

Understanding Soil Testing Results

The biggest expense on a farm is fertiliser, and to validate how much is applied we soil test. But what do all these tests really mean and which tests are best for your property?

Most of NZ soils are inherently deficient in phosphorus, sulphur and to a lesser extent potassium, and sometimes trace elements. Large capital inputs of fertiliser (and often with lime), along with time and nutrient recycling from grazing animals build up the soil organic matter and nutrient reserves. Pasture production and feed quality increases as soil nutrient status increases.

Soil tests indicate the general soil fertility status. They are only useful if they are calibrated against pasture growth or production levels. The target ranges for the various tests shown on the lab reports indicate the nutrient levels needed in the soil for near maximum pasture production. Although this range will be required to achieve near maximum pasture production, the investment in fertiliser to lift test levels may not always be economically viable. Risk factors such as climate variations, product and freighting prices, plus the difficulty in utilising additional small amounts of pasture grown, may influence economic benefits.

Fertiliser applications build up reserves of nutrients in both organic (available in soil organic matter) and inorganic forms, until a point where near maximum pasture production occurs. Farms at this stage, then only need to apply maintenance fertilizers levels to replace the losses of nutrients removed from the property in animal products (e.g. milk, meat, wool), transfer by the animals and the inevitable losses of nutrients that occur in soils. Off these the loss by transfer by animals, which is driven primarily by the animal stocking rate, is the single biggest factor contributing to nutrient loss on the farm.

The following soil tests are available from most commercial laboratories;

pH- A measurement of soil acidity and used to assess the requirement for lime. The optimum pH for pasture plant growth is 5.8-6.0. Low pH's will influence the levels of molybdenum and aluminium and can affect animal health. Lime is used to raise pH.

Olsen P- this is the measure of plant available Phosphorus. This measurement assesses the level of 'soluble P', or the amount of P that is readily available for plant uptake. This test does not assess the amount of insoluble P.

Resin P test- This test measures both the soluble and insoluble phosphorus present in the soil. It should be used if you are applying RPR products as RPR will dissolve slowly into soil solution over several years.

The MAF Quick Tests for K and Mg measures the plant available potassium and magnesium. The **Sulphate-S test** measures the immediately plant available sulphur whilst the **Organic S test** measures the build up in organic S and provides an indication of the long-term supply of sulphur.

Anion storage capacity measures the soils ability to store the nutrients phosphorus and sulphur (previously referred to as the **P retention test**).

Cation exchange capacity- measure of the soils capacity to store the nutrients Ca, Mg, K and Na.

Soil sampling,

It is critical that the sample (usually consisting of twenty individual cores) comes from the same soil type.

Soil types behave differently. We have seen results from samples that came from a combination of ash and sedimentary soils. An ash soil has a high anion storage capacity, whilst the sedimentary soil has a low anion storage capacity – the combined sample results are meaningless. Hence it is critical that soil

samples are taken from individual soils or groups of soils with very similar physical and chemical properties.

If you don't know the soil types on your property, get out there and dig some holes or get someone to map it for you. If you don't know this information you can not make a good informed decision on the most appropriate fertiliser policy for your farm.

Established permanent sampling transects (lines) over the major soil types on the farm is a big step to reducing the variability of soil test results. Many fertiliser reps do this, but do you as the landowner know where these transects are and are you 100% confident that the same transects are being tested each time?

Often it is not the actual numbers shown in the soil test results that are meaningful, but the trends over time. Are they going up or down? If they are going up you should be seeing some production gains. Permanent sampling transects give you the ability to look at trends over the years.

Soil sampling should be undertaken at the same time of the year, in similar conditions, every one or two years. Often it may be wise to delay sampling to as close to fertiliser application as possible, so you get a better picture of the current nutrient status of the soil.

In summary, soil tests indicate the general soil fertility status of the soil. They are only useful if they are calibrated against pasture growth or production levels. The soil nutrient status should be considered by the trends of the test values over a number of years, as there is a level of variability with soil testing. Ensure that the sampling is undertaken along transects at similar climate/property conditions, to reduce this variability. Achieving soil nutrient status within the optimum range will provide the potential for maximum pasture production and the most effective use of your fertilizer dollar.