

Base fertiliser

In view of the recent price developments for the majority of fertiliser inputs, it's crucial that farmers know their precise costs, and how the cost/benefit ratios stack up for all inputs — especially now the focus is so strongly back on yield.

So what does that mean for P and K? It's well known that nitrogen has the single biggest effect on crop yield — both by increasing the number and size of the cells within the plant. But when roots take up nitrogen, they must also absorb an accompanying cation (i.e. a positively charged particle) — both to aid transport from the soil into the root and more importantly, to maintain the correct osmotic balance of the water within plant tissues.

Once the water inside the plant has sufficient K in solution, its structural strength is enhanced — maintaining better leaf turgor (i.e. rigidity) so the maximum amount of sunlight can be intercepted.

Potassium is the principle cation required for this purpose in most arable crops, and therefore a lack of K not only reduces the level of N use efficiency, but increases the risk of lodging and drought stress as well.

In a recent collaborative study between Rothamsted Research and GrowHow UK, winter wheat took up a maximum of 77% of the N applied when the K status was index 2 or above (see figure). But when the K index was below the recommended level, the level of N uptake dropped significantly (i.e. to below 50% at K Index 0, and to 71% at K Index 1).

In the worst case, the difference between the quantity of N used at K0

and that used when K was adequate was almost 100kgN/ha. The effect was therefore three-fold — a waste of around £80/ha of valuable N fertiliser; a serious reduction in yield; and a loss of N to the environment.

Yet when fresh K fertiliser was applied with the nitrogen top dressing, the N use efficiency on the index 0 and 1 plots increased to 66% and 76% respectively. A similar study was conducted on cereals in Germany, confirming the role of K and other nutrients in maximising N efficiency.

At the time of writing, triple super phosphate and muriate of potash are around £350/t and £300/t respectively. The table below highlights the current cost of replacing P and K (i.e. maintenance doses) and what the PK costs amount relative to current crop values.

Interestingly, the PK cost:crop value ratio is broadly similar for all crops (i.e. 4-7%) and for combinables, it remains largely unchanged from last year — demonstrating that the cost of these inputs has increased in line with combinable crop values.

Root crops don't fare so well (notably sugar beet) but as beet can replace a large % of its K requirement with sodium, products such as Magnesia-Kainit (27% NaO, 11% K₂O, 5% MgO + 10% SO₃) — which haven't been subject to the same price pressure as straight K fertilisers — look particularly attractive.

As a by-product of cereal production, straw removes large quantities of K from the field, with a typical 8t/ha wheat crop removing around 50kgK₂O/ha — more than the grain itself. Added to the amount of P and Mg being removed, this amounts to around £35/ha — so growers must be sure to factor this into their decision about whether to chop or bale the straw.

So why have fertiliser prices rocketed so much? Quite simply, because of the tight supply situation and increased demand. There are relatively few producers in the world and the supply is largely inelastic — hence if demand suddenly increases, supplies can quickly become tight and buyers will bid up the prices.

World prices for basic foodstuffs have also increased sharply due to stronger demand, and therefore growers have an increased incentive to raise their yields. For many farmers in the emerging economies, that may mean a change from using zero fertiliser to using a total of 50kg/ha — and given the scale of the world arable area, this represents a large increase in demand.

Food production and fertiliser supply are truly part of the global economy and the effects we're currently seeing are being driven chiefly from Brazil, China and India. It's unlikely that the situation will change in the short term as there's very little additional capacity to increase fertiliser supply, and demand for a higher quality and quantity of food appears to be unrelenting.

So in summary, fertilisers remain highly profitable if used wisely. N efficiency is key, therefore it's essential to ensure an adequate balance with other nutrients (P, K, Mg, and S), and K replacement is still worthwhile.

Make good use of alternative sources of nutrients (e.g. organic manures) and if you don't analyse your soil regularly, start now because it means you're operating inefficiently.

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	Crop value/ha Jan 2007	Crop value/ha Jan 2008	Cost of replacement of P & K 2007	Cost of replacement of P & K 2008	% of crop value 2007	% of crop value 2008	Change 07-08
Winter OSR	£598	£1120	£25.60	£57.20	4.3%	5.1%	+0.8%
Winter feed wheat	£725	£1400	£30	£67	4.1%	4.7%	+0.6%
Potatoes	£6850	£7500	£130.50	£284	1.9%	3.7%	+1.8%
Sugar beet	£1344	£1284	£40.35	£87.20	3%	6.8%	+3.8%
Field beans	£386	£820	£19.60	£46	5%	5.6%	+0.6%

Source: Potash Ltd

