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FACT SHEET | AUGUST 2025

HOW DO YOU KNOW IF YOUR SOIL IS HEALTHY?

What is soil health?

Soil health is a holistic concept that encompasses all the interconnected aspects of soil, including its physical structure, chemical components, and the diverse biological life it sustains.

By managing soil structure, nutrient content, and biological activity, it can become possible to utilise soils productively without causing degradation. A healthy soil is one where these aspects are functioning well together and are managed in a way that allows for high quality and high yielding crops, as illustrated in Figure 1.

This fact sheet offers practical tools to assess soil health and outlines clear management options – giving you the confidence to identify and respond to potential issues when they arise.

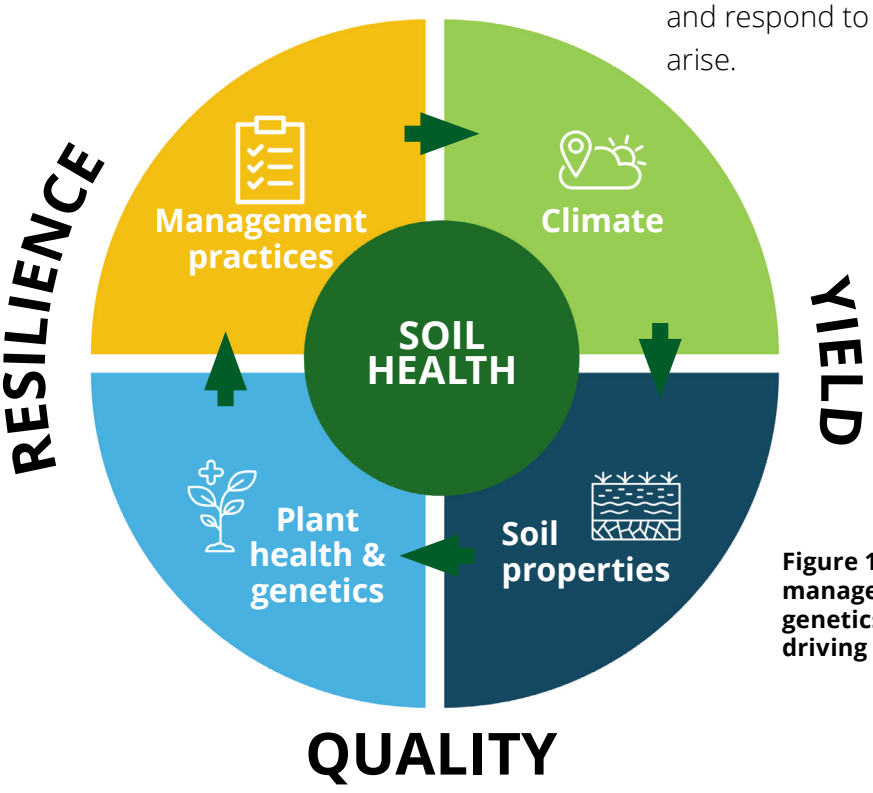

Figure 1. Soil health is shaped by management, climate, plant health, genetics, and soil properties – together driving resilience, yield, and quality.

Hort Innovation

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How to know if your soil is healthy: Practical indicators

Group A: Field-based observations

Table 1 can be used as a checklist to identify areas that need attention. Completing the checklist at the same time each year helps track improvements or declines in soil health.

Soil health also depends on the balance and activity of soil microbiology, which underpins:

- Organic matter decomposition
- Nutrient cycling and availability
- Adequate air space and water holding capacity
- Good soil structure and stability

Table 1. Soil health indicator checklist

Indicator	What to look for	Healthy? ✓ Needs Attention? *x*
Soil structure and tilth (spade test)	Is it friable, breaking apart easily into small, well-aggregated pieces?	☐
Earthworms	Are earthworms present in 10 spadefuls of soil? (Aim for >10 worms per m²)	☐
Ground cover	Is at least 70% of the soil surface covered by plants and residues?	☐
Water infiltration	Does water soak in within 30-60 seconds? (Slow = compaction)	☐
Slake test	Do soil aggregates stay intact in water?	☐
Root health	Are roots white, branching, and penetrating the soil well?	☐
Labile carbon	Do tests show active biology and enough carbon for microbiology?	☐

QUICK FIELD-BASED INTERPRETATION TIPS

- If compaction is an issue → reduce tillage and apply traffic management plan.
- If organic carbon is low → add compost, cover crops and retain residues.
- If soil loss via erosion is occurring → maintain consistent plant coverage and add organic matter to improve structure.

Group B: Soil testing

Review recent test results from a certified lab, using the indicators in Table 2 to check whether values fall within optimal ranges for your crop and soil type.

For guidance on interpreting lab values, refer to the Soil Testing and Interpretation for Vegetable Crops: A guide (*soilwealth.com.au/2017/05/soil-testing-and-interpretation-for-vegetable-crops-a-guide/)*

Table 2. Quick soil interpretation

Indicator	What to look for	Healthy? ✓ Needs Attention? *x*
pH	Is soil pH within optimal range (for CaCl2, between 5.5 and 7)?	☐
CEC (cation exchange capacity)	Is your soil able to retain and supply nutrients effectively? • A low CEC is considered to be < 5 [cmol/kg] • A high CEC high CEC > 20 [cmol/kg]	☐
Macronutrients (NPK)	Are key nutrients within target levels for your crop and crop stage?	☐
Micronutrients	Are trace elements within target levels for your crop and crop stage?	☐
TOC (total organic carbon)	Is TOC above 1.5-2% (or your regional target)?	☐

QUICK SOIL TEST INTERPRETATION TIPS

Organic carbon (OC) and organic matter (OM) are key drivers of nutrient storage, cycling, soil life, and root access to nutrients. They improve water storage, soil aeration, and support soil organisms. High OM/OC indicates strong microbial activity, nutrient holding capacity, and disease suppression potential.

- Issues with salinity + sodicity → Check irrigation water and apply gypsum if sodic.
- Low CEC → Boost organic matter to improve nutrient retention.
- Unbalanced pH → Most nutrients are only available in the 6-7.5 pH range. Adjust with lime/sulphur accordingly.
- Low TOC → Focus on residue retention and amendments such as composts and mulches.

Soil health diagnosis and actions

Table 3 lists common soil health issues, how to identify them, and actions to improve your soil's condition.

Table 3. Common soil health issues, tests and observations, and management actions

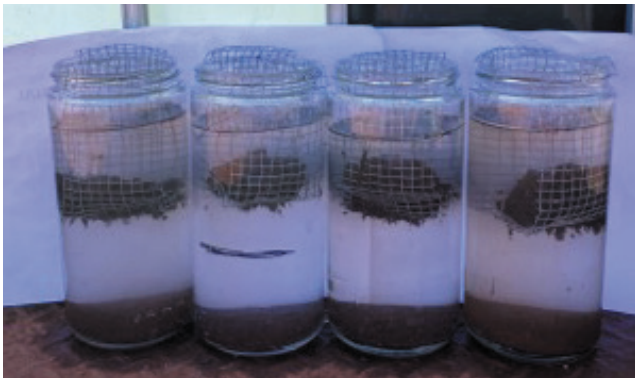
Soil health issue	Why it's an issue	How to check for it (tests and observations)	What to do about it (management actions)
Decline in organic carbon levels	Soil organic carbon is one of the pillars of physical, chemical, and biological soil functions. A decline reduces microbial activity, cycling of nutrients, aggregation of particles, leading to weakened structure and water holding capacity. It can also lower nutrient retention, buffering capacity, and resilience to compaction, salinity, and erosion. With reduction in organic carbon, dependence on synthetic inputs increases.	• Soil test for TOC or labile carbon test • Earthworm count • Slake test (aggregate stability) • Visual observation of topsoil colour (darkness) • Assessment of crop residue decomposition • Spade test for tilth and friability	• Growing of cover crops, retention of crop residues and stubble • Applying compost, manure, and mulches • Reduced tillage • Consistent and good groundcover • No or minimum fallow periods
Soil structure decline (compaction, low infiltration, drainage, water holding capacity)	A decline in soil structure – through reduced aggregation, compaction, or crusting – limits water infiltration, reduces drainage capabilities, and restricts root penetration. Poor structure leads to a reduction in aeration through reduction in pore space. Decline in soil structure increases erosion risk.	• Spade test – does soil crumble or is it blocky? • Water infiltration test (slow absorption = compaction) • Slake test to assess aggregate stability • Root assessment (stunted or too shallow roots) • Visual signs of crusting on the surface or ponding • Bulk density measurement	• Growing of cover crops, retention of crop residues and stubble • Applying compost, manure, and mulches • Reduced tillage • Consistent and good groundcover • No or minimum fallow periods • Add organic matter • Controlled traffic and reduced passes • Avoid working wet soils

Soil health tissue	Why it's an issue	How to check for it (tests and observations)	What to do about it (management actions)
Soil erosion	Healthy topsoil is the layer that contains the highest concentration of organic matter, nutrients, and biological activity – all crucial to growing healthy crops. Erosion reduces the land's capacity to store water, cycle nutrients, and weakens soil structure as well as microbe populations – leading to an increased reliance on inputs. Topsoil formation occurs over centuries; therefore, erosion represents a long-term degradation of soil health.	• Groundcover visual assessment (bare soil percentage) • Observation of physical erosion • Decrease in topsoil depth or change of colour • Slake test – poor stability can equal high erosion risk	• Consistent and increased ground cover year-round • Use windbreaks and buffers • Improve soil aggregation through organic matter
Decline in soil fertility (pH, EC, nutrient levels or balance)	Imbalanced pH, excessive salts (high EC), and poor nutrient levels reduce nutrient availability, can harm soil microbes, and lead to plant stress. All of this can cause stunted growth and nutrient toxicities or deficiencies. Over time, soil structure can degrade, biological functions can be disrupted and can lower the capacity of the soil altogether.	• Soil test for pH, EC, macro and micronutrients, and CEC • Plant tissue testing • Visual signs in plants: yellowing, stunted growth, poor flowering and set	• Use soil testing and site specific nutrient management plans • Right product, right time, right amount, right placement • If pH is acidic, apply lime to raise the pH • If pH is alkaline, apply elemental sulphur to lower pH
Salinity and sodicity	Excess salinity and sodicity can degrade health by disrupting structure and movement of water. Calcium and magnesium can be managed, sodicity causes clay particles to disperse and swell, blocking soil pores. This leads to reduced water infiltration, poor drainage, crusting, and blocked pores.	• Test for EC and exchangeable sodium percentage (ESP) • Visual indicators: salt crusting, poor germination, patchy growth • Dispersion tests (high sodicity = clouding or structural collapse) • Infiltration and drainage tests • Check irrigation source for salt levels	• Improved drainage • Irrigation monitoring, including water quality • Apply gypsum if sodic

Soil health tissue	Why it's an issue	How to check for it (tests and observations)	What to do about it (management actions)
Microbial decline/low biological activity or imbalance	Soil microbes are essential for nutrient cycling, disease prevention, and the breakdown of organic matter. A decline in microbial activity reduces nutrient availability and organic matter decomposition. It can also limit the biochemical and physical processes that bind soil particles which can lead to less stable aggregates, compaction or crusting, and lead to a greater risk of erosion.	• Labile carbon test • Earthworm count • Spade test: root zone structure, presence of insects and fungi • Visual assessment: poor breakdown of residue, compacted soil • Reduced plant response to compost or organic matter inputs	• Reduced use of pesticides • Lime to pH 6-7.5 • Maintain living roots year round • Amendments of manures, composts and mulches • Plant biofumigation crops

Infiltration test. Infiltration testing measures how quickly water enters the soil. Slow infiltration can indicate compaction, poor soil structure, or surface sealing, while very fast infiltration may suggest low water-holding capacity or poor soil aggregation.

Labile carbon test. The labile carbon field test is a useful in-field tool for comparing management practices that affect soil organic carbon, as labile carbon represents the fraction most readily available to microorganisms as a source of carbon and energy.



Slake/stability test. The slake test indicates how well soil can hold together in water – if it falls apart, the soil may need more organic matter or better management.

Penetrometer test. A penetrometer can show how difficult it is for roots to grow – if the probe meets strong resistance, the soil may be compacted and need management.

Further reading

From Health to Wealth: Looking after soils for Vegetable Production *soilwealth.com.au/2016/11/from-health-to-wealth-looking-after-soils-for-vegetable-production/*
What you need to know about soil microbiology fact sheet *soilwealth.com.au/2020/10/what-you-need-to-know-about-soil-microbiology/*
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Organic soil amendments fact sheet *soilwealth.com.au/wp-content/uploads/2023/08/Organicsoilamendments20201215.pdf*

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- Soil organic matter: Rules of thumb *soilwealth.com.au/2024/04/soil-organic-matter-rules-of-thumb/*