

4.3 PHOSPHORUS AND TRACE ELEMENT FOR MAXIMUM WHEAT PRODUCTION IN THE HIGH RAINFALL ZONE – STREATHAM SITE

Researcher: Andrew Speirs ph: 0428 685 172
HiFert

Location: Glenthompson, Streatham site
Co-operator: SFS, Jenkins site



Aim:

To develop a phosphorus response curve for high rainfall production of white wheat as well as investigating the responsiveness of acid soils to zinc and or copper based products which showed promise in the 2000 trial at Streatham.

Soil Type: Loam

Annual Rainfall mm: 722mm
Growing season rainfall: 535mm

Trial layout:

A fully randomised complete block design. Glenthompson 6 replicates, plot size 20 m , 10 treatments.

Paddock History:

2001 Wheat Kellalac
2000 Canola (Gypsum applied)

Last Soil Test Results:

Test	Org. C %	P ¹ mg/kg	K mg/kg	S mg/kg	pH H ₂ O	pH CaCl ₂	Cu DTPA mg/kg	Zn DTPA mg/kg
Result	2.5	20	193	24.5	5.0	5.6	0.44	0.30
Status	High	Adeq	Adeq	High	Moderate Acidic	Moderate Acidic	Marg	Low

Test	CEC meq/100 mg	Ca %	Mg %	Na %	S 0-60	SALT dS/m	N (kg/ha) 0-10	N (kg/ha) 0-60
Result	5.4	69.4	13.4	5.7		0.09		
Status		Adeq	Adeq	Elev		Low		

¹. P test is Olsen, Colwell 39 0 – 10 cm nitrate 34 and Ammonium 3
Phosphate buffering Index

Treatment Details:

Treatment	Sowing	Pre Sowing	Nutrients applied (kg/ha)				
			N	P	S	Zn	Cu
1	Nil	Urea	60	0	0	0	
2	DAPS	Urea	60	25	17	0	
3	DAPS	Urea	60	35	24	0	
4	DAPS	DAPS/Urea	60	50	34	0	
5	DAP Zinc 5%	Urea	60	25	2.5	6.25	
6	DAPS	Urea 5% Zn	60	25	17	4.4	
7	DAP Cu 2.5 %	Urea	60	25	2.5	0	3.2
8	DAP	Urea	60	25	2.5	0	
9	DAP Cu/Zn 2.5 %	Urea	60	25	2.5	3.2	3.2
10	DAP im S R + D	Urea	60	25	12	0	0

Urea was deep banded under all treatments to balance the total nitrogen input to 60 kg/ha. The additional P applied above 25 P was pre drilled .

Co operation required:

Sowing equipment, weed control and harvesting will be required from the SFS group/DNRE at each site.

Calendar of Events and Observations ¹.

Date	Event	Comments ²
17/5/2001	Sowing	Sown into good moisture
12/7/2001	Site inspection	Site inspection P response evident 40 P plots looking better & T9 looking very well
6/9/2001	Site inspection	Tissue tests taken
25/9/2001	Site inspection	Phosphorus response still visual
9/11/2001	Field day	Crop flowering some rust on lower leaves yield potential good

¹. Record of trial management activities or events that may affect the trial². Note observations relevant to effects of events on trial outcomes**Actual rainfall recorded (mm) total : 722**

J	F	M	A	M	J	J	A	S	O	N	D
19.8	18.1	39.7	70.2	32.3	50.6	52.2	132.1	68.4	119.6	79.6	39.2

Results:**Yield and Protein**

Treatment	Product	Yield (t/ha)	Yield % of Nil	WUE* (kg/mm)	Protein (%)
1	Nil P	6.735	100	15.85	8.13
2	DAPS	7.347	109	17.29	7.92
3	DAPS	7.378	110	17.36	8.00
4	DAPS	7.515	112	17.68	8.20
5	DAP Zinc 5%	7.501	111	17.65	7.97
6	DAPS	7.590	113	17.86	8.08
7	DAP Cu 2.5 %	7.379	110	17.36	8.15
8	DAP	7.175	107	16.88	8.03
9	DAP Cu/Zn 2.5 %	7.519	112	17.69	7.97
10	DAP impreg S	7.520	112	17.69	7.85
Mean					
LSD 5 %		0.36			0.42
CV %		4.2			4.4

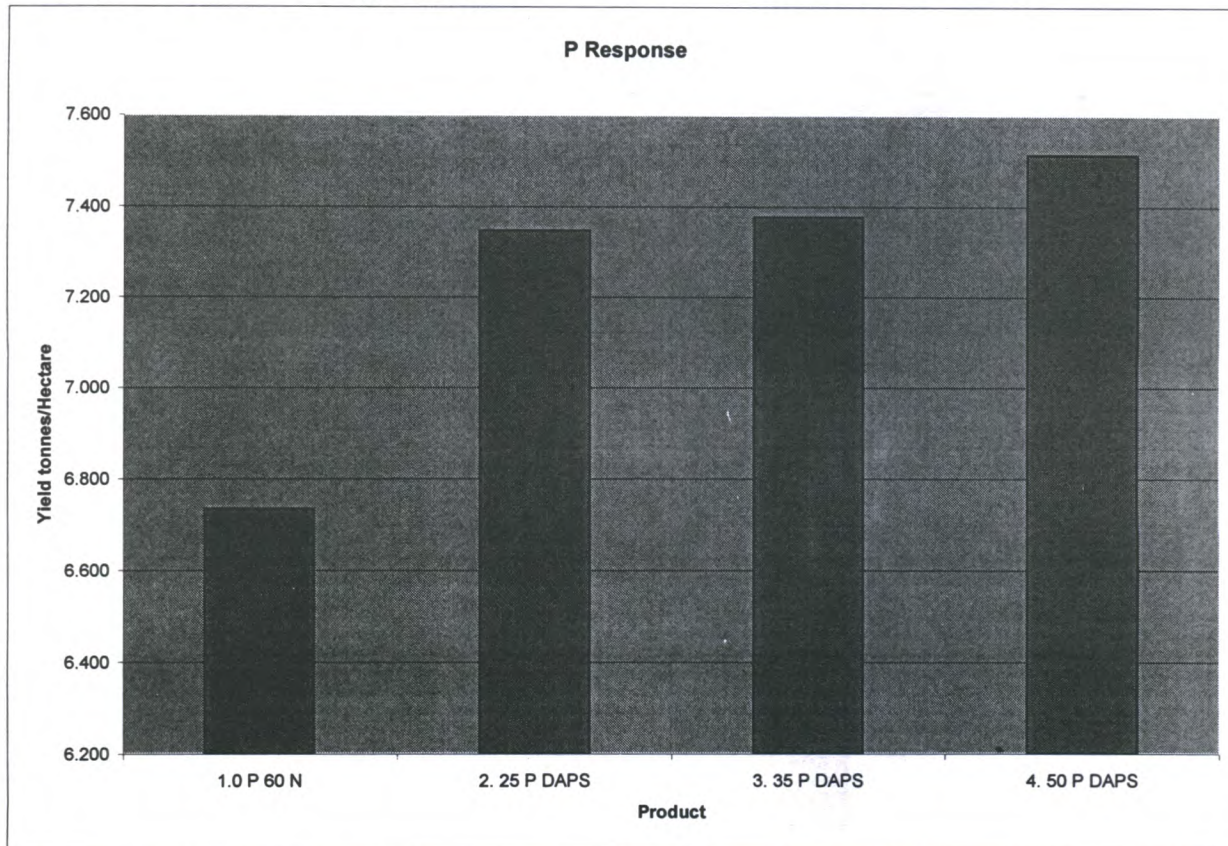
* Water use efficiency = (GSR (M-N) – 110 mm) x 0.02 which for 2001 equals 8.5 tonne.

* Crop harvested at 15.1 % moisture yields adjusted to 12.5 % moisture

Tissue test results YEBS 25th September selected Treatments:

Treat	Product	N %	P %	K %	S %	Ca %	Mg %	Na %	Cu ppm	Zn ppm
2	DAPS	3.92	0.305	3.075	0.285	0.169	0.108	0.014	4.1	15.0
5	DAP Zinc 5%	4.18	0.310	2.975	0.300	0.176	0.115	0.016	5.0	18.2
7	DAP Cu 2.5 %	4.34	0.308	3.025	0.320	0.188	0.119	0.020	4.9	15.5
LSD 5 %										
CV %										

Grain yield response to applied P



Trial Summary:

Main Findings:

Phosphorus (P) responses were visual and evident from 3 leaf stage until the end of September with the 50 of P treatments being well ahead of the nil P as well as the 25 of P plots showing out compared to nil P treatments. There was a significant response to phosphorus at the 5 % level for grain yield.

There was a positive trend to applied zinc but not a significant effect on grain yield.

The grain size was good with screenings less than 3 % in all treatments.

Grain protein across the site were low (between 8 – 8.5 %) due to the higher than expected yield indicating that with adequate nitrogen there may have been other nutrients become limiting ie the zinc trend may have become significant if sufficient nitrogen was applied.

Water use efficiency was greater than 17 kg per mm of growing season rainfall which is quite acceptable, however yields were still below the 20 kg per mm of growing season rainfall.

Zinc in the plant tissues was reduced by applying phosphorus at rates of 25 of phosphorus per hectare and further reduced as the P rate increased, hence with high yielding crops needing at least 25 of P to maintain soil P levels zinc may need to be included as a preventative due to the negative effect higher P rates have on zinc uptake.

Longer term issues with achieving such high yields is simply matching nutrient removals assuming 3.5 kg P per tonne of grain removed at 7.5 tonne 26 kg of phosphorus has been exported let alone what is fixed by the soil. Further work needs to be done to match crop nutrient needs in the South West where yield potentials are high.

Recommended action:

Continue a similar trial in 2002 with the view of monitoring the crop nitrogen requirements more closely to ensure yield potentials are achieved.