chook	6.91	45.5
Everything High+Fert	6.80	45.7
N High	6.52	45.3
P High	6.16	45.9
P High + Fert	6.30	45.9
S High	5.89	46.1
TE High	5.55	45.9
LSD (P=0.05)	1.6	ns

**Table 5. Results of soil tests taken at Coomunga 2022, prior to wheat being sown.**

2020 Treatment	Total mineral N 0-100cm (kg/ha)	Colwell P (mg/kg)
Lupins - Everything High	66	26
Lupins - District Practice	80	39
Wheat - Everything High	65	26
Wheat - District Practice	74	30

**Table 6. Grain yield (t/ha) of 2022 wheat sown into 2021 canola.**

Treatment	Yield (t/ha)
District Practice	5.06
Everything High	5.09
N High	5.25
P High	5.01
S High	5.06
TE High	5.27
LSD (P=0.05)	ns

**Table 7. Grain yield (t/ha) of wheat in 2022 at Coomunga following the different 2020 crops and canola in 2021.**

2020 Crop	Yield (t/ha)
Lupin	5.30
Wheat	4.90
LSD (P=0.05)	0.13

**Table 8. Results of pre-seeding soil tests taken at Yeltukka 2022.**

2021 Treatment	Total Mineral N 0-100 cm (kg/ha)	Organic C (%)	Colwell P (mg/kg)
Faba Bean - Everything	115	0.94	25
Faba Bean - District Practice	74	1.16	22
Wheat - Everything	132	0.96	24
Wheat - District Practice	52	1	27

**Table 9. Grain yield (t/ha) of canola 2022 at Yeltukka following the different 2021 crops.**

2021 Crop	Yield (t/ha)
Faba bean	6.02
Wheat	5.49
LSD ( $P=0.05$ )	<i>ns</i>

**Table 10. Grain yield (t/ha) and oil content (%) of canola 2022 at Yeltukka as a result of treatments applied.**

Treatment	Yield (t/ha)	Oil (%)
District Practice	4.92	44.7
Everything High+Chook	7.19	45.2
Everything High+Fert	6.85	45.4
N High	6.60	45.2
P High	5.07	44.8
P High+ Fert	5.51	45.7
S High	5.26	46.0
TE High	4.65	44.9
LSD ( $P = 0.05$ )	1.6	<i>ns</i>

**Table 11. Results of pre-seeding soil tests taken at Yeltukka 2022, prior to wheat being sown.**

2020 Treatment	Total mineral N (kg/ha) 0-100cm	Organic C (%)	Colwell P (mg/kg)
Faba bean - Everything	87	1.35	26
Faba bean - District Practice	95	1.19	27
Wheat - Everything	121	1.38	34
Wheat - District Practice	98	1.15	21

**Table 12. 2022 grain yield (t/ha) of wheat sown into 2021 canola.**

Treatment	Yield (t/ha)
District Practice	5.90
Everything High	6.12
N High	5.94
P High	5.86
S High	5.96
TE High	5.90
LSD ( $P = 0.05$ )	<i>ns</i>

**Table 13. Grain yield (t/ha) of wheat 2022 at Yeltukka following the different 2020 crops and canola in 2021.**

2020 Crop	Yield (t/ha)
Faba bean	5.98
Wheat	5.85
LSD ( $P = 0.05$ )	0.07

**What does this mean?**

Where nitrogen levels were higher in the soil prior to sowing canola at both sites in 2022, canola yield was higher compared to all other treatments. In this instance the higher N levels were created by adding high urea to both pulses and wheat later (around head emergence) in the growing season in the year prior to growing canola.

The viability of being able to re-create this across a wider landscape still requires sorting out some detail around longevity and return on investment. However, the message of having higher fertility levels available in the soil that can be drawn on to capitalise on better growing seasons holds true regardless of how higher fertility levels are created.

All other treatments (district practice and where higher levels of sulphur, trace elements, and phosphorous were added) all yielded similarly. This indicates that current soil and tissue testing critical values (complete range of soil and plant tests conducted not displayed) appear to be accurate for canola and that canola has a strong ability to scavenge and find these nutrients.

There was no effect of the previous crop (either pulse or wheat) on canola yield. However at both sites the wheat crop following the canola grown in 2021 yielded higher following pulse (faba beans/lupins compared to wheat), indicating a longer-term benefit of growing the pulse crop.

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*Brianna Guidera, SARDI presenting GRDC National Variety Trial results at Minnipa Agricultural Field Day, 7 September, 2022.*

