Visual Soil Assessment – A Basic Guide

A Sustainable Farming Fund Project

Visual soil assessment is the process of looking at the physical properties of your soil to know what they look like, determine their structure, porosity, colour and number of earthworms. Having this knowledge at your fingertips can be beneficial to the ongoing management and performance of your soils and farm system. With regular monitoring you can identify changes and mitigate or replicate management practices.

This basic guide bases its information on the more technical and in-depth steps found in the Visual Soil Assessment Manuals and Field Guides put together by Graham Shepherd in 2000 from Manaaki Whenua – Landcare Research, New Zealand. Several field guides were created for doing visual soil assessments (VSA) on cropping, pastoral flat to rolling, and hill country soils, with accompanying Soil Management Guidelines. This basic guide has been put together to provide you some information to make a start on visual soil assessment.

What does a basic VSA involve?
- Drop shatter test to assess structure.
- Colour, and porosity assessment.
- Worm count.
- Water Infiltration Test (optional although valuable)

What Tools Do You Need

<table>
<thead>
<tr>
<th>Soil Assessment</th>
<th>Water Infiltration</th>
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<tbody>
<tr>
<td>Spade</td>
<td>150mm pipe ring (150mm wide and 150mm long)</td>
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<tr>
<td>Plastic box or wood panel</td>
<td>Hammer and block of wood</td>
</tr>
<tr>
<td>White/light coloured sack</td>
<td>1 litre water</td>
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<td></td>
<td>Timer</td>
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<td></td>
<td>Clingfilm</td>
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Soil Assessment

Step 1: Site Selection

When picking where to sample your soil, ensure you avoid areas around gate ways, water troughs, irrigation hydrants or pivot wheel tracks and also stock camps and fence lines. The area should be a good representation of the paddock from a grazing and management perspective.

Step 2: Collect your soil

Using your spade dig your square approximately the width and depth of your spade blade. Keep the square of soil as intact as possible and lift out and onto your sack. Remove all soil from the hole and put onto the sack at the correct depth it came from as much as possible.

Here you can make some initial assessments on the colour of your soil. Is your soil dark brown in colour or is it more pale and light brown? Can you see evidence of mottles – orange flecks/spots? Can you see any earthworms?

Step 3: Drop Shatter Test – Assessing soil structure.

Note: this test should be done when the soil is moist. A dry soil will look/behave differently. Pick up your main block of soil holding it turf up and using your plastic box or panel of wood, drop the soil from about 1m high or waist height into the box or onto the board. If small pieces break off, put them onto your sack, keeping in a similar order of depth as in step 2.
If you still have large clods, pick them up and drop them again. Drop each piece of soil no more than 3 times. Then arrange all your pieces on your sack from smallest to largest. This will often be in the same order they came out of the hole.
Good Soil Structure = Many fine particles with a top clod that breaks apart on the drop shatter test.

Average Soil Structure = larger particles with dense hard clods, a top clod that is hard to break apart and changes very little on the drop shatter test.

The top clod here is mostly bound together with plant roots.

Average to Poor Soil Structure = larger particles with dense hard clods, a top clod that is hard to break apart and changes very little on the drop shatter test.
Step 4: Soil Colour and Porosity

**Colour:** Good topsoils are a dark/rich brown colour with poorer soils being very light in colour. The darkness of a good soil comes about through the organic matter that has built up over time through microbe activity and the addition of nutrients to the system through dung and fertilisers. It is important to look at the soil colour when the soil is damp, as soils will appear lighter if they have dried out. You may need to spray your soil with water to get a good indication of its colour, if it has dried out.

Assessing colour also includes checking for mottles. Mottles are an indication of water logging. They appear as orange spots or flecks throughout the soil.

**Porosity:** This is the about the number of macropores (larger) and micropores (smaller) within the soil. Pores provide space for water, air and roots to move around and deliver or uptake nutrients. Compaction is the biggest factor leading to low porosity, compaction is caused through heavy stock or heavy machinery on our soils. Due to New Zealand’s high cattle population and use of large tractors and machinery, our soils are often compacted.

<table>
<thead>
<tr>
<th>Lighter Soil Colour &amp; Dense Soil Particles (low porosity)</th>
<th>Darker Soil Colour &amp; Loose Soil Particles (good porosity)</th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="Lighter Soil Colour &amp; Dense Soil Particles (low porosity)" /></td>
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<th>Mottles in Soil</th>
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<td><img src="image" alt="Mottles in Soil" /></td>
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Step 5: Earthworm Count

From your soil sample on your sack filter through it with your hands and count the earthworms. You may need to break apart clods to find them. Look through the soil from the top to the bottom, you can sort the earthworms into small and large earthworms to keep a record of what is in your soil.

<table>
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<th>Earthworm Count</th>
<th>Description</th>
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<tbody>
<tr>
<td>Less than 10 earthworms</td>
<td>Poor</td>
</tr>
<tr>
<td>10 to 20 earthworms</td>
<td>Moderate</td>
</tr>
<tr>
<td>20 or more earthworms</td>
<td>Good</td>
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Once you have counted your earthworms, return the soil to your hole in the same order it came out.

Keep your notes on your soil assessment somewhere handy. Measure a couple of paddocks across your farm at different times.

Visual Soil Assessment and Your Farm Environment Plan

Nutrient and soil management are important aspects to your farm environment plan and evidence to support your knowledge and actions is valuable.

Including an understanding of your soils as a component of your farm environment plan that you assess on an annual basis and record the changes you notice in your soils, from colour to compaction, worm counts and infiltration rates will be beneficial to improving your farming environment.

What happens in your soils has a big impact on what happens above the soil surface, from pasture production to animal health and decision making for crop rotations. Irrigation management has a big impact on soils.

An active soil with good earthworms, microbiology, water and air enable plant roots and nutrients to move freely for a healthier soil resulting in healthier plants and healthier animals.

The full Visual Soil Assessment Guides are available through Landcare Research and provide a scoring template that you can use year on year. Make sure you are using the correct volume for your farming type. These guides also include information for plant scoring and pugging susceptibility.

This basic guide should be used as an introduction to visual soil assessment, it is recommended to use the full guide to give you a more robust analysis of your soil physical properties.
Co-Funders

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