



Know Your Stuff With Dr Will Talbot

Potassium (K) - Potash

Key Points

- **Some of our younger sedimentary soils have naturally good potassium (K) reserves.** But many of our soils are naturally low in K including those of volcanic origin and some highly weathered soils.
- **Clovers are more susceptible to K deficiency than grasses.** Soil and clover herbage testing can help identify K deficiencies.
- **Fertilisers such as Potassium Chloride (Potash) can be applied to correct this deficiency and increase pasture production.**

Potassium in NZ Soils

New Zealand soils have varying natural levels of K depending on their parent material and climate. Many of our young sedimentary and recent soils have naturally high levels of K, especially those found on the east coast of the South Island and the lower North Island. However, after 50 to 100 years of continuous farming, we are starting to deplete their natural reserves. On the other hand, many soils are naturally

low in K, particularly those formed from volcanic material (ash and pumice soils), organic soils and those that are highly weathered (West Coast podzols).

Potassium and Clovers/ Pasture Production

Grasses, with their more extensive root systems, are better at extracting K from the soil compared to clovers. As a result, when soil K levels are low, grasses can outcompete clovers, making them more susceptible to K deficiency and poor growth. Ensuring adequate K levels will help improve the clover content of pastures and increase overall pasture production. Because of this, herbage testing clovers is a great way to check for K deficiency, effectively testing the 'canary in the coal mine.'

Role of Potassium in Plants and Animals

Potassium is essential for both plants and animals. In plants, K regulates the opening and closing of stomata which controls the exchange of water vapor, oxygen, and carbon dioxide in and out of the plant. It is also associated with the movement of water, nutrients, and carbohydrates within plant tissues. Additionally, K is involved in enzyme activation, which affects the production of proteins, starch, and ATP.

In animals, K helps with nerve and muscle function, kidney function, metabolism of carbohydrates and proteins, water and electrolyte balance, and many other roles such as regulating the heartbeat.

Some young recent and sedimentary soils can supply considerable amounts of K for pasture growth. This is K provided by continual gradual weathering of clay minerals and is not measured by Quick Test K. A measure of this reserve is given by the 'reserve K test' (also known as the TBK test) which provides a useful indication of whether your soil has low, medium, or high reserve K levels. For these young sedimentary soils, a combination of QTK, TBK, and clover K% results will give you the best idea of your farm's K status.

It is challenging to raise the K status of coarse-textured ash and pumice soils, peat soils, and podzol soils under high rainfall. In these situations, both pasture K levels, and soil tests, should be used as an indication of soil K status.

When K Pays and When It Doesn't

When considering the application of K, it's also important to take economics into account. The optimal economic level for soil QTK depends on the price of fertiliser K and the gross margin per hectare. For most sheep and beef farms, the increase in pasture production to widespread K application is often not sufficient to be economically viable. In comparison, most dairy farms can economically justify maintaining their soil K levels within the optimum range for pasture production.

Gains and Losses From the System

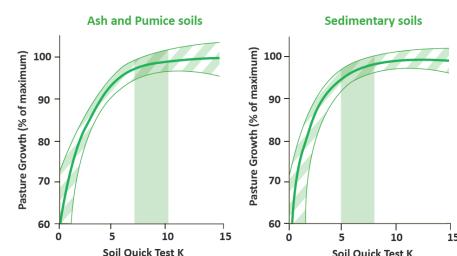
Gains: Significant amounts of K can be returned to a paddock through farm dairy effluent, brought in feed, recycled from urine, weathering of soil minerals, and fertiliser.

Losses: Significant amounts are taken off the farm when you cut and carry hay or silage (e.g., 3 t DM/ha cut of silage can remove around 75 kg K/ha). K can also be lost when animal products leave the farm, through transfer to stock camps/laneways, and leaching from urine patches.

What is My Farm's Potassium Requirement?

Taking soil and herbage tests can help you better understand your farm's K requirements.

The main soil test for measuring plant-available K in the soil is the Quick Test K (QTK). The figure below shows the relationship between relative pasture production and soil QTK results for ash, pumice, and sedimentary soils. The shaded boxes represent the optimal ranges.



Want to know more?
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