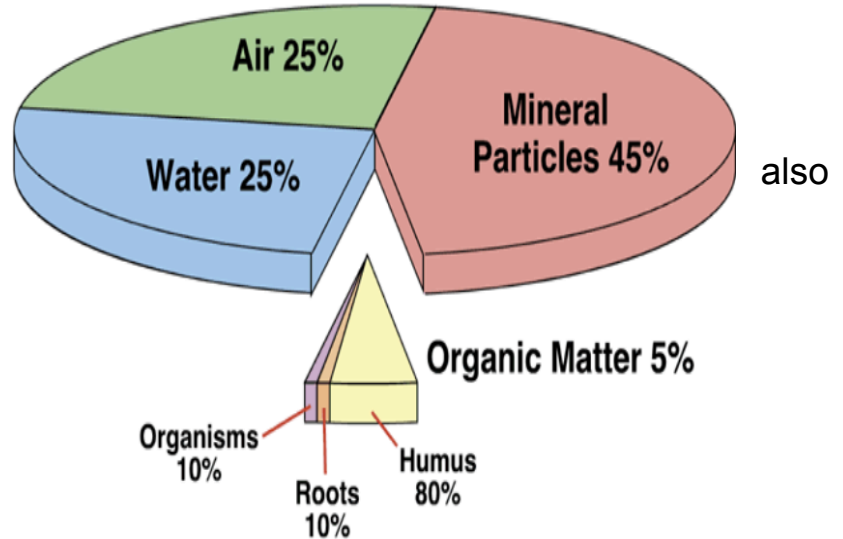


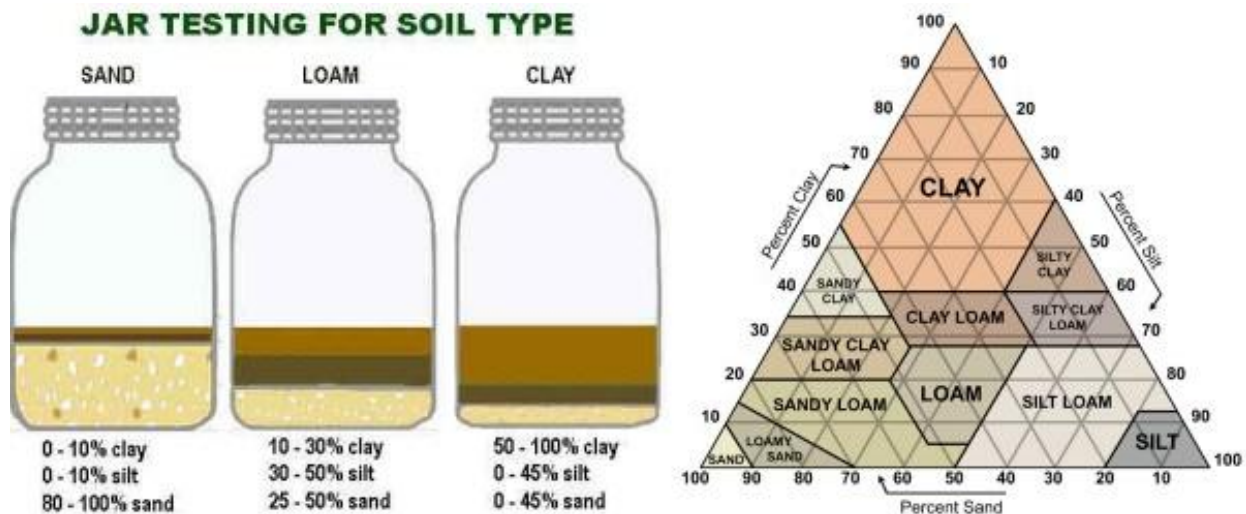
## What is Soil?

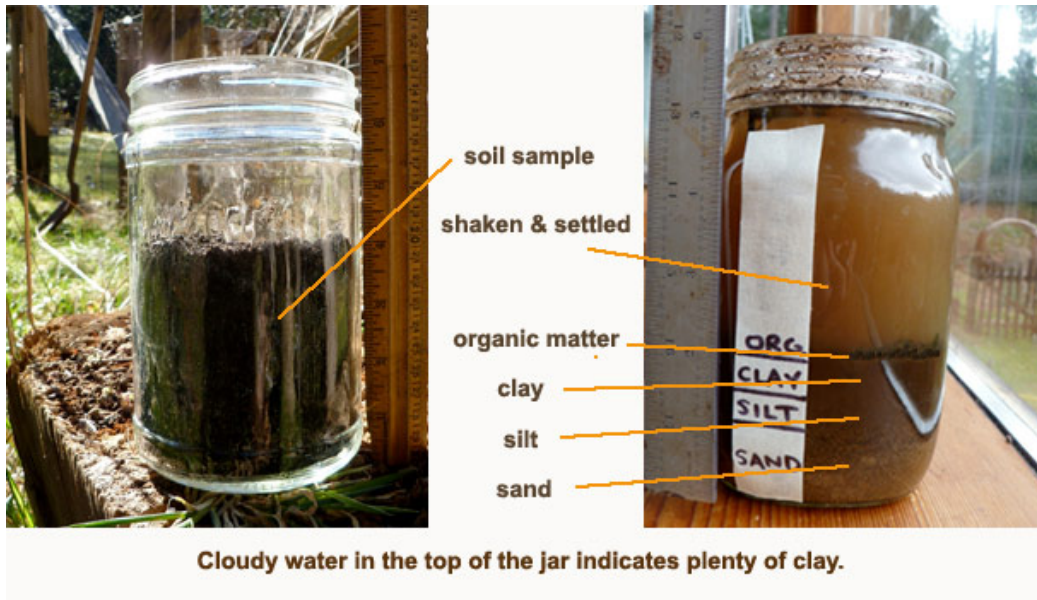
A healthy soil contains much more than just mineral particles of different sizes. It contains water, air, organic matter and life in the forms of micro and macro organisms. Many of those organisms such as earth-worms are beneficial organisms in regard to soil health and plant growth.



## Test 1: Soil Composition: The Jar Test

Put a handful of your soil into a jar and 3/4 fill the jar with water. Shake the jar well until all the soil is in suspension. Place the jar on a flat surface and wait to see how long it takes to settle. As the soil settles, different layers will form. Course sand will settle fastest, fine clay will settle last. (except organic matter, which may not settle at all.) By comparing the different thicknesses of the layers, you can work out the percentages of the different soil particle sizes and determine more closely your soil type.





Measure the percentages of sand, silt & clay and apply them to the soil triangle to determine your soil type.

## Test 2: Testing Soil pH

All substances have a specific pH (potential Hydrogen) which is a measure of acidity or alkalinity. An acid substance is one that releases hydrogen in solution, an alkaline substance is one that removes hydrogen from a solution. pH is measured on a logarithmic scale from 0 to 14 with 0 being fully acid, 7 being neutral and 14 being fully alkaline. Use a pH meter or litmus paper.

The pH of your soil will affect how well some plants can perform compared to others. Different plants are adapted to different soil pH. Most food producing plants prefer a soil that is slightly acid to neutral (pH 5 - 7). At higher pH levels some minerals (particularly iron) become less available to plant roots. Soil pH can be adjusted to suit the needs of the plants that you wish to grow. Potatoes and strawberries prefer a more acid soil. Brassicas on the other hand prefer a slightly alkaline soil (consider liming prior to this crop in a rotation if your soil is acid).

If your soil is alkaline (pH 9+), additions of organic matter in the form of compost, worm castings, blood and bone (hoof and horn), seaweed spray or manure, or any combination of these, will help to make soil more acid. Soils containing a lot of organic matter tend to be slightly more acid. If your soil is too acid it can be adjusted by applications of dolomite lime powder.

### **Soil test kit**

Use a soil test kit to assess primary nutrients (Nitrogen, Phosphorus and Potassium, or N-P-K) as well as pH levels. By testing your soil, you determine its exact condition so you can fertilize more effectively and economically. Soil should be tested periodically throughout the growing season.

### **Test 3: Sausage Test**



Collect some soil from your garden. For a true picture of the soil, take the sample from below the humus layer in the rootzone of your plants. Take a handful of soil and moisten it to the point where it will form a ball. Wrap your fingers around the ball and try to squeeze out a sausage between the thumb and forefinger, let the sausage bend as you form it whilst watching to see how far it can be bent before breaking.

If you cannot form a ball, you have a **very sandy** soil;  
If you can feel larger gritty particles in the ball, you have a **coarse sand**;

If you can form a ball but a sausage cannot be formed without breaking, you have a **sandy** soil;

If the sausage bends a little, you have a **sandy loam**;

If the sausage will bend half way around the forefinger, you have a **loam or silty-loam**;

If the sausage bends more than halfway around your finger, you have a **clay-loam or sandy-clay**.

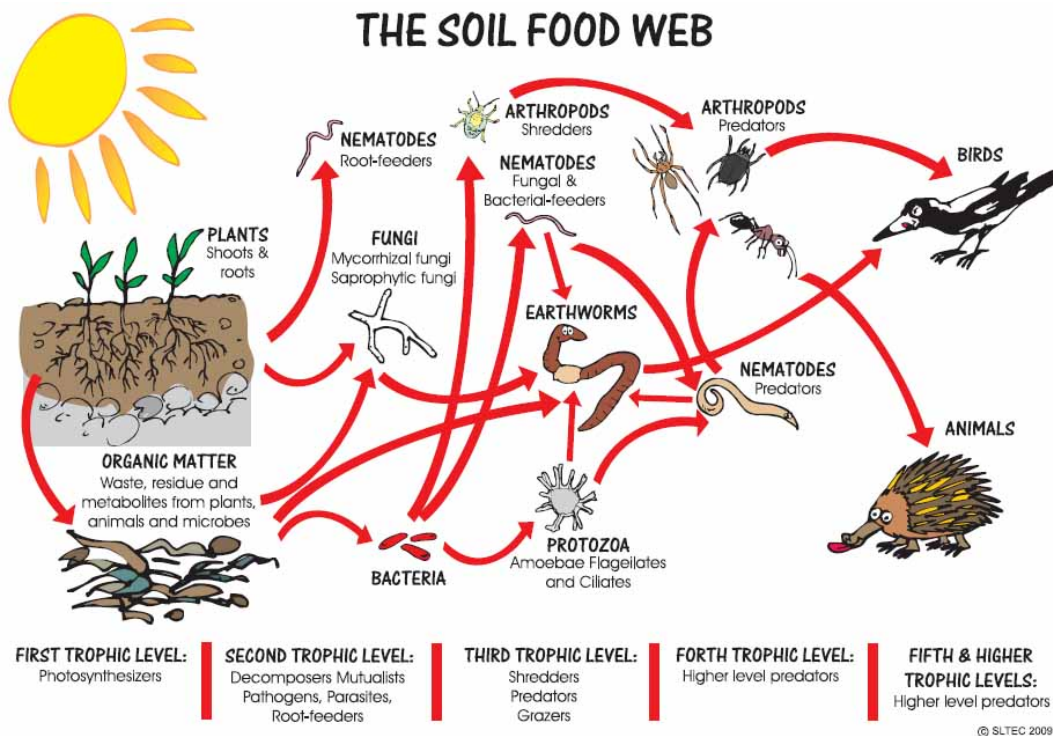
If you can form a longer sausage with cracks, you have a **clay** soil;

If you can form a longer sausage without cracks, you have a fine (or heavy) clay.

The best soil structure for growing most plants is a **loam or silty loam** as this has the best combination of moisture retention and air spaces. (Plants need to breathe through their roots.)

## Test 4: Living Organisms

"Soils are home to over one fourth of all living species on earth, and one teaspoon of garden soil may contain thousands of species, millions of individuals, and a hundred metres of fungal networks."



## The Six Types of Soil

There are six main soil groups: clay, sandy, silty, peaty, chalky and loamy. They each have different properties and it is important to know these to make the best choices and get the most from your garden.

### 1. Clay Soil

Clay soil feels lumpy and is sticky when wet and rock hard when dry. Clay soil is poor at draining and has few air spaces. The soil will warm up slowly in spring and it is heavy to cultivate. If the drainage for the soil is enhanced, then plants will develop and grow well as clay soil can be rich in nutrients. **Great for:** Perennials and shrubs Early vegetable crops and soft berry crops can be difficult to grow in clay soil because of its cool, compact nature. Summer crop vegetables, however, can be high yielding vigorous plants. Fruit trees, ornamental trees and shrubs thrive on clay soils.





## 2. Sandy Soil

Sandy soil feels gritty. It drains easily, dries out fast and is easy to cultivate. Sandy soil warms up fast in spring and tends to hold fewer nutrients as these are often washed away during wetter spells. Sandy soil requires organic amendments such as glacial rock dust, greensand, kelp meal, or other organic fertilizer blends. It also benefits from mulching to help retain moisture . **Great for:** *Shrubs and bulbs Vegetable root crops like carrots, parsnips and potatoes favour sandy soils. Lettuce, strawberries, peppers, corn, squash, zucchini, collard greens and tomatoes.*



## 3. Silty Soil



Silty soil feels soft and soapy, it holds moisture, is usually very rich in nutrients. The soil is easily cultivated and can be compacted with little effort. This is a great soil for your garden if drainage is provided and managed. Mixing in composted organic matter is usually needed to improve drainage and structure while adding nutrients.

**Great for:** *Shrubs, climbers, grasses and perennials such as Mahonia, New Zealand flax. Moisture-loving trees such as Willow, Birch, Dogwood and Cypress do well in silty soils. Most vegetable and fruit crops thrive in silty soils*

*which have adequate drainage.*

## 4. Peaty Soil

Peaty soil is a dark organic acid soil and feels damp and spongy. Acidity slows down decomposition and leads to the soil having fewer nutrients.

**Great for:** *Heather, Witch Hazel, Camellia, Rhododendron. Vegetable crops such as Brassicas, legumes, root crops and salad crops do well in well-drained peaty soils.*

## 5. Chalky Soil

Chalky soil is larger grained and generally stonier compared to other soils. It is free draining and usually overlays chalk or limestone bedrock. The soil is alkaline in nature which sometimes leads to stunted growth and yellowish leaves – this can be resolved by using appropriate fertilizers and balancing the pH. Adding humus is recommended to improve water retention and workability. **Great for:** *Trees, bulbs and shrubs. Vegetables such as spinach, beets, sweet corn, and cabbage do well in chalky soils.*

## 6. Loamy Soil



Loamy soil, a relatively even mix of sand, silt and clay, feels fine-textured and slightly damp. Great structure, adequate drainage, is moisture retaining, full of nutrients, easily cultivated and it warms up quickly in spring, but doesn't dry out quickly in summer. Loamy soils require replenishing with organic matter regularly, and tend to be acidic.

**Great for:** *Perennials, shrubs and tubers. Most vegetable crops and berry crops will do well. However, loamy soil requires careful management to prevent depletion and drying out. Rotating crops, planting green manure crops, using*

*mulches and adding compost and organic nutrients is essential to retain soil vitality.*

### Summary: How to make the most of your soil, whatever the type

It's a good idea to regard your soil as living as your plants – it too needs food and water.

- Add organic matter.
- Do not apply chemical fertilizers and pesticides
- Use organic mulches such as straw, dried grass clippings and deciduous leaves.
- If you can, introduce and encourage living organisms to your soil. The fungus Mycorrhizae will aid your plants in the absorption of water and nutrients and worms will help speed up the composting process and help spread fertilizer through the soil.
- Practice crop rotation, use green manures, cover crops and the use of mulch and the periodic addition of organic materials like compost and fertilizer are standard ways of restoring soil health after crop harvests.