



## TECHNICAL NOTE

# SOIL AND PLANT TESTS FOR LIFESTYLE BLOCKS, SMALL HOLDINGS AND HOME GARDENS

Hill Laboratories provide a comprehensive range of tests to assess the fertility or nutrient status of your soils, plants or crops.

### Why test?

Some common objectives of soil & plant testing are:

- To determine the nutrient status of soils, plants or crops.
- To indicate clearly the existence of any deficiency, excess or imbalance of major nutrients.
- To aid in assessing fertilizer and lime requirements for crops, pastures and turfs.

### The tests you will most likely need are:

#### Soils

Test Situation	Tests	Profile Code
Home Gardens, Turf	Basic Soil	BS (includes pH, Olsen Phosphorus, Calcium, Magnesium, Potassium, Sodium, Cation Exchange Capacity, Base Saturation, Volume Weight )
Lifestyle, small holdings and grazing blocks for general fertiliser requirements	Basic Soil, Sulphur Profile	BS, S
Organic Farming	Basic Soil Profile, Organic Matter (Total Carbon)	BS, OM (Total Carbon)

Recommended sampling depths for soil are: 7.5cm (3") for pastures/turfs  
15cm (6") for gardens, crops, orchards

#### Plants

Test Situation	Tests	Profile Code
Plant Tests, Home Gardens,	Basic Plant	BP (includes Nitrogen, Phosphorus, Potassium, Sulphur, Calcium, Magnesium, Sodium, Iron, Manganese, Zinc, Copper, Boron)
Grazing pasture tests	Mixed Pasture	MPast ( includes BP + Molybdenum, Cobalt, Selenium, Chloride, Crude Protein, Metabolisable Energy)

For specific crops, i.e. Olives, Avocados, vegetable or flower crops, then please select the recommended profile column and we will automatically enter the correct tests for either soil or plant analyses. Further information can be found in the Crop Guides on our website, [www.hill-laboratories.com](http://www.hill-laboratories.com).

## Soil Test Definitions:

The **Basic Soil (BS)** profile is a series of tests and measurements reported on the sample submitted, which provides a minimum set of information for soil nutrient status.

This test measures the status of 5 major nutrients, Phosphorus, Potassium, Magnesium, Calcium and Sodium, as well as soil pH.

Interpretation criteria are provided in a generalised form as 'medium range' levels appropriate for the land use or crop and presented in the histogram format of results. These are intended as a general guide only rather than a precise interpretation.

Results represent a mean from the area sampled and it should always be assumed that there is variability within any sampled area.

Environmental factors and visual observations of the soil and crop should be considered in addition to soil test data when interpreting soil test results.

A wide selection of additional tests are available that provide information on nutrients not included in the Basic Soil profile.

### pH

The pH measures the level of the soils acidity or alkalinity, important as an influencing factor on chemical and biological processes in the soil including the availability of plant nutrients.

### Phosphorus (P)

Regarded as a key nutrient for the successful growth of pastures and crops, the P status of many 'native' NZ soils is low.

Olsen P is the standard soil test used in NZ to assess 'plant available' Phosphorus.

P is found in several organic and inorganic forms in soils, that are in equilibrium with plant available forms of P. At any one time the proportion of the total soil P that is 'plant available' is quite small.

### Potassium (K), Calcium (Ca), Magnesium (Mg), Sodium (Na)

These are referred to as 'cation' nutrients because they are positively (+) charged ions in the soil solution. These nutrients are important for plant and/or animal growth and production and influence soil physical structure.

#### Function of Cation Nutrients:

- **Potassium** is a major nutrient for plant growth required in quantities second only to nitrogen. Low levels are associated with reduced growth of all plants, and particularly poor yield and quality of fruit and root type crops. Excessively high levels reduce plant utilisation of calcium and magnesium and may create metabolic disorders in grazing animals.
- **Calcium** level is adjusted to influence soil pH and physical structure and is an essential nutrient for plants and grazing animals.
- **Magnesium** is an essential plant nutrient, a component of chlorophyll (green pigment) for plant growth, also an essential nutrient for animals. Excessively high levels may be found in soils affected by seawater intrusions.
- **Sodium** is utilised by some plants as a nutrient but is more important as an animal nutrient. High levels are associated with saline soils and with poor physical structure of soils.



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### CEC (Cation Exchange Capacity)

CEC is a measure of the soil's capacity to retain cations, particularly potassium, calcium, magnesium and sodium. High CEC values are associated with a high capacity to retain or 'exchange' cation nutrients from negative charged sites on the soil particles. Exchange sites are found on clay and humus (organic matter) components of the soil so the CEC is a rough indicator of soil texture and organic matter status, and characterises the soil type under consideration.

The amount of lime required to change the pH of soils is roughly proportional to the CEC. A rule of thumb sometimes used is that for a CEC = 20 me/100g soil, 1000 kg lime per hectare as a capital application will increase the pH by 0.1 units.

### Volume Weight (Bulk Density) VW

Volume Weight is simply the weight per unit of volume of the dried and ground soil sample. This figure gives an indication of the soil texture but is mainly used for conversion of test results to other units if necessary. For any soil, increasing the level of organic matter will tend to decrease the VW.

Result less than 0.6:

Low VW is typical of peat soils or soils with a high pumice content.

Results greater than 0.6 and less than 1.0:

VW is typical of a wide range of soils from silt loam to clay loam soils

Result greater than 1.0:

High VW is typical of sandy loam soils or sand with low levels of organic matter.

#### Reporting Units:

- '**me/100g**' or '**MAF Units**' represent the amount of each cation element extracted from the soil, indicating the total amount that should be available to plants.
- **Base Saturation %** (for each cation) is the proportion of the soil's exchange capacity that is occupied by each cation nutrient. This information may be used to indicate soil nutrient balance and soil structure influencing factors.
- **Base Saturation % (Total)** is the proportion of the soil's exchange capacity that is occupied by the total of exchangeable cations. Increasing Total % BS is associated with increasing soil pH and useful for calculating the lime requirement.

### Extractable Sulphur Profile, S

This test measures the readily available sulphur in the form of dissolved and adsorbed inorganic sulphate (SO<sub>4</sub>-S) and also the labile (extractable) organic sulphur. The inorganic SO<sub>4</sub>-S fraction in the soil at any one time is influenced by mineralisation from soil organic matter and as such is highly variable, particularly as soil temperature and moisture levels alter.

## Taking soil or plant samples:

A sampling auger for taking the soil sample may be loaned from a rural supplies store or you can use a clean spade or trowel. Approximately 500gm of fresh soil is required per sample taken from multiple random places in the area being sampled. One sample will normally consist of a soil bag containing 15-20 soil plugs or cores. Avoid any dung or urine spots, fence lines, trough areas etc.

Pasture samples can be taken using clean, rust-free shears or scissors, or by grab samples, avoid 'pulling' and subsequent soil contamination.

Approximately 500gm of fresh sample is required cut to grazing height, once again avoiding any dung or urine spots, fence lines, trough areas

Crop samples are best taken by following the sampling instructions for the specific crop in the **crop guides**

**Full sampling instructions are included in the Soil and Plant DIY kit. Further supplies of the kit can be ordered through our website, or by contacting our office or from one of the rural supplies stores.**

Minimum information required on the analysis request form is Client Name, address, phone number and email together with sample name (as written on the sample bag) and tests wanted.

## Other tests available through our laboratory are:

- Water quality: analysing the quality of your drinking water, bore water, irrigation water or stock supply – request a quote
- DDT, Heavy Metals (e.g. Copper, Arsenic, Lead) – request a quote
- Multi Residue Testing on either soils or plants if there are concerns with contamination – request a quote

For further information on which tests may be best for your particular situation then please contact one of our client services managers.

Test Profile (Agriculture Sector Nutrient tests)	Codes	Indicative pricing* (per sample) excl GST
Basic Soil	BS	\$59
Basic Soil + Sulphur Profile	BS,S	\$75
Basic Soil + Organic Matter	BS,OM	\$79
Basic Plant	BP	\$79
Mixed Pasture	MPast (= BP, Mo, Co, Se, Cl, CP, ME)	\$115

\* pricing subject to change.

## What to do with your test results

Hill Laboratories does not provide fertiliser or other land management advice, as our core business is provision of analytical services.

Where adequate reference information is available, Hill Laboratories test reports for soil & plant samples will include a histogram graph indicating results as low, medium or high for indicative guideline purposes.

Recommendations should be sought locally via rural merchants, garden centres or through grower groups who might have expertise in the growing system on your property.