



A guide to soil health and visual soil assessment



Soil profile from a paddock in Southland.

Agricultural production on the land is dependent upon what is taking place underground. Even though it's not apparent to the human eye, healthy soil is a dynamic, living ecosystem that is swarming with macro and micro-organisms cycling through nutrients.

Fungi, bacteria, protozoa, nematodes and worms – all in their millions in a healthy soil are critical to plant health and vigor. Together these make up the soil food web. The interaction among them all provides plants with all of the requirements they need to survive and flourish. One size does not fit all. Each plant group has its own specific biological needs that must be met for optimum and profitable production.

► Advantages of a healthy soil for farmers

- Improved nutrient retention and availability
- Reduced soil compaction
- Improved water holding capacity
- Increased pest and disease resistance with an enhanced plant immune system
- Improved crop quality, taste and shelf life
- Improved productivity and profit margins
- Healthy stock and lower vet bills



Visual soil assessment

► Achieving healthy soil

There are five key principles to achieving a healthy productive soil.

1. Limited disturbance

Limit mechanical, chemical, and physical disturbance of the soil. Tillage destroys soil structure, reducing aggregates and pore spaces (microscopic holes) that store water. The result of tillage is often soil erosion via wind or water runoff. Synthetic fertilisers, herbicides, pesticides and fungicides all have negative impacts on the life in the soil, generally killing beneficial organisms and creating sterile uninhabited soil.

2. Armor

Keep soil covered in vegetation at all times. This is a critical step toward rebuilding soil health. Providing a natural coat of armor protects the soil from wind and water erosion while providing food and habitat for macro and micro-organisms. It also prevents germination of weed seeds and moisture evaporation, increasing drought resilience.

3. Diversity

Strive for diversity in both plant and animal species. Monocultures are rare in nature. Think of what each of these species has to offer. Some have shallow roots, some deep,

some fibrous, some tap. Some are high-carbon, some are low-carbon, some are legumes that take-up nitrogen. Each plays a role in maintaining soil health. Diversity enhances ecosystem function.

4. Living roots

Maintain a living root in the soil as long as possible throughout the year. Activities like cultivation, herbicide use and fodder crop grazing significantly reduce the amount of living roots in the soil. Those living roots are feeding soil biology by providing a basic food source: carbon. This biology, in turn, fuels the nutrient cycle that feeds plants.

5. Grazing animals

Animal grazing can stimulate plants to pump more carbon into the soil. This drives nutrient cycling by feeding the soil biology.

► Visually assessing the soils health

The Visual Soil Assessment has been developed for farmers and land managers to quickly identify the condition of their soil. The information obtained from the assessment is practical, helping guide good management practices to protect or enhance soil health.

More information

More information on soil health can be found on the following websites:

- www.es.govt.nz (see 'Maps & Data' for soils and physiographic zones)
- www.landcareresearch.co.nz (Visual Soils Assessment Field Guides)
- www.nzsoils.org.nz

- www.amazingcarbon.com
- www.quorumsense.org.nz (Regenerative farming network)

Further assistance

To work out how you can apply these five principles or to assist with a Visual Soil Assessment, call us on 0800 76 88 45 to arrange a free visit from our land sustainability team.