

# The Back Nine

A new column for writers and members to air and share their views on golf greenkeeping topics

This month, Robert Laycock, delves into nutrients and the potassium fallacy

**Getting turf nutrition wrong can cost a greenkeeper his reputation and possibly his job. So it is important to get it right. Take potassium. In my experience, many golf greens are fed far too great an amount of potassium salts each year. The advice I give my agronomy clients is to maintain adequate potassium levels but not to provide more than the turf needs.**

Cast your mind back to your days at college. Do you remember being taught that if you analyse healthy grass clippings, the ratio of the major nutrients N, P and K is roughly 9N:1P:6K. If you analyse turf leaf tissue it will contain the major nutrients in this approximate ratio, depending on the species of grass concerned. It always did and it still does! When expressed in the way the fertiliser trade traditionally does this, using the oxides of phosphorus (P2O5) and potassium (K2O), this becomes 4:1:3. This indicates that the turfgrass plants need these elements in this kind of ratio and fertiliser programs should be planned to reflect this. This isn't rocket science. It is basic plant science (or botany, as universities called it when I graduated). The trouble is that many of the people who sell fertiliser and some of the people acting as agronomists do not have much knowledge of plant science!

When potassium is deficient in turfgrass plants it renders them prone to drought damage and infection by pathogens. Applying additional potassium under these circumstances is beneficial. However, applying additional potassium to turf that is already well supplied does not convey additional disease resistance or drought-tolerance.

Potassium salts are soluble and so one would expect them to be leached from soils, particularly the sandy soils encouraged for golf greens. However, many soils contain vast amounts of potassium and, time and again, university research

has shown the capacity of grasses to exploit "non-exchangeable" soil potassium to satisfy their requirement for potassium without the need for potassium fertiliser supplements.

Plants can take up nutrients that soil tests don't detect as being available to them. Surprisingly, many sands contain potassium which is available to turfgrass plants. Soil tests that show low "available" potassium may not account for potassium from the natural weathering of sand, for example. With the right sand, it is quite possible for turfgrasses to survive with no potassium inputs, relying solely on the potassium content of pure sand for their needs.

So what if grasses take up too much potassium. Is that a problem? Yes, there are downsides.

Unfortunately, when grasses take up potassium, they don't know when to stop and are able to take it up far in excess of their actual requirements! "Luxury uptake" occurs, which can be shown to depress the content of magnesium and calcium in the cells of the turfgrass plants. In agricultural grassland this leads to nutritional disorders of grazing animals, such as hypomagnesaemia, where luxury uptake of potassium lowers the amount of magnesium in grass and forage with severe effects on the health of the animals that eat it. In broad-leaved herbaceous plants, induced magnesium deficiency symptoms can be easily spotted.

In these species other than grasses, where larger leaf size means that deficiency symptoms are easier to monitor, the effects of low calcium on plant structure would become apparent, but these are not so clear in grasses.

But there may be other consequences: when he was working at Cornell University, David Moody completed some interesting research which confirmed earlier US research findings that the effect of a high level of potassium on the content of other nutrients are more wide ranging than previously



thought. For example, in the case of induced calcium deficiency caused by high potassium levels, the most important finding is that low cell calcium content was correlated with a greater incidence of both pink and grey snow mould. Analysis of cell contents shows that there was a subclinical deficiency of calcium within the cell which interfered with cell biochemistry, specifically with the Krebs cycle, which is the series of chemical reactions the turfgrass plant uses to produce energy. This finding contrasts with the traditionally held idea that high potassium levels improve disease resistance.

The aim when feeding turfgrasses must be to achieve a natural nutritional balance. This will produce healthy turf, which is less prone to pest and disease attack.

## So what if grasses take up too much potassium. Is that a problem?

### about the author



Robert Laycock has had a wide-ranging career as a turfgrass scientist, beginning with MSc research at Imperial College, London. This was followed by six years cutting edge research at the STRI and then working with a plant breeder in the grass seed industry before becoming Technical Director of Rolawn and General Manager of Karsten Turf Science. He is a Chartered Biologist and a Fellow of the Institute of Horticulture and first began working as an independent professional agronomist 20 years ago. Recently relocated to the North York Moors National Park, Robert is mainly occupied advising on golf courses of all types across the UK. [www.robertlaycock.co.uk](http://www.robertlaycock.co.uk)

If you are going to apply potassium to turf, compare the available sources. Potassium nitrate is frequently used as a source of nitrogen and potassium because it is soluble and readily available. Unfortunately, potassium nitrate (13-0-46) contains far more K than N and when used on its own can cause oversupply and luxury uptake.

Unbalanced turf nutrition renders turfgrasses liable to infection by diseases and, I suspect may be at the root of the recent problems with nematodes, something which has never been a problem in the past even though nematodes have always been around. Nematode resistance is certainly related to plant nutrition in other plant species, with high fertiliser potassium being associated with higher nematode activity.

To summarise, potassium deficiency exists and is occasionally seen in turfgrasses but it is rare so in most cases only a little extra potassium needs to be applied as fertiliser each year.

The views expressed within this column are not necessarily those of Greenkeeper