

MAXIMISING VALUE FROM FERTILISERS

by Jerry McHoul, Technical Manager UK & Ireland, Potash Ltd

If you haven't yet picked up the phone to order your fertiliser requirements for this year then prepare for a shock when you do. Fuelled by a number of globally important factors, the cost of all of the major nutrients N, P and K have rocketed.

In brief, sharp increases in oil prices coupled with a huge surge in fertiliser demand from nations such as China, India and Brazil have driven prices up. Demand has soared because of rapidly rising standards of living in these countries and healthy commodity prices for agricultural products. Because the fertiliser industry is largely inelastic, it cannot respond quickly to such demands and therefore materials become scarce and prices are driven up.

Vegetables hungry for nutrients

Because many vegetable crops are in the ground for only a

short time the root system has limited opportunity to develop and so the required quantity of nutrients must come from a smaller volume of soil. This is the principle reason why the target index for P, K and Mg in vegetable crops is higher than those for arable crops (see table)

	P	K	Mg
Arable crops	2	2-	varies
Vegetables	3	2+	2

RB209 (2000)

Vegetable species are also generally hungry for nutrients; the edible portions are often



Jerry McHoul in a lettuce crop.

the seeds, the seedpods or flowers and these enlarged organs require much energy to produce. The many flavour compounds and vitamins found in vegetables also increase the need for an adequate supply of nutrients

Fertiliser spend in perspective

The increased fertiliser price relative to the increased value of the major combinable crops has actually been approximately in proportion and fertiliser cost as a % of crop value for wheat has changed from approximately 4.1% to 4.7% in the last year. Growers of

potatoes and particularly sugar beet do not fare quite as well and for vegetable producers, although the fertiliser spend is more likely to be less than 1% of crop value, this will have increased significantly more than vegetable prices. There are many different ways to improve fertiliser usage including getting the form of the nutrient right and ensuring a balance of nutrients in the soil, to simple exercises such as calibrating the spreader regularly. Here we review the cost effectiveness of fertilisers for vegetable production and discuss ways in which the impact of these price hikes can be mitigated.

Nitrogen - key for outright yield

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A red cabbage crop demonstrating that nutrients need to be in balance for nitrogen efficiency.

the size of cells and is required for synthesis of proteins. Timing of N is crucial and because of the leachable nature of N, it is generally applied just prior to the onset of the main growth phase and in many cases dressings are split to improve use efficiency. This efficiency by which a plant takes up and uses N is an area which is attracting a great deal more interest, not only because of environmental restrictions on the quantity of N permitted, but also due to the

rising costs of N. Growers should now be more focussed on ensuring the % uptake and usage from every dressing is maximised

Important factors for N use efficiency

- a.) Ensure other nutrients are not limiting. K, Mg and S have a particularly strong relationship with N
- b.) Use quality N products and the right form. Urea applications can suffer volatilisation (loss of N to the

atmosphere) under specific conditions (warmth, high pH, drying soils). Poor quality products will spread inconsistently and give crop variability

c.) Consider slow release N (eg. ENTEC type products) for high value vegetable crops where application timings can be reduced and use efficiency and supply to the crop can be increased.

Make the most of manure N and calculate carefully the realistic contribution of this N to the season's requirements

Phosphorus - for a good headstart

Of all nutrients, the value of P has increased the most over the last 18 months and therefore potentially the biggest savings can be made. For vegetables, P fertiliser should be water-soluble and available immediately as crops are typically in the ground for a short time only and need nutrient delivered quickly at the point of need. Placement of P is still an underused technique, particularly when in a mixed

rotation where arable crops (target P index 2) follow vegetables. There is a wealth of commercial devices on planters and other machinery which can place a dose of fertiliser close to the plants but remember that chloride based fertilisers should be avoided for this purpose. If available, animal manures are an excellent way of boosting background P reserves although the release of P from such materials is inconsistent and variable and therefore it would be unwise to rely on manure P alone in most situations.

Potassium - essential for N efficiency and crop quality

Potash is not only key for N efficiency but typically more K is taken up than any other nutrient. For vegetable crops where quality is as important if not more important than quantity, adequate K availability is absolutely crucial. K is required for water management within plants and crops well fertilised with K are better able to withstand stresses such as temporary drought, fluctuations

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Potassium deficiency in cauliflower.

in temperature, resistance to pests and diseases and frosts. This is of paramount importance for overwintered crops where heavy frosts on K deficient crops such as cauliflower, leeks and spring cabbage can cause quality problems and therefore costly rejections. On very light soils consider applying a % of the K as a foliar spray which can

improve uptake of this nutrient at times of peak demand. Remember that sulphate of potash is recommended for many vegetable crops and evidence suggests that quality improvements in terms of taste, storage qualities and vitamin content can be achieved by using the sulphate form. Certainly any dressings close to planting or close to the

seed/plants should be in sulphate form to avoid risk of scorch to the young plants. More information on SOP can be found at www.sopib.com

The largest K applications in a rotation should be made prior to the most responsive crops which would almost always be vegetables and on all but the lightest sandy soils, a high proportion of the K will be effectively held in the soil for the following crop/s. If there are cereals in the rotation, consider the value of the nutrients in the straw which if baled, will remove around £40/ha worth of P, K and Mg. The same is true of other crops wastes which if returned to the soil can recycle a reasonable quantity of K

Magnesium and sulphur

Mg and S are particularly important for vegetable crops. Mg is of course an essential constituent of chlorophyll so Mg deficiency means limp looking yellowed leaves. There are numerous unnecessary dressings of N applied to fields in desperate attempts to "green up" crops when lack of Mg and/or S is so often the problem. This unwanted N just leads to forced weak growth and high nitrate content in leaves which is a problem for storage. **The Horticultural Development Council** has very good baseline figures for recommended levels of

nutrients in fresh tissue samples and these can be used to highlight the cause of an acute problem.

Sulphur can be supplied with a nitrogen product or increasingly with other nutrients when N is not required (eg. Patentkali K+Mg+S or Kieserite Mg+S). Reliance upon elemental S which must be broken down first to sulphate form is a particularly risky exercise for high value crops therefore S should be applied in sulphate form (the form plants take S up in). Similarly choice of Mg fertiliser is critical and growers are urged to find out what source the Mg is from in a blend or compound product. If it is insoluble carbonate, oxide or hydroxide then Mg is only released over a very long period and only on acid soils. Mg in sulphate form (Kieserite) is however water-soluble and crop available

General tips on increasing efficiency

Soil analysis. It is estimated that around 70% of arable producers are still not practising soil analysis but the % for vegetable producers is more difficult to predict. It would be tempting to say that due to the value of a hectare of vegetables, nobody would be foolish enough not to base a fertiliser policy on regular soil analysis data but if you haven't analysed your soil in the last 2-

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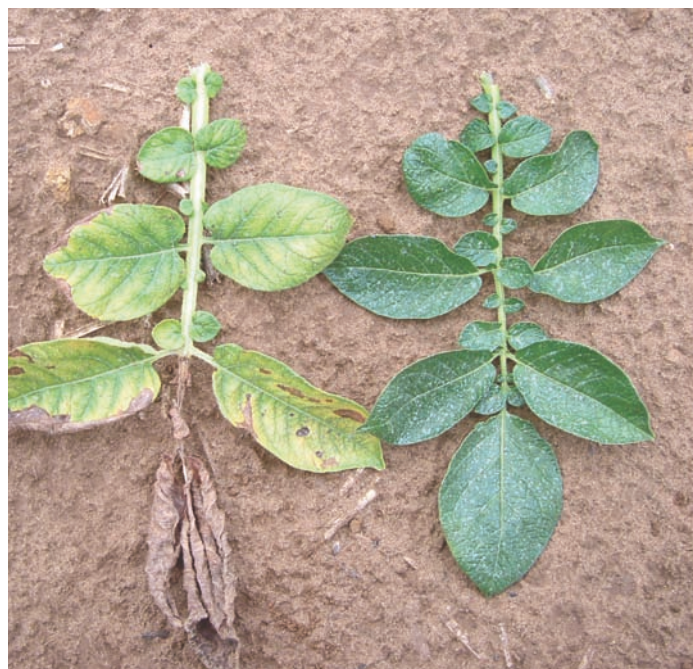
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Magnesium deficiency in potatoes.

3 years, then this could be the single biggest cost saving exercise that you carry out this year.

Calibration of spreaders.

Similarly it was recently reported that around 25% of spreaders are either never tested or tested less than annually. Most spreader manufacturers have detailed spreader settings for individual

fertiliser products and these should be used.

Avoid poor quality products. At such times it is tempting to use cheap products but the risk is not worth running for high value crops. Anything other than SP5 rated N will reduce spreading accuracy and therefore variability in the field. Fortunately, blended products have improved vastly over the

years and now careful size matching of the components can give very high quality products. The difference between a reasonably accurate system with a Co-efficient of Variation (CoV) value of 10% and a poorly set-up system with a CoV of 30% is worth over £40/ha of margin in wheat, so the cost in a field of valuable vegetables is likely to be many times greater.

Use of precision application technology using variable rate spreading and straight P, K and Mg fertilisers appears to be underutilised in the vegetable sector. Data from the **British Survey of Fertiliser Practice** (2006), show that the % of vegetable crops receiving straight P or K was just 10-15%, and none of the brassica crops in the study received any P or K in the form of straights.

Summary

- Fertiliser use for vegetable production is still highly worthwhile although the spend relative to crop value has increased.

- Timing, type and quantity of N applied should be given careful thought.
- Allowing base nutrients to run-down to below recommended indices is a false economy.
- Form of nutrients for sulphur and magnesium is critical, for vegetables in particular, only water soluble nutrients should be used.
- Maximise use of organic manures if available which can help to raise background nutrient levels
- Consider placement of fertiliser, particularly P.
- Pay attention to soil structure for larger stronger root structures.
- Consider precision fertiliser applications. The potential savings made have increased with the increased cost of nutrients and uniformity in crops can be improved.
- And lastly, to quote my very wise late Grandfather, "buy cheap, buy twice". Poor quality product represents a false economy.



Potassium deficiency in savoy.

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