

4.4 PHOSPHORUS AND TRACE ELEMENT FOR MAXIMUM WHEAT PRODUCTION IN THE HIGH RAINFALL ZONE – HAMILTON SITE

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HiFert

Location: Hamilton Site

Co-operator: SFS, John Herman's site



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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

Trial layout:

A fully randomised complete block design. Hamilton site 4 replicates, plot size 15 m , 10 treatments.

Annual Rainfall mm: 824mm

Growing season rainfall: 597mm

Paddock History:

2001 Wheat Kellalac

2000 Pasture

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	4.1	19	262	28.1	4.9	4.4	0.46	0.73
Status	High	Adeq	Adeq	High	Strongly Acidic	Strongly Acidic	Marg	Marg

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	12.1	56.9	28.4	4.4		0.317		>250
Status		Marg	Elev	Elev		Marg		

¹ P test is Olsen, Colwell 60 0 – 10 cm nitrate 176 and Ammonium 18

Phosphate buffering Index

Treatment Details:

Treatment	Sowing	Pre Sowing	Nutrients applied (kg/ha)				
			N	P	S	Zn	Cu
1	Nil		0	0	0	0	
2	DAPS		23	25	17	0	
3	DAPS	DAPS	32	35	24	0	
4	DAPS	DAPS	46	50	34	0	
5	DAP Zinc 5%		23	25	2.5	6.25	
6	DAPS		23	25	17	4.4	
7	DAP Cu 2.5 %		23	25	2.5	0	3.2
8	DAP		23	25	2.5	0	
9	DAP Cu/Zn 2.5 %		23	25	2.5	3.2	3.2
10	DAP im S R + D		23	25	12	0	0

No Urea was pre banded due to the high soil N levels. 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
28/5/2001	Sowing	Sown into good moisture
12/7/2001	Site inspection	Site inspection P response evident
17/8/2001	Site inspection	Tissue tests taken YEBS visual P response
25/9/2001	Site inspection	Crop looked well
20/10/2001	Site inspection	BYDV evident
November	Field day	Crop flowering some rust on lower leaves with BYDV affecting yield potential.
¹ . Record of trial management activities or events that may affect the trial		
² . Note observations relevant to effects of events on trial outcomes		

Actual rainfall recorded total : 824mm

J	F	M	A	M	J	J	A	S	O	N	D
12.8	26.2	65.2	68.2	28.6	56.4	38.4	142.8	78.6	150.2	102.4	54.4

Results:**Yield and Protein**

Treatment	Product	Yield (t/ha)	Yield % of Nil	WUE* (kg/mm)	Protein (%)
1	Nil P	5.794	100	11.90	10.98
2	DAPS	5.645	97	11.59	11.23
3	DAPS	5.764	99	11.84	11.38
4	DAPS	5.742	99	11.79	11.43
5	DAP Zinc 5%	5.333	92	10.95	11.75
6	DAPS	5.742	99	11.79	10.63
7	DAP Cu 2.5 %	5.697	98	11.70	11.7
8	DAP	5.377	93	11.04	11.63
9	DAP Cu/Zn 2.5 %	5.697	98	11.70	11.35
10	DAP impreg S	5.794	100	11.90	11.8
Mean					
LSD 5 %		0.49			1.28
CV %		6.0			7.8

*Water use efficiency = (GSR (M-N) – 110 mm) x 0.02 which for 2001 equals 9.7 tonne.

Tissue test results YEBS 25th September all Treatments :

Treat	Product	N %	P %	K %	S %	Ca %	Mg %	Na %	Cu ppm	Zn ppm
1	Nil	4.57	5.99	22.59	0.202	0.148	0.014	2.95	0.315	0.34
2	DAPS	4.81	3.07	22.65	0.265	0.177	0.020	2.55	0.35	0.345
3	DAPS	4.91	4.53	23.20	0.188	0.151	0.015	2.85	0.34	0.335
4	DAPS	4.93	4.80	24.69	0.174	0.147	0.012	2.95	0.36	0.34
5	DAP Zinc 5%	4.79	4.86	24.57	0.207	0.142	0.015	2.55	0.315	0.34
6	DAPS	4.55	5.74	22.48	0.187	0.147	0.012	2.9	0.345	0.34
7	DAP Cu 2.5 %	4.93	4.49	22.57	0.198	0.151	0.012	2.8	0.33	0.325
8	DAP	4.76	4.20	21.98	0.222	0.165	0.015	2.65	0.335	0.335
9	DAP Cu/Zn2.5 %	4.83	4.95	22.72	0.205	0.150	0.012	2.75	0.33	0.345
10	DAP impreg S	4.99	3.00	25.09	0.219	0.156	0.014	2.7	0.355	0.345
LSD 5 %										
CV %										

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 not a significant response to phosphorus in relation to grain yield, this may have been the result of high soil P levels Colwell P 60 ppm and the impact of BYDV and leaf rust. The grain size was good with screenings less than 3 % in all treatments. Grain protein levels across the site were adequate (between 10.5% and 12%) indicating that nitrogen did not limit yield

Water use efficiency was low at 11 – 12 kg per mm of growing season rainfall this indicates that BYDV and leaf rust had a significant impact on grain yield, confirming the need for a management strategy to be developed to achieve yield potential in high rainfall cropping covering the following aspects of crop health, nutrition, insect control and leaf disease control.

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.



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