

Managing soil on my property

Fact Sheet series for the
Small Rural Landholder

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What is a healthy soil?

If our aim is to grow healthy food full of minerals and vitamins with great taste then we must provide a healthy soil.

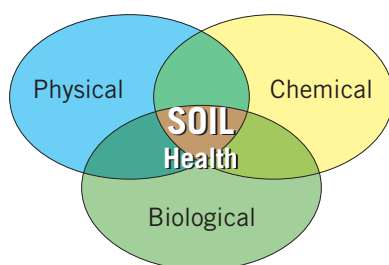
Soil health is a term used to describe the general condition of the soil resource including its biological properties.

Farmers can recognise a healthy soil by observing, tilling, feeling and smelling it. It is the integration of the chemical, physical and biological properties which gives us this healthy soil.

The Food and Agricultural Organisation of the United Nations describes a healthy soil as a living system that:

- *recycles essential plant nutrients,*
- *controls plant disease,*
- *stores air and water in its open pore structure,*
- *forms beneficial associations with plant roots supplying plant nutrients; and*
- *ultimately improves crop production.*

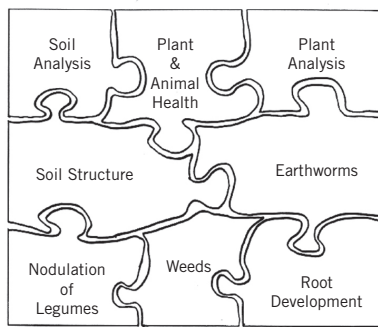
A practical approach to managing your soil



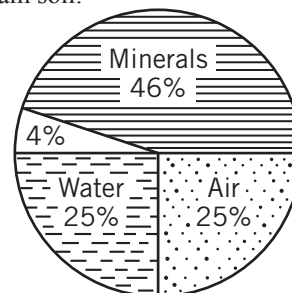
The concept of soil health integrating the three key areas of soil health.
(Adapted from The Rodale Institute).

How can we assess soil health?

A thorough soil assessment is like compiling a jig saw puzzle of observations and analytical data. No one piece of this puzzle should be relied on for making management decisions. Visual soil assessment of physical and biological soil characteristics, observations on plant and animal health along with soil and or plant analysis will provide the necessary information on which decisions can be based.



This visual and analytical assessment assists in pinpointing weaknesses relating to the major components of the soil seen in the pie chart below which illustrates the volumetric composition of an average silt loam soil.



Assessing minerals (chemistry)

Soil analysis and tissue analysis are widely used along with observations on plant/crop quality, production levels, animal and plant health.

Assessment of air and water

Information on pore space can be provided by bulk density, observations on soil texture and structure, compaction and water infiltration.

If your soil is compacted oxygen and moisture will not reach plant roots, important soil biology maybe limited and plant nutrient elements may be restricted. As a result growth and crop quality will be poor.

Assessment of organic matter and biological soil life may be provided by analytical techniques including microbiological testing, observations of soil colour, plant root structures, legume nodules, worm numbers and other soil life forms.



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COMMON GROUND

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Biological life in the soil

By returning wastes to the soil we are stimulating microbial activity and ensuring the population of soil organisms is maintained or increased.

The vast majority of soil organisms, worms, bacteria, fungi, actinomycetes, protozoan, algae, mycorrhiza are creators of fertility and are invaluable aids to the farmer.

Nodule-forming bacteria in association with legumes fix considerable quantities of nitrogen per year.

Mycorrhiza fungi-like threads that invade plant roots can double its root capacity, exchange carbohydrates from the plant in return for supplying phosphate and trace elements to the plant. Research indicates it also plays a role in protecting plants against some soil-borne pathogens.

Conditions that are favourable for the maintenance of an active biological soil population are:

- **AIR**
- **WATER**
- **FOOD**
- **WARMTH**



Careful management of soil through cultivation, the return of organic residues and the occasional input of natural mineral nutrients will assist in maintaining and enhancing the fertility of the soil.

How can I build a healthy fertile soil?

Sustainable strategies focus on feeding the soil while more conventional approaches rely on feeding the plant at the expense of the enhancement of the soil fertility.

After careful assessment of all the soil characteristics, management strategies can target optimising soil fertility as a base for nutrient supply and tactical “topping up” of key essential plant nutrients where identified.

Farm scale strategies

If we are dealing with a farm then it is recommended that a full soil analysis is undertaken and its interpretation made by a specialist who will also look at other key soil characteristics.

Plant nutrients can be provided by the range of commercial inorganic or organic fertilisers, by additions of poultry litter and compost made from on-farm or garden waste materials.

Compost is a wonderful addition to a soil that is low in organic matter.

Soil pH levels

Use of a colorimetric pH kit (available from most garden supply shops) will assist in providing basic pH information.

Our aim is to work towards a pH of 6-6.5. If the kit indicates an acid soil then a proper soil test will help to decide if an application of lime is required.

Aeration

On a farm there may be a need for strategic soil aeration if soil compaction is an issue. The addition of compost, gypsum (if the soil is a clay based) will assist in breaking up compacted layers.

Home-made probe for indicating soil compaction

Wire probe should move easily down through the upper profile indicating a low level of compaction. (see pic above left)

Biological improvements

Soil biology can be increased by compost additions and by the use of organic mulch material which will minimise water use and protect garden plants.

The aim

A well-structured soil containing high levels of organic matter and microbial activity to recycle and enhance nutrient availability.



A well structured soil



This project is supported by South Gippsland Landcare Network through funding from the Australian Government's National Landcare Programme.

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