

Do your fertiliser sums in 2008

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Take home message

Fertiliser decisions are economic decisions based on the relative prices of fertiliser and grain – at higher grain prices, investments even in higher cost fertilisers can still be attractive. Do your sums and calculate the best option.

MAP 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.

Do I really need phosphorus?

In 2008, the cost of MAP 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.

As part of the GRDC funded Nutrient Management Initiative, the potential of skipping a year of P in experiments at Kalkee we investigated. In 2007, a phosphorus experiment that failed in 2006 was re-cropped a phosphorus experiment that failed in 2006 with a range of phosphorus rates. Table 1 gives an overview of some of these results.

Soil tests, such as Colwell P or Resin-P are helpful, but the general view would be that some phosphorus at seeding – placed near the seed – is important to achieve yield potentials and is a relatively cheap form of insurance.

Table 1 – Wheat yield response in 2007 to phosphorus applied in 2006 and/or 2007 on a Vertosol (cracking clay) soil at Kalkee. LSD for a real difference is 0.25 t/ha

P applied 2006	Yield (t/ha) in 2007			
	P applied 2007			
	0	5	10	20
0	2.25	-	-	2.72
10	2.42	2.77	2.67	-
20	2.74	-	2.78	2.88

This example tells us that the residual value of phosphorus applied the previous season is generally very low. The exception was when high rates – in this case 20 kg/ha of phosphorus – were applied in the previous year which gave some residual value in 2007. If normal rates were used, not applying phosphorus in 2007 was a costly decision. Even half rates (5 kg/ha of phosphorus) applied in 2007 were as good as the full rate, which supports the fact that there needs to be some phosphorus close to the seed at sowing for better results.

If the phosphorus history of the paddock is very good, then it may be possible to skip phosphorus application after a failed (drought affected) crop.

Are there any better products available?

Over the past three years, the GRDC supported Nutrient Management Initiative investigated a range of products at various sites across the Wimmera and Mallee. There were several sources of available phosphorus including liquids and granular formulations, some with various biotic (e.g. humic acid) and abiotic (e.g. sulfur) supplements or amendments. In these experiments we balanced the other nutrients to ensure that the phosphorus source was the only difference in the treatments. Table 2 summarises these experiments, and shows that on all except one site, small but statistically significant yield responses were shown to phosphorus, despite experiencing a run of poor seasonal conditions.

The best phosphorus sources were considered to be those that were significantly better than MAP, and the best option varied from site to site and year to year. On the whole, however, the differences between these products were only small, although the liquids e.g. APP, seemed to perform quite well on these soils, which is consistent with other research.

Table 2 – Summary of phosphorus source experiments in the Wimmera and Mallee 2005-2007.

	WIMMERA SITE		MALLEE SITE	
	P Response	Best Products (>MAP)	P Response	Best Products (>MAP)
2005	No (Marnoo)	No difference	Yes + 5% (Sealake)	Cargill MES, EASY NPTM, APP
2006	Yes + 10% (Kalkee but droughted)	EASY NP, APP EASY NP, APP	Yes + 11% (Hopetoun)	Humic Acid Treated MAP or TSP
2007	Yes + 7% (Kalkee)	APP, Humic Acid Treated MAP	Yes + 10% (Walpeup)	No differences among products

Cargill MES – Sulfur enriched; APP- Ammoniated Poly Phosphate (fluid); TSP-Triple Superphosphate; EASY NP- liquid ammonium phosphate from Incitec Pivot

From this, we can conclude that the source of P did have a small effect on these sites, with some fluids (APP for example) providing up to a 5% better yield than MAP. This efficiency, while small, needs to be considered when doing cost comparisons between different phosphorus sources.

Do your fertiliser sums to get the cheapest phosphorus source

When selecting a phosphorus source, the key issue is price per kg of phosphorus delivered to the seed row. It is important for growers to compare the cost of each option carefully. This can be done using:

1. *Phosphorus content of fertiliser* – see Table 3 below for some examples. Your agronomist or reseller can help you with other products.

Table 3 – Examples of phosphorus content of various fertilisers

Fertiliser	P content (% w/w)	N %	S%	Form
SuPerfect®	8.8	0	11.0	Solid
Triple Super	20.7	0	1.0	Solid
DAP	20.0	18.0	1.6	Solid
MAP	21.9	10.0	1.5	Solid
Granulock® 15	12.0	14.3	10.5	Solid
Granulock SuPreme ZTM*	21.8	11.0	4.0	Solid
Ammonium Polyphosphate	10.0	14.8	0	Fluid
EASY NP	12.5	8.9	0	Fluid

* also contains 1% zinc.

2. Cost of fertiliser delivered to paddock – this would include freight costs, on-farm storage and any special application equipment required. Low phosphorus content fertilisers will have relatively higher freight costs. GST exclusive price delivered on farm is the real price of the products. If deciding to convert to a fluid fertiliser source, take into account the one-off capital cost of purchasing tanks, pumps etc.
3. Use the formula below to calculate the real cost:

$$\text{\$/kg P delivered} = \frac{\text{Cost/t of fertiliser}}{10 \times (\%P)}$$

For fertilisers that also contain nitrogen, deduct the value of this added nitrogen from the whole cost of the product, based on the cost for nitrogen derived from urea.

What about other nutrients?

Unlike some phosphorus fertilisers e.g. super or double super, MAP contains very little sulfur (S). Long term use of MAP can significantly reduce soil sulfur status if gypsum has not been applied recently. Under these circumstances, a sulfate supplemented fertiliser is a good idea.

Our research has shown that zinc responses are common, especially where there has been no zinc supplement applied in the past five crop years. Indeed, to get the best out of a phosphorus fertiliser, other nutrients such as nitrogen, sulfur and zinc need to be considered because if these are inadequate, the phosphorus return will be lower.

Under low soil mineral nitrogen conditions, having some nitrogen at sowing, such as derived from either MAP or DAP, can be of value. However, our research has also shown that there is no particular benefit from applying nitrogen and phosphorus together at sowing. In fact, when soil mineral nitrogen levels are adequate, there is often little difference between topdressing nitrogen and applying nitrogen at sowing.