4.3.2 Investigation Of The Benefits Of Specialty Phosphorus Products And Liquid Phosphorus Options In Cereals - Mininera, Vic

Location: Mininera

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Background:
Research on the Eyre Peninsula in recent years has demonstrated the benefits of fluid P fertilisers over granular forms on highly alkaline calcareous clays. More recently, work in the Wimmera, Mallee and North East of Victoria has at times demonstrated some benefits of fluids over granules on a variety of soil types albeit with advantages of generally lower magnitude.

Despite demonstrated advantages, adoption has been slow, mainly due to the high costs of liquid P alternatives (ammonium poly phosphate, phosphoric acid, tech grade MAP).

Aligned with the quest for more efficient P fertilisers is the search for more effective granular fertilisers. Numerous manufacturers have introduced products that reportedly improve the efficiency of fertiliser P through either physical or chemical means. Further, there are reports from Italy of improved P efficiency in TSP through coating with humic acid.

As an integral part of the GRDC Nutrient Management Initiative, Incitec Pivot in co-operation with Melbourne University, DPI Victoria Birchip Cropping Group and Southern Farming Systems has trialed the following products at a range of phosphorus application rates and timing of applications (Table 4.11) to answer some of the above questions. The trial was also repeated at Walpeup (Mallee) and Kalkee (Wimmera).

Table 4.11: Treatment list

No.	Treatment
1	MAP
2	APP (Ammonium polyphosphate)
3	Easy NP (liquid ammonium phosphate-ammoniated phosphoric acid)
4	Granulock 15 (compounded MAP and Sulphate of Ammonia)
5	Southern Cross Fertilisers, Sulphur Enriched MAP
6	Micro essentials S15 (MAP + Elemental S + additional sulphate S as added H2SO4)
7	Biophos (Composted rock phosphate)
8	HA coated Triple Super (humic acid coated 8%)
9	HA coated MAP (humic acid coated 8%)
10	Split application MAP (50% at sowing, 50% at DC23
11	MAP applied all at DC23

Completely randomized split block design with 4 replicates. Each Treatment sown at 3 rates of phosphorus, 0, 15 and 30 kg/ha. Basal N and S (and Zn) applied at sowing as granular urea and sulphate of ammonia to balance both N and S across all treatments.

Table 4.12: Trial inputs

Previous crop:	Canola
Sowing date:	25 June 2007
Variety:	Ruby Wheat
Sowing rate:	80 kg/ha

Observations:

This trial sight was chosen as a typical regional soil type and had had a representative cropping rotation. Unfortunately the soil phosphorus levels (Colwell P) show that this site was possibly not phosphorus responsive as required for the purposes of this trial.

Adequate winter and late spring rains resulted in average grain yields. The trial was never moisture stressed and high grain protein levels indicate that the trial was not stressed for nitrogen. Visually it was difficult to pick any differences between treatments during the growing season.

But at harvest there were significant yield differences between treatments and the controls (no P)

▼ Table 4.13: Soil Test Results

	Ec	OC	Col P	PBI	pH water	pH CaCl	S
Rep 1	0.12	2.3	61	75	5.9	5.3	23
Rep 2	0.10	2.6	70	83	5.6	4.9	17
Rep 3	0.12	2.6	70	89	5.4	4.7	24
Rep 4	0.13	2.8	90	89	5.2	4.5	21

▼ Table 4.14: Grain Yield Results

Trt. No.	Treatment	P Rate kg/ha		
		0	15	30
1	APP	3.685	3.889	4.100
2	Biophos	3.834	4.199	4.030
3	Cargill MES	3.714	4.329	4.346
4	Easy NP	3.788	4.405	4.574
5	Granulock 15	3.443	4.164	4.169
6	HA coated MAP	3.868	4.369	4.650
7	HA coated TSP	3.615	4.051	4.186
8	MAP	3.693	4.384	4.360
9	MAP all at DC23	3.418	3.847	4.313
10	SCF MAP-S	3.724	4.046	3.984
11	Split MAP 50/50	3.596	4.127	4.052
Average		**3.671**	**4.164**	**4.251**
LSD (5% level)		**P Rate**	**0.1696**	
CV%			**7.1**	
LSD (5% level)		**P Rate Treat-ment**	**0.5625**	
CV%			**9.9**	

▼ Table 4.15: Grain protein results

Trt. No.	Treatment	P Rate kg/ha		
		0	15	30
1	APP	12.43	12.60	12.58
2	Biophos	12.60	12.48	12.43
3	Cargill MES	12.60	12.48	12.58
4	Easy NP	12.73	12.78	12.30
5	Granulock 15	12.78	12.48	12.58
6	HA coated MAP	12.58	12.30	12.23
7	HA coated TSP	12.55	12.53	12.48
8	MAP	12.75	12.45	12.28
9	MAP all at DC23	12.78	12.68	12.78
10	SCF MAP-S	12.48	12.63	12.60
11	Split MAP 50/50	12.95	12.80	12.58
Average		**12.66**	**12.56**	**12.49**
LSD (5% level)		**P Rate**	**0.1203**	
CV%			**2**	
LSD (5% level)		**P Rate Treat-ment**	**0.3989**	
CV%			**2.3**	

Conclusions:

These data demonstrates significant yield responses to the application of 15 kgP/ha. There were no differences to the various treatments. At the higher rate , 30kg there were significant differences for the liquid treatments APP and Easy NP plus the Humic acid treated MAP as compared to the 15kgP rate.

Most soils in the SFS region are naturally responsive to phosphorus applications but some responses may be small due to a long history of phosphorus application. Soil tests, such as Colwell P are helpful, but the general view would be that phosphorus at seeding – placed near the seed – is important to achieve yield potentials and is a relatively cheap form of insurance.

Recent upward pressure on current fertiliser prices makes it even more important for grain growers to make good decisions about what phosphorus source to use. DAP is the most commonly used fertiliser for field crops, supplying phosphorus (P) and some nitrogen (N). It is well adapted for use in air-seeders. In 2008, the cost of DAP is set to remain high, but there is still good money to be made from fertiliser investments mainly because grain prices are also relatively high.