

'Don't starve crops of P, K and Mg'



"Nitrogen can't be taken up as efficiently if potash is in short supply," claims Jerry McHoul.

Cutting back on P, K and Mg inputs could be false economy, according to a recent series of trials.

"Maintaining the recommended soil indices for these inputs has strong economic advantages, as well as agronomic benefits," claims Dr Jerry McHoul of Potash UK.

He claims research work in the UK and Germany illustrates the need to have sufficient exchangeable potash (K) in the soil to ensure nitrogen uptake is as efficient as possible.

"In one series of trials in Germany where precise measurements of nitrogen applied and utilised were taken, N efficiency without sufficient potash was found to be just 57%, compared with 74% where K was in adequate supply.

"Furthermore, when magnesium and sulphur were applied as well, 85% N efficiency was achieved. Put simply, the difference between the plots in terms of N loss alone accounted for £60/ha."

He highlights additional research at Rothamsted, conducted in conjunction with GrowHow, in which high rates of nitrogen were applied to different plots with a known K status.

"Where the potash Index was zero, the nitrogen efficiency was found to be just 50%, whereas at Index 2-, the N efficiency increased to 77%. At high experimental rates, a difference in N efficiency of over 100kg N/ha was observed — equivalent to a cost of £100/ha.

"Additionally, there were clear differences in the susceptibility to lodging observed between plots of different K status."

His explanation for this is because nitrogen is mostly taken up as a negatively charged anion. "So in order to maintain the electrical balance, the plant requires an equal amount of positively charged cations — and potash is the preferred cation for almost all crop plants.

"Therefore if K is in short supply, N can not be taken up as efficiently." So where crops are grown on land with sub-optimal K, the yield and quality will be compromised and more nitrogen will be lost to the environment, says Jerry McHoul.

However, he admits that it's not easy to assess the cost benefits of P, K and Mg on an annual basis since both have short-term and longer-term impacts. "Maintaining the recommended indices for these nutrients has to be viewed as an ongoing soil fertility management process, with the costs budgeted as part of fixed costs of the farm, rather than as variable costs for just one crop."

Armstrong Fisher, an independent trials contractor, has embarked on a long-term

experiment looking at the effects of depleting potash and magnesium, in terms of the response and rate of depletion, and the build-up of these nutrients.

"With a likely ten-year duration, the trial started last year with a crop of winter barley on light land in Norfolk. The potash Index was 78mg/kg (i.e. Index 1) and the magnesium Index was just 26mg/kg (i.e. a low Index 1)."

He explains that the untreated plots will receive no potash or magnesium each year, and these will be compared with plots where K and Mg are maintained with adequate annual applications. "The trial will therefore show the longer-term penalty of allowing base nutrients to become depleted, and should give us an idea of both the speed of depletion and the quantity of nutrient required to restore the balance."

He notes that the benefit of potash has already been seen after just one season. "The areas of winter malting barley with no applied potash yielded 7.19t/ha but the areas treated with potash resulted in 0.56t/ha of extra yield." The value of the extra grain plus the additional straw is currently worth around £80/ha, he estimates

"Not only has this provided a return on investment for the fertiliser applied but it will also help to maintain the fertility for the following crop. In the area which received no K, we expect the yield penalty to be even greater next harvest.

"With input costs being squeezed, every kg of nutrient counts and this research is designed to help growers and the industry understand ways to ensure all nutrients — but nitrogen in particular — are utilised as efficiently as possible in future."