

Describing the soil

If you dig a hole about a metre deep in the soil, you will see the 'soil profile' has a number of layers. Called 'horizons', these layers are quite different to one another. Taking time to study the different horizons can provide you with important knowledge about your soil.

What soil horizons are there?

At the surface there is usually a layer of fresh organic material - dead leaves, and surface roots, and organisms feeding on these. This is called the litter layer (scientists label it the L horizon).

The top layer of soil (Topsoil) is called the A horizon. This layer is richest in organic matter and nutrients. It is usually very different to the original material from which it developed. You will find the soil is clumped into aggregates or peds. Because it is rich in organic matter it is usually darker than the lower layers.

The un-modified parent material (river silt or volcanic material maybe) is called the C horizon.

In between the topsoil and the parent material is a layer of partly modified soil called the B horizon. Being low in organic matter it is normally lighter than the A horizon. It may have some soil aggregates, but less than the topsoil.

In many parts of New Zealand you need to be careful when inspecting soil profiles. Sometimes you will find 'buried soils' because flooding, volcanic activity or wind blown 'loess' has covered a soil that was previously there. Also, we often have soil developed from volcanic material that settled on eroded rock. The rock itself is not the parent material at all!

Describing the horizons

Horizons differ in depth, colour and smell, stone content, biological activity, structure, strength and consistency and texture. These features can tell you a lot about the health, history and even the future of your soil.

Colour

Deep brown colours come from organic matter and rusty colours come from iron. Very old or very young soils are pale coloured.

An important aspect of colour is mottling. As a soil weathers iron is released, and this forms rust coloured iron oxides. Rusty mottles on a dark background indicate uneven weathering- that's ok. Rusty mottles on a pale background indicate long term cycles of waterlogging and drying so beware when choosing crops for this soil.

Another important colour feature is gleying. Gleyed zones of soil have a grey-blue sheen on top of normal background colours. This means that the soil has recently been waterlogged- unless rainfall has been unusually heavy gleying tells you to be careful how you use or manage the soil.

Stones

Stones can have a big impact on what you use the soil for. Estimate the stone content visually- you want to know what percentage of the soil layer is made up by stones. This figure can be very helpful, especially if you are comparing your site with descriptions of soils given in maps.

Biological activity

You should be looking for signs of a healthy living soil. The sorts of questions to ask are:

- Is it easy to find roots and do they look healthy?
- How deep do the roots grow?
- Can you see earthworms (is that normal at this time of year)?
- Are there any grass grubs or larvae?

Soil texture

Soil texture is the amount of sand, silt and clay particles in the soil. Texture is different to structure, but does affect your soil in a lot of ways. For example, the amount of clay in the soil is important as clay helps the soil hold onto nutrients such as potassium and magnesium.

Soil structure

Soil structure is the arrangement of the solids and spaces in the soil. It's easiest to describe this by concentrating on the solids.

The "primary particles" in soil are organic matter, sand, silt and clay. These are usually joined into bigger units called aggregates or "peds". The size and shape of the aggregates is important- there will be differences between the topsoil and subsoils. For example, you wouldn't want prismatic, blocky aggregates in your topsoil.

Granular
Granular
& weak platy



Platy
& blocky



Prismatic
& blocky



Soil structure affects how well your crops will grow, how easy it will be to prepare the ground for

crops and how easy it will be to use machinery in the paddock after rain.

Soil strength and consistency

Stony soil structure resists damage during cultivation and if the soil is driven on. This is usually good. If the soil has poor structure and is compacted, problems can occur. It is important to look for strongly compacted layers or pans in your soil. They affect root growth and water movement and can make your crop more susceptible to drought (due to shallow root growth), waterlogging or diseases.

You can check how easy it is to penetrate the soil by pushing a pencil or welding rod into the soil from the side of your hole- if you can't push a welding rod into the soil with your hand then roots won't be able to grow through it either! In badly compacted layers the water may not drain well either - this can be recognised by a hard dry layer between two wet layers. Even one badly structured layer can affect your crop.

Below is a chart which may help in describing the texture of your soil.

Take a small sample of the soil (remove particles >2 mm if you can), then		
<ul style="list-style-type: none"> ➤ Moisten it while rubbing between thumb and fingers (spit works fine!) ➤ Stop adding water and rubbing it when there is a thin surface film of moisture that reflects light ➤ How does it feel and sound when you rub the soil now? Work out the texture, as follows: 		
Feel and sound	Cohesion and plasticity	Texture class
Gritty and rasping	Can't be moulded into a ball	Sand
Slight grittiness/rasping sound	Can almost be moulded into a ball - but falls apart if you flatten it	Loamy sand
Smooth soapy feel	Moulds into a ball that cracks if you press it flat	Sandy loam
Very smooth, slightly sticky to sticky	Moulds into a ball that cracks if you press it flat	Silt loam
Very smooth, sticky to very sticky	Plastic, moulds into a ball that you can squash without it cracking	Clay loam
	Very plastic, moulds into a ball that you can squash without it cracking	Clay

Clay textures are rare for topsoils in New Zealand, but textures in the mid range are common. You will often find silty clay loams (between silt loam and clay loam) and fine sandy loams (usually these are silt loams but with the recognisable feel and sound of fine sand).

'Te Pānui Tips' are simple fact sheets that cover topics designing organic crop production systems on the East Coast.

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