Understanding Your Soil

How to interpret a soil test

This guide explains how to interpret soil test results to manage nutrients effectively and improve crop performance.

Why regular soil testing matters

Regular (seasonal) soil testing provides information on nutrient levels, pH, organic matter, and other factors critical for crop health and growth. Soil testing also helps guide us when making decisions about fertiliser inputs, and designing seasonal fertiliser programmes.

Soil testing

Soil sampling requirements

Sampling time	Prior to crop establishment and annually at any time of the year, although autumn to early winter is recommended.
Core depth	15 cm
Collect from	From the drip zone of the trees.
Quantity per sample	12 - 20 cores from under trees selected at random from throughout the block. The samples should be representative of the whole area taken in a transect (line) or grid pattern and should be taken in a way which can be repeated from year to year.
Other notes	Use clean equipment and sample bags. Make sure the entire core is placed in the bag. Clearly label sample bags with a permanent marker or ballpoint pen. Send to the sample laboratory as soon as possible after collection. If the ground is too hard or stony, don't just take the top few centimetres, try another area.

Source: Hill Labs, Crop Guides and Analysis request form.

There are several commercial laboratories that offer soil testing in New Zealand.

Hill Labs (https://www.hill-labs.co.nz/)

Eurofins (https://www.eurofins.co.nz/agricultural-testing/)

The laboratories offer different types of soil tests depending on requirements. Generally, a basic soil test and a soil health test will provide a comprehensive assessment.

Your local fertiliser/orchard supplies rep/agronomist may be able to help with soil sampling and interpretation of test results.

How to interpret a soil test

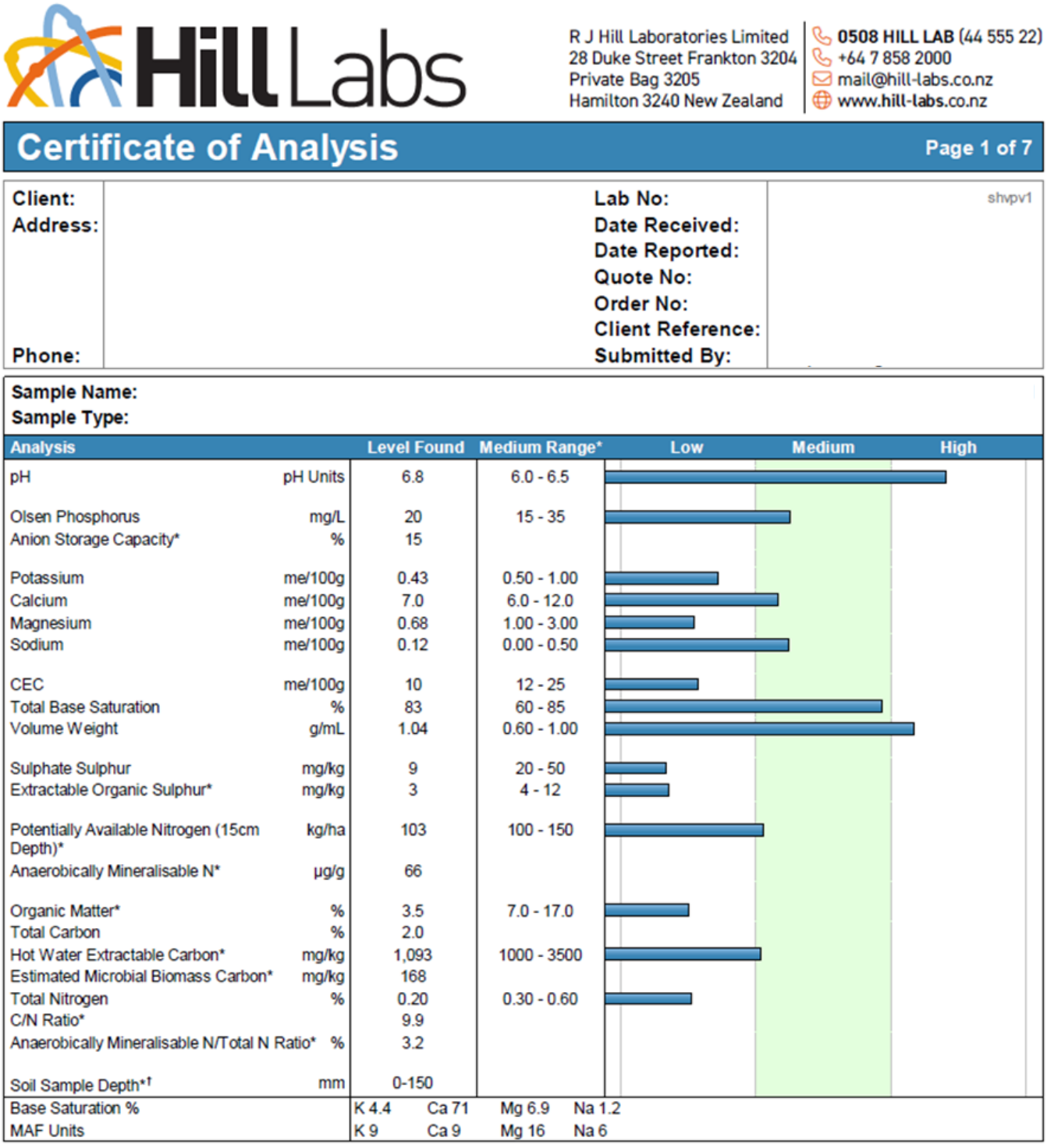
Basic soil test: pH, olsen phosphorus, potassium, calcium, magnesium, sodium, CEC, base saturation, volume weight.

Soil health test: Includes basic soil test plus sulphur profile, anion storage capacity, organic soil profile*, hot water extractable carbon.

*Organic soil profile includes organic matter, total nitrogen, potentially available nitrogen.

When reviewing soil tests, certain aspects stand out as especially important for managing soil health and optimizing crop performance. By focusing on these factors, growers can build a soil management strategy that supports healthy root systems, balanced nutrition, and optimal soil conditions for fruit production.

Example of a soil testing report



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Certificate of Analysis — Page 1 of 7

Client:		Lab No:	shvpv1
Address:		Date Received:	
		Date Reported:	
		Quote No:	
		Order No:	
		Client Reference:	
Phone:		Submitted By:	

Sample Name:
Sample Type:

Analysis		Level Found	Medium Range*
pH	pH Units	6.8	6.0 - 6.5
Olsen Phosphorus	mg/L	20	15 - 35
Anion Storage Capacity*	%	15	
Potassium	me/100g	0.43	0.50 - 1.00
Calcium	me/100g	7.0	6.0 - 12.0
Magnesium	me/100g	0.68	1.00 - 3.00
Sodium	me/100g	0.12	0.00 - 0.50
CEC	me/100g	10	12 - 25
Total Base Saturation	%	83	60 - 85
Volume Weight	g/mL	1.04	0.60 - 1.00
Sulphate Sulphur	mg/kg	9	20 - 50
Extractable Organic Sulphur*	mg/kg	3	4 - 12
Potentially Available Nitrogen (15cm Depth)*	kg/ha	103	100 - 150
Anaerobically Mineralisable N*	µg/g	66	
Organic Matter*	%	3.5	7.0 - 17.0
Total Carbon	%	2.0	
Hot Water Extractable Carbon*	mg/kg	1,093	1000 - 3500
Estimated Microbial Biomass Carbon*	mg/kg	168	
Total Nitrogen	%	0.20	0.30 - 0.60
C/N Ratio*		9.9	
Anaerobically Mineralisable N/Total N Ratio*	%	3.2	
Soil Sample Depth*†	mm	0-150	
Base Saturation %		K 4.4 Ca 71	Mg 6.9 Na 1.2
MAF Units		K 9 Ca 9	Mg 16 Na 6

Key elements of a soil test

Test	Importance
Soil pH *(pH units)*	• Soil pH is a measure of the acidity or alkalinity of the sample. It is important because of how it influences the chemical and physiological processes in the soil, and the availability of plant nutrients. • If the soil pH is outside the ideal range (5.8 – 6.5 for most fruiting crops), plants may struggle to absorb nutrients, even if they are present in the soil in adequate amounts. • Stonefruit will grow best within a soil pH range of 6.0 – 6.7. At lower soil pH's (<5.5) root growth and overall tree health can be adversely affected by aluminium, manganese, and iron toxicity. At higher soil pH's (>7.5) trace element deficiencies can be induced.
Olsen Phosphorus (*mg/L*)	• Olsen Phosphorus is the measure of phosphorus that is in the soil solution and that is readily available for plant uptake. • The Olsen Phosphorus test is the standard method used in New Zealand to assess soil phosphorus availability to plants. • Some essential functions of phosphorus include promotion of root development, sugar and starch formation, carbohydrate transport, and energy transfer within plants.
Potassium, Calcium, Magnesium, Sodium (*me/100g*)	• Potassium, calcium, magnesium, and sodium are an important group of nutrients essential for plant growth. These nutrients are referred to as **cations**. • The soil test results are measured in terms of the actual amounts extracted. This provides an indication of the absolute amount of these nutrients available to plants. • Sodium is generally considered of only secondary importance in the soil test as its uptake by plants is largely dependent on plant species. For most horticultural crops sodium can be ignored unless the soil level is very high (> 0.5) in which case remedial action may be required.
Cation exchange capacity (CEC) (*me/100g*)	• The Cation Exchange Capacity (CEC) of a soil is a measure of its capacity to hold positively charged nutrients, in particular potassium, calcium, magnesium, and sodium. • The larger the value of the CEC, the greater the soil's capacity for these nutrients, which can indicate better nutrient retention. • Fine textured soils and those with high organic matter and clay content will typically have higher CEC's.
Total Base Saturation (%)	• A measure of the proportion of the soil's total capacity for **cations** that is actually occupied by these nutrients. • Total Base Saturation is calculated by summing together the levels of potassium, calcium, magnesium, and sodium from the soil test, and expressing this as a percentage of the soils CEC value.
Volume Weight (V/W) (*g/mL*)	• The Volume Weight provides an indication of the soil's physical characteristics. • Typical Volume Weights for soil characterised by various types are 0.4-0.5g/mL for raw peat, 0.6g/mL for pumice, 0.8g/mL for clay, and 1.0-1.3g/mL for sandy soils.

Test	Importance
Potentially available nitrogen (PAN) (*kg/Ha*)	• Also known as Anaerobically Mineralisable Nitrogen (AMN). • The Potentially Available Nitrogen test provides an **indication** of the quantity of nitrogen that can be readily **mineralised** from soil organic matter under **ideal** conditions. • Because this process is biological, the amount of nitrogen that will be mineralised in the soil will depend on factors such as soil temperature, moisture content, and the amount of oxygen (aeration) in the soil.
Organic Matter (%)	• Soil organic matter is foundational for soil health, improving soil structure, water -holding capacity, and microbial activity. These are characteristics which add considerable value to a soils' productive capability. • Organic matter is an important source of nitrogen, phosphorus, and sulphur. As earthworms and microorganisms decompose organic matter these nutrients slowly become available for plants.
Hot Water Extractable Carbon (HWEC)	• The HWEC test provides a robust measure of the labile (easily altered or unstable) fractions of soil carbon. It can be used to help assess subtle changes in soil quality that occur due to farm management practices.
Total Nitrogen (%)	• This test determines the total nitrogen content of the soil including that present as chemically stable humus (the end process of organic matter decomposition) and partially decomposed plant and animal residues. • The test provides an indication of the nitrogen supplying power of a soil. • For fruit crops, balanced nitrogen levels are crucial to avoid excessive vegetative growth, which can detract from fruit quality.
Anaerobically Mineralisable N/Total N ratio (%)	• The ratio of AMN to Total N can be used to determine the proportion of the 'active fraction' organic matter in the soil. • The AMN reflects the nitrogen in the organic matter, whereas the Total N is measured from the nitrogen in all fractions of organic matter. • A high AMN:TN ratio (4-6) indicates that a high proportion of the soil organic matter is in the 'active fraction' meaning good reserves of partially decomposed organic matter, which are a substrate for micro-organisms and a source of mineralisable plant nutrients, particularly nitrogen. • A low value (1-2) indicates depletion of organic matter due to continuous cultivation/cropping or a combination of environmental factors that degrade organic matter. Such soils may have lower nitrogen fertility and may show poorer soil structure and water infiltration rates.

Useful resources

Hill Labs (https://www.hill-labs.co.nz/)

Eurofins (https://www.eurofins.co.nz/agricultural-testing/)