

# DRY SUMMER SLOWS UPTAKE



Calcined magnesite plot (left) showed reduced vigour (more soil visible) compared to the plot treated with Patentkali.

HOT, DRY seasons like 2006 naturally stimulate discussion about yield reduction, scab levels and problems with physiological conditions such as secondary growth. Jerry McHoul, technical manager of Potash Ltd, points out that nutrient deficiency in potatoes is also commonplace following such conditions, particularly on unirrigated crops.

'Nutrients are taken up from the soil in solution and without sufficient water as a carrier the plant is unable to absorb vital nutrients at key growth stages,' he says. 'This can have a serious impact on yield and quality. Magnesium deficiency is a common symptom picked up in dry years and this year was no exception, with more fields than ever displaying the characteristic patchy yellowing and interveinal chlorosis on the leaves.'

'Magnesium is a key component of chlorophyll without which plants are unable to photosynthesise,' he explains. 'Also, magnesium is still often termed a secondary nutrient or even a trace element and as such seems to get secondary consideration when in fact the potato crop removes almost as much magnesium as it does phosphate.'

'It also plays an important role along with potash in maintaining turgor and for transporting nutrients, which is why deficient plants often appear wilted and stunted. Lastly, magnesium has been strongly linked to uptake of phosphate and so sometimes an apparent lack of phosphate can be indicative of problems

with magnesium availability.' Dry conditions are not the only cause of deficiency, observes Mr McHoul. He explains that crops may be at risk if they are grown on high pH soils, on sandy soils, or where levels of other cationic nutrients such as potassium and calcium are present in excess.

He points out that potatoes are highly responsive to magnesium and reminds growers that where soil levels are low, the Defra recommendation (RB209) is to apply a magnesium fertiliser prior to the most responsive crop in the rotation (generally sugar beet or potatoes).

Mr McHoul believes this principle is sound, particularly for heavier soil types, but says it is also critically important to get the Mg applied in the correct form for maximum availability. He suggests that looking at offtake figures published by the FACTS fertiliser information service can be useful in determining crop requirements.

#### Offtake values for arable crops

Crop	Magnesium removal (kg MgO per tonne)
Cereal grain	2.00
Wheat straw	1.35
Barley straw	1.15
Rape seed*	5.60
Potatoes	0.35
Sugar beet	0.50
Peas	3.00
Beans	2.35

\*K+S Kali GmbH data

'Based on these figures, if the rotation is a long one (potatoes, for example) a typical 75kg MgO application (the official recommendation for index 1 soil) would supply magnesium for the potato crop and just two following cereals but that isn't allowing for any leaching, runoff or fixation into unavailable forms.'

He says the 'little and often approach' may be preferable on lighter soil types where Mg is more susceptible to leaching or on high pH soils where application of highly soluble Mg is necessary due to the levels of calcium ions which mask or 'lock-up' the magnesium.

In these cases he recommends an offtake replacement practice where Mg is applied annually for each crop in the rotation according to its individual requirements. It is also important to appreciate the difference between offtake and uptake, he adds.

'Offtake is the quantity of nutrient removed from the field with the crop and which should be replaced, whereas uptake is usually significantly higher as a large percentage of Mg is returned to the soil via the unharvested parts. Satisfying uptake requirements ideally means maintaining a soil index of 2-3.'

Potash Ltd commissioned replicated trials to evaluate the effectiveness of fertiliser regimes. Co-ordinator Dr Mike Armstrong, of independent contractors Armstrong-Fisher, reported large differences in crop vigour on plots comparing different forms of magnesium fertiliser.



A shortage of magnesium can show up as leaf yellowing.

‘These were not only visual differences,’ he observed. ‘Plots treated with Kieserite (magnesium sulphate) yielded an average increase of 3.3 and 2.94 tonnes/ha over untreated and calcined magnesite plots respectively. Differences were statistically significant in all cases.

‘When Patentkali was used (Kieserite + sulphate of potash) followed by EPSO Microtop (bittersalts + Mn + B) applied with the blight programme, differences were even greater, with an increase of almost 6 tonnes/ha at one site in Lincolnshire.’

Dr Armstrong attributed the extra yield to the availability of magnesium from the Kieserite and the use of

Epsom salts to alleviate Mg stress, but he acknowledged that the sulphate forms of potash also seemed to have positive effects.

#### Magnesium fertilisers

- Straight products (e.g. Kieserite, calcined magnesite), used when there is a high requirement or when soil levels are depleted (index 0 or 1).
- Foliar products (e.g. Epsom salts or bittersalts), said to boost Mg levels at times of peak demand (i.e. around June–September).
- As constituents of compound fertilisers for offtake replacement when soil levels are adequate to maintain Mg index. (e.g. Patentkali).

For more information on maximising efficiency from nutrients under dry conditions contact Jerry McHoul, Technical manager at Potash Ltd on:

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