POTASH NEWS

July 2022

Impact of Price on Nutrition Decisions

It is understandable in such uncertain times, to place greater scrutiny on all inputs, to ensure that the returns on the investment that are sometimes promised are achieved. However, farmers must be careful not to reduce inputs which are crucial but whose benefits are not visual or directly obvious. Potash fertiliser is one of the best examples of this danger.

With nitrogen inputs, there is a direct correlation between the price paid for the product and the economic optimum rate of application. It has been discussed on many occasions over the last 6 months that the higher the cost of the input, the lower the rate of application (at the same crop output price). If output price rises keep pace with input costs, then the breakeven ratio (the difference between the price of the two) may remain the same, and therefore the optimum rate remains the same and it is just the risk, and the pressure on the cash flow, that increases!

Phosphate and Potash do not follow the same principle as nitrogen when determining the appropriate application rates. The correct rates are driven by the crop demand, irrespective of price, and the offtake by a crop, which is affected by yield. If nitrogen rates are reduced significantly due to cost, then this may lead to a lower yield, which in turn would reduce the offtake of phosphate and potash, but this reduction is not driven by the price of these inputs directly.

All plants, except legumes, require a larger supply of potash than any other nutrient - even nitrogen. If the total requirement is not available or if the rate of supply at periods of peak growth is limiting, plant performance will be impaired leading to lower yields and poorer crop quality. This becomes even more important in a situation where there is greater levels of risk and cash tied up in growing a crop. With the variable costs of growing a winter wheat crop increasing from around £600/ha to potentially over £1000/ha for 2023 it is more important than ever to ensure that each one of those pounds is used as efficiently as possible. Focussing entirely on nitrogen inputs will not deliver the anticipated returns if other major nutrient decisions, such as phosphate and potash, have been overlooked where these are required.

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Table 1. Crop uptakes & offtakes, kg/ha

	Typical uptake	Offtake
Cereals (grain only)	320	50
Winter cereals (grain & straw)	320	95
Spring Cereals (grain & straw)	320	110
Oats (grain & straw)	320	150
Oilseed rape	375	40
Potatoes	480	300
Sugar beet	450	100
Peas & beans	190	50
Maize	370	175
Silage 1 cut 2 cuts	150 250	120 200

Plants obtain their potash requirements from the soil which must contain large enough reserves within normal rooting depth to provide for peak uptake. Crop offtake should be replenished by manure and fertiliser potash additions. However, because of the large total requirement of potash, there are still many soils – usually the lighter textured ones - where reserves are not adequate. Because of current financial pressures basal fertiliser use may be deliberately cut-back. In these situations, replacement of offtake will become increasingly costly and difficult to 'catch-up' the longer it is left. Clearly, where soils are above the target index, there are opportunities to reduce the level of inputs without causing any issues to the crop and resultant financial penalties.

Effects of omitting potash

Saving money on potash applications might be appropriate if the soil contains large reserves of K in the less-readily available pool or a large amount of clay that releases potassium. But what are the risks and consequences of getting it wrong?

The effects of omitting potash applications to arable land at or above the critical index of 2- are unlikely to be noticeable in the first few years because of:

- replenishment from reserves;
- seasonal variation in yields;
- effects of soil cultivation and
- uptake of K from the subsoil

There is some evidence that crops traditionally considered very responsive to potash do not respond even on soils with a low K Index. For example, no response by sugar beet to K fertiliser has been reported on some soils at low K Indices. This might be caused by past enrichment of subsoil below light textured topsoil to which large amounts of K have been applied. Deep-rooted sugar beet can probably access this subsoil K. In addition to exploiting potash reserves in the subsoil, greater attention to soil cultivation and improved soil structure will allow plant roots to explore a larger volume of soil for nutrient acquisition. Better cultivations and soil structure may delay the eventual decline in yields as a result of omitting potash, but eventually the 'crunch point' will come and there will be too little K available for the crop to achieve its optimum economic yield.

Long term yield implications

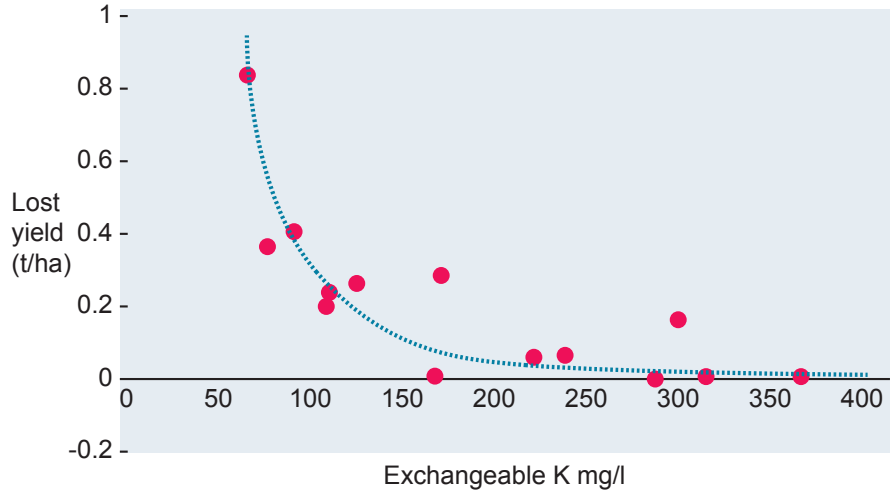
In the longer-term, declining soil K will inevitably result in declining yields. This has been demonstrated many times in long-term field experiments at Rothamsted (Table 2).

Table 2. Implication of declining soil K levels on crop yield (t/ha)

	Exchangeable soil K (mg/kg)		
Crop	**311**	**131**	**36**
Potato tubers	44.30	25.20	10.10
Sugar beet (sugar)	7.32	5.36	2.80
Barley grain	4.37	4.07	2.82
Oats grain	5.04	4.49	4.62

Trials show the decline in yield (Figure 1) results in a significant loss of profit as the soil level reduces. The optimum index of 2- (121-180 mg K/kg soil) is clearly identified by the shoulder of the blue line.

Figure 1. Loss of yield due to reducing levels of soil K



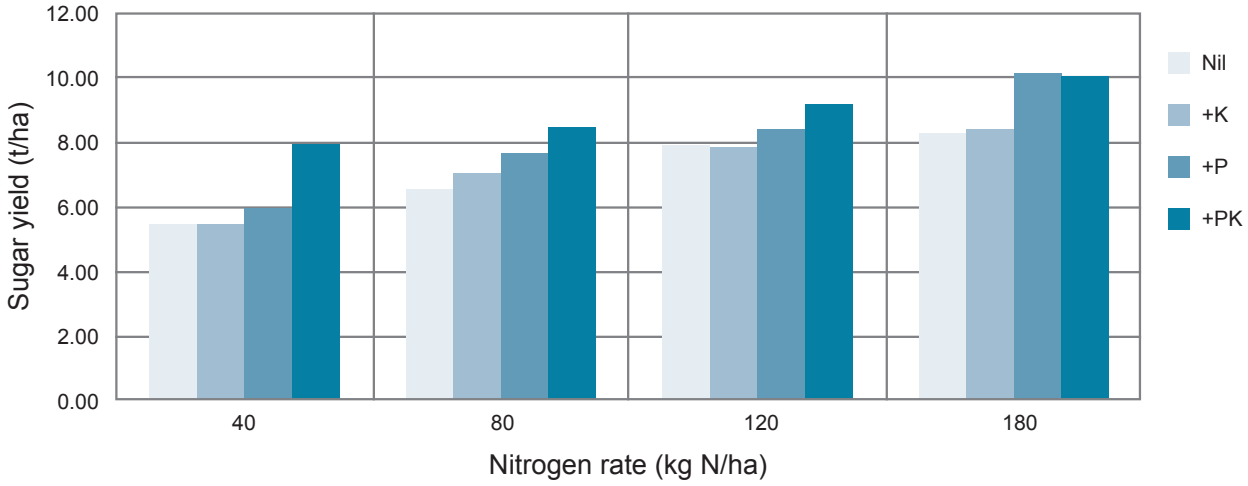
The biggest effects are with those crops that need most potash or have poor root systems which are unable to exploit soil reserves effectively.

Loss of yield is not the only result of potash deficiency in soil. Lack of potash also results in:

- inefficient use of other nutrients, especially nitrogen, a financial cost with the added risk of environmental pollution through nitrate leaching and emissions of nitrous oxide;
- enhanced susceptibility to crop diseases;
- less natural vigour and resistance to stress from pests, diseases and adverse weather;
- weaker straw with greater risk of lodging;
- reduced grain quality.

The decrease in yields with declining exchangeable K in these long-term experiments also emphasise the importance of balanced nutrition – maintaining the supply of adequate amounts of all nutrients. Balanced nutrition involving N/P/K/S interactions is important to achieve optimum economic yields of good quality produce. The yields of sugar shown in the graph below (Figure 2) illustrate such interactions. With too little nitrogen (N), the sugar beet did not fully exploit the soil to find sufficient K to achieve optimum yield; simply adding extra K fertiliser did not solve the problem. The appropriate amount of readily available phosphorus (P) in soil was essential and, in this case, more important than K. The maximum yield of just over 10t sugar/ha was achieved with 180 kg N/ha and P or PK.

Figure 2. Impact of balanced nutrition on sugar yield



Although it has been highlighted many times before, the importance of making the most of any organic manures has never been greater. Making sure applications are fully accounted for and applied to those fields that are most in need (below the target index) will be of high importance going forward.