

### 3.5 Evaluating sulphur sources in Canola

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**Summary of Findings:**

None of these trials have given a clear sulphur (S) response irrespective of form even though some had quite low soil sulphur levels. This indicates that elemental sulphur is quite a suitable sulphur source especially where it is for maintenance sulphur requirements as appears to be the case in all of Hi Fert's trials. The trials over the last four years indicate that the soil sulphur level using (KCL-40) in 0 -10 cm may not be a good indicator of likely response to sulphur in canola. The total amount of sulphur in the root zone at sowing looks to be indicator from the Western Australian, which indicated that crops at a yield of up to 2 tonnes/ha a level of Sulphur below 25 kg in the root zone is likely to be responsive.

In crop mineralisation of sulphur from the organic fraction must be playing a significant roll in supplying sulphur to the crop as it does for nitrogen in western district soils which have good soil organic matter levels.

**Aim:**

To investigate the effectiveness of elemental sulphur in canola, what percentage of the applied sulphur can be applied as fine (less than 250 micron) elemental sulphur without loss of grain yield or oil content. In this trial either 2 kg of sulphur or 28 kg of sulphur has been applied per hectare. The form of sulphur varies from 100 % sulphate (Ss) to 100 % elemental (Se). With the aim to develop a Sulphur impregnated ammonium phosphate fertilizer suitable for canola.

**Locations:** Yalla Y Poora and Chatsworth

**Co operator:** Name: Southern Farming Systems  
Mick Keating (DPI), Una Allender and Richard Beggs

Site Details: Yalla Y Poora

Soil Type: Buckshot Loam

Annual Rainfall mm:		mm	Growing season rainfall mm		268 mm		
Actual			( April – November )				
Paddock History							
Year	Crop / Pasture	Yield t.ha	Stocking Rate DSE	Nutrients Applied (kg/ha)			
				N	P	K	S
2005	Barley						
Notes (crop, grazing management etc.):							

**Last Soil Test Results: Yalla Y Poora**
**Year: 2006**

Test	Org. C %	P <sup>1</sup> mg/kg	K mg/kg	S mg/kg	pH H <sub>2</sub> O	pH CaCl <sub>2</sub>	Cu DTPA mg/kg	Zn DTPA mg/kg
Result	1.14	29	237	9.7	6.3	5.2	nt	nt
Status	Mod low	Adeq	Adeq	Adeq	Mod Acidic	Mod acidic		
Test	CEC meq/100mg	Ca %	Mg %	Na %	S mg/kg 10-50	SALT dS/m	N (kg/ha) 0-10	N (kg/ha) 0-50
Result	12.29	73	18.5	5.3	8.4	0.10	22.1	48.1
Status		Adeq	Eleva	SI Elev				

<sup>1</sup>. P test is Colwell,

Soil S approx 43.6 kg Deep soil 10 –50 cm

Sown 11/5/06 into reasonable moisture, Inspected at flowering all treatments had good flower colour harvested 29/11/06

Site Details:

Soil Type: Light Grey Sand

Chatsworth

Annual Rainfall mm: Actual	mm	Growing season rainfall mm ( April – November )	mm
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Paddock History

Year	Crop / Pasture	Yield t.ha	Stocking Rate DSE	Nutrients Applied (kg/ha)				
				N	P	K	S	Other
2005	Wheat							

Notes (crop, grazing management etc.): Poor history full of onion weed.

**Last Soil Test Results: Chatsworth**
**Year: 2006**

Test	Org. C %	P <sup>1</sup> mg/kg	K mg/kg	S mg/kg	pH H <sub>2</sub> O	pH CaCl <sub>2</sub>	Cu DTPA mg/kg	Zn DTPA mg/kg
Result	2.17	22	162	6.4	5.8	5.2	nt	nt
Status	Mod	Marg	Adeq	Marg	Mod Acidic	Mod Acidic		
Test	CEC meq/100mg	Ca %	Mg %	Na %	S mg/kg 0-60	SALT dS/m	N (kg/ha) 0-10	N (kg/ha) 0 – 60cm
Result	nt	nt	nt	nt	8.4	0.07	nt	203
Status								

<sup>1</sup>. P test is Colwell, Sulphur 0 – 60 cm 65.5 kg

## Treatments:

**Table 1: Treatment Details for all sites**

Treatment	Product mix	Nutrients applied ( kg/ha)				
		N	P	Se	Ss	St
1	MAP/SOA/Urea	60	63		28	28
2	Super M/Gold N	60	63	26	2	28
3	Super M/SOA/Urea	60	63	14	14	28
4	Super M/MAP/SOA/Urea	60	63	7	21	28
5	Super M/Gold N/Urea/SOA	60	63	21	7	28
6	MAP	60	63	0	1	1
7	S impregnated MAP	60	63	13.1	13.8	27

Urea SOA or Gold N was deep banded under all treatments to balance the total nitrogen (N) input to 60 kg/ha, no more than 12 kg of N was placed with the seed and only 25 kg/ha P. All treatments other than treatment 7 had 190 kg/ha of Triple Super Phosphate (TSP) pre drilled, T7 had 197 kg/ha of S8 pre drilled. This enabled all the sulphur to be applied in treatment 7 from the S8 and eliminating phosphorus as a possible limiting factor.

## Results:

**Table 2 Yalla Y Poora Grain yield and oil contents (not yet done)**

Treatment	Grain Yield kg/ha	Oil Content %
1.MAP/SOA/Urea	477	
2.Super M/Gold N	500	
3.Super M/SOA/Urea	450	
4.Super M/MAP/SOA/Urea	562	
5.Super M/Gold N/Urea/SOA	617	
6.MAP	504	
7.S impregnated MAP	462	
LSD 5 %	300	
CV %	50	

**Table 3: Chatsworth Grain yield and oil contents (not yet done)**

Treatment	Grain Yield t/ha	Oil Content %
1.MAP/SOA/Urea	1.285	
2.Super M/Gold N	1.312	
3.Super M/SOA/Urea	1.365	
4.Super M/MAP/SOA/Urea	1.406	
5.Super M/Gold N/Urea/SOA	1.354	
6.MAP	1.212	
7.S impregnated MAP	1.289	
LSD 5 %	0.300	
CV %	22	

**Table 4: Chatsworth Tissue tests of Youngest Fully Emerged Blade (YEBS)  
sample date 30/8/06**

Treatment	N %	P %	K %	S %	Na %	Ca %	Mg %	Cu mg/kg	Zn mg/kg	Mn mg/kg	Fe mg/kg	B mg/kg
T1. 28 kg S as SO <sub>4</sub>	7.08	0.89	4.49	0.74	0.12	1.14	0.33	7.42	62.40	72.43	98.83	26.93
T6. 1 kg S as SO <sub>4</sub>	6.72	0.78	5.43	0.44	0.17	1.37	0.32	6.83	49.43	84.67	84.63	25.60

Note: Average of three reps sulphur levels are higher where the higher rate of sulphur was applied however both levels are in the adequate range (0.34 – 1.04 % S)

### Discussion/Conclusion:

#### Yalla Y Poora

The dry season and frosts limited yields dramatically; there was no difference in flower colour between treatments at flowering or at any stage of growth. Available soil sulphur (S) at sowing was 43 kg/ha (taken to a depth of 50 cm) and with a yield of 0.5 t/ha maximum requiring 7 kg of sulphur to be taken up by the plant assuming an efficiency of 40 % this means there only had to be 15 kg S available for this canola crop. This crop had enough soil sulphur already supplied before additional sulphur was applied as the end yield was very low. The high CV of 50 % and low yields mean that there is no significant difference between treatments.

#### Chatsworth

This site yielded well site average 1.3t/ha.

Soil sulphur levels in the 0 – 10 cm were low 6.4 mg/kg, however the amount of sulphur in the 0 – 60 cm profile was 65.5 kg/ha, this is a result of sulphur leaching down the profile. Given the increased rate of phosphorus and sulphur being applied in the pasture phase and farmers awareness of canola being a high sulphur user most paddocks have received quite a lot of sulphur over the last 10 years or so. Western Australian data (Soil and tissue tests to predict the sulphur requirements of Canola in south-western Australia Authors: R.F.Brennan and M.D.A.Bolland Australian Journal of Experimental Agriculture, 2006, 46, 1061 - 1068) looking at sulphur responsiveness in canola also indicates that a 0 – 10 cm soil sample is not a good indicator of likely S responses, this work fits with the work Hi Fert has done over the past 4 years. A better indicator of potential sulphur responses in canola is to look at root zone sample, when these numbers are below 25 kg of sulphur in the profile responses are possible.