

3.4.4 Different sowing and topdressing phosphorus options in wheat - Lake Bolac, Vic

Location: Lake Bolac Research Site.

Funding:

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Researchers:

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Background/Aim:

Evaluate Phosphorous Efficiencies of various different phosphate fertilisers on wheat

Summary of findings:

- There were adequate levels of phosphorus in the soil profile, but we still saw a response to phosphate fertiliser.
- There was some differences within different products at the 12kgP rate – with Sulfur enhanced products delivering a better outcome.
- Other additives to phosphorus fertilisers delivered no additional benefits

Trial information:

The trial initiated on the 21st of June 2010. The soil analysis results from the site are presented in Table 1. The plots were sown with wheat (*cv. Beaufort*) at 60kg/Ha and various sowing starter and top dress fertilisers as indicated in Table 2.

The fertiliser treatments were determined using three different rates, either 3, 9 or 12 kg of applied Phosphorus. A basal application of Urea and Gran am was applied at 40kg N/ha to ensure that N was not limiting.

Table 1: Initial Soil test results summary

Soil Test Analyte	Result
Sample Depth To	0-10cm
Annual Rainfall	600mm
pH (1:5 Water)	4.8
pH (1:5 CaCl ₂)	4.3
Elec. Cond. (Sat. Ext.) dS/m	0.21
Chloride (mg/kg)	40
Nitrate Nitrogen (NO ₃) mg/kg	85
Ammonium Nitrogen (KCl) mg/kg	1.8
Phosphorus (Colwell)	84
Phosphorus Buffer Index (PBI-Col)	91
Available Potassium (mg/kg)	220
Calcium (Amm-acet.) Meq/100g	3
Calcium/Magnesium Ratio	1.9
Cation Exch. Cap. Meq/100g	6.05
Sodium % of Cations (ESP) mg/kg	4.6
Aluminium Saturation %	9.9
Copper (DTPA) mg/kg	0.5
Iron (DTPA) mg/kg	440
Manganese (DTPA) mg/kg	8.1
Zinc (DTPA) mg/kg	0.76
Boron (Hot CaCl ₂) mg/kg	1.2
Sulfate Sulfur (KCl40) mg/kg	27
Organic Carbon (OC) %	2.2
Soil Colour	Brown
Soil Texture	Clay Loam
Disp. Index, Loveday/Pyle	2
Slaking 2Hrs	Partial

Table 2: Treatments and nutrients rates (kg/Ha)

Product	N	P	S	Zn	Prod rate kg/ha
Control (basal N only)	0	0.0	0	0	0.0
Bascote P max	10	21.9	1.5	0	54.8
DAP	12	18	10		66.7
Granulock Z	17	18.8		0.01	16.0
Granulock Z + Protifert	11	21.8	4	1	41.3
Granulock Z + Humic Acid	11	21.8	4	1	41.3
Granulock Z + AVAIL	11	21.8	4	1	41.3
Duratec (70% DAP:30% Basacote)	11	21.8	4	1	41.3
Easy NP AVAIL	8.5	12.4	0	0	72.6
Easy NP	0	19.6	9.7	0	61.2
Granulock 15	8.5	12.4	0	0	72.6
SCF MAP-S	14.3	12	10.5	0	100.0
MES 10	11.7	19	11.6		63.2
Granulock S	18	20	1.6		15.0
MAP	16	17	12		70.6
TSP-S	16.3	17.5	8.4	0.03	51.4

Results and discussion:

Despite apparently adequate P levels (Colwell P 84 mg/kg / PBI 91), the site was still highly P responsive e.g. 3 kg/ha P as DAP gave a statistically significant yield increase of 0.5 t/ha. The high degree of P responsiveness may be in part due to the late sowing date. Alternatively, severe water logging may have limited root access to soil P supplies. Incremental to the P response, the addition of S compounded with the starter fertiliser gave a significant response compared to MAP (at 12 kgP/ha) with 4 of the 5 PS compound fertilisers trialled. It is difficult to attribute this response to sulphur however given the adequate soil S reading at the commencement of the trial. Other additives to P fertiliser failed to result in any additional responses.

Summary:

Despite reasonable soil P levels, this site is still highly P responsive. Starter fertilisers compounded with additional S appear to give incremental yield under these conditions.

Table 3: Results

		Grain Yield	Grain Protein	Screenings	Test weight
Name		t/ha	%	%	
Control (basal N only)	0	3.25	10	2.6	61.1
Bascote P max	3	3.78	10.07	2.5	61.9
DAP	3	3.87	9.77	2.8	58.9
Granulock Z	9	3.81	10.1	2.5	59.9
Granulock Z + Protifert	9	3.99	10.1	2.1	59.4
Granulock Z + Humic Acid	9	4.04	10	2.5	60.2
Granulock Z + AVAIL	9	4.11	10.17	2	60.3
Duratec (70% DAP:30% Basacote)	9	4.06	10.27	2.2	59.3
Easy NP AVAIL	9	3.76	10.03	2.4	60.2
Easy NP	9	3.97	10	2.1	57.2
Granulock 15	12	4.1	10.23	2	59.6
SCF MAP-S	12	4.3	9.77	2.4	59.1
MES 10	12	3.96	10.07	2.3	59.8
Granulock S	12	4.06	10.7	9.8	41.5
MAP	12	3.72	9.93	2.4	60.3
TSP-S	12	4.1	9.97	2.2	60
	CV	5.2	2.2	111.7	13
	LSD	0.34	0.37	5.2	12.74