UNDERSTANDING YOUR SOIL'S CONTRIBUTION TO FERTILITY

Soil is more than just a medium for anchoring the roots of plants. In addition to a range of essential functions, most soils directly contribute nutrients that would cost many dollars if they had to be supplied using various fertilisers.

Approximately 95% of a plant is made of carbon, hydrogen and oxygen found in air and water. Of the remaining 5%, around 50% of this is made up of nitrogen (N), 20% potassium (K), and 10% calcium (Ca), 7% magnesium (Mg), 7% phosphorus (P) and 5% sulphur (S). This is illustrated in Figure 1.

Note that actual nutrient contents vary widely depending on soil fertility and plant species. Most soils can naturally provide many of these nutrients without human inputs. Agricultural production exports nutrients in the form of crops and livestock, so over time soil nutrient levels will be depleted and need to be topped up to prevent deficiencies.

Due to the suitable clay minerals found in parts of our region, most soils in the SE that are loamy or clayey will provide adequate supplies of potassium (potash) for most crops and pastures. So if you are removing 4 tonnes/ha of dry matter annually, the potassium removed is worth in the order of $120 to $240/ha/yr to the grower. This is based on the cost of potash if it were required to be replaced as a fertiliser. Similarly most soils supply adequate levels of calcium and magnesium.

Soil testing provides an indicator of what nutrients the soil is deficient in and what needs to be applied to maintain production. Testing the top 10cm of the soil will show the accumulation of nutrients such as phosphate, however testing deeper down the soil profile is also useful in revealing the content of more soluble nutrients such as potassium, nitrate and sulphur. As shown in Figure 2, a soil's potassium supply can change with the depth of the soil quite dramatically.

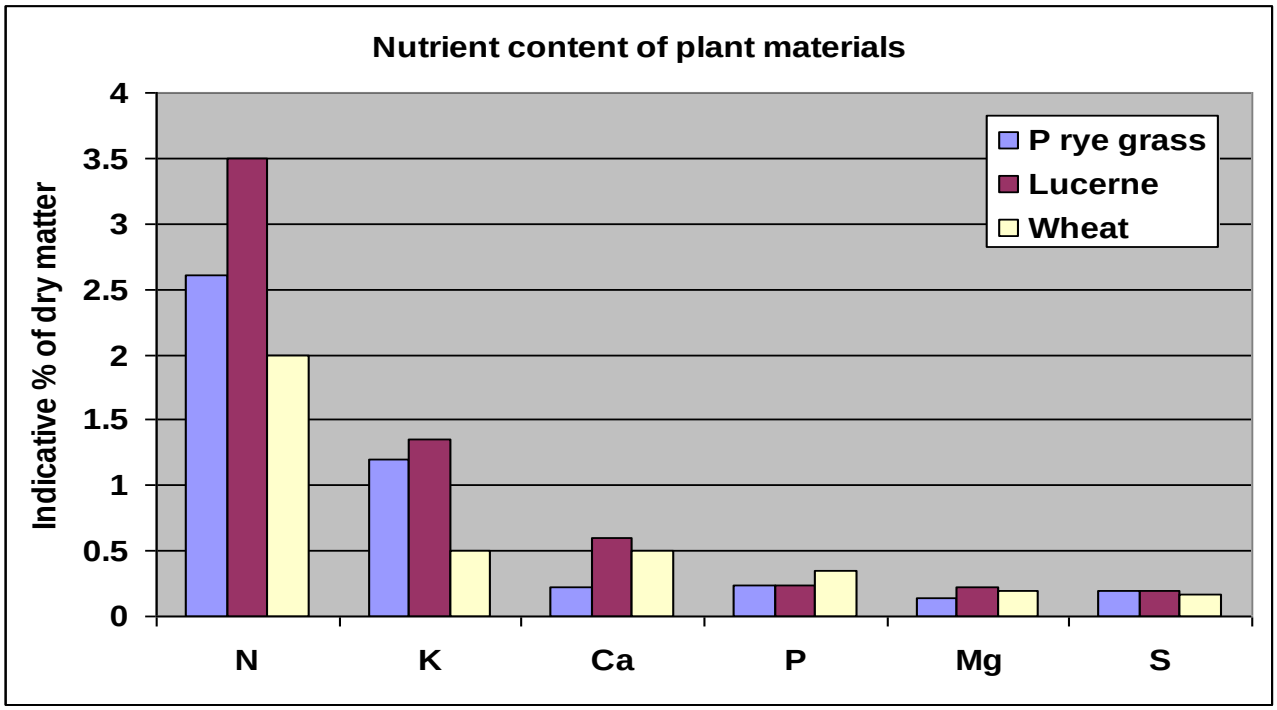

Figure 1. Indicative marginal nutrient content of plant materials

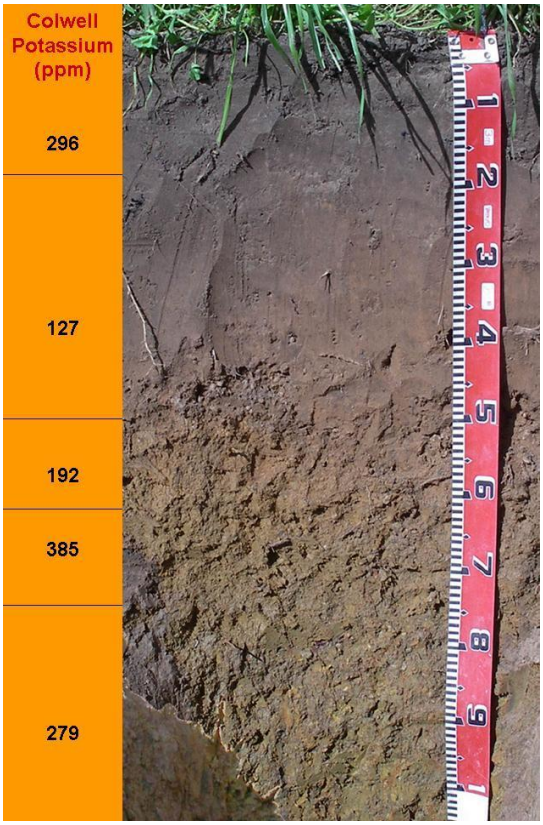

Figure 2. Soil profile from Kalangadoo showing the natural content of Potassium in depth and amounts.

The top 10cm has 296 parts per million of potassium and then at 20cm-50cm the concentration is significantly less (127ppm). However, plant roots will still be accessing this sub-surface potassium pool, and due to the volume of soil in the lower profile, it is possible that more potassium is sourced from the sub-surface than from the surface soil.

Adding nutrients is not always necessary. Enhancing your soil health can be done through choosing a plant variety such as a legume which can contribute to the soil. For example a reasonable legume pasture may fix 125kg/ha of nitrogen that is equivalent to 270 kg of Urea costing about $150/ha.

Healthy soils, that is, those with optimum pH, nutrition and friability will improve nutrient uptake and can also supply free-living nitrogen fixing bacteria and other beneficial biological life.

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