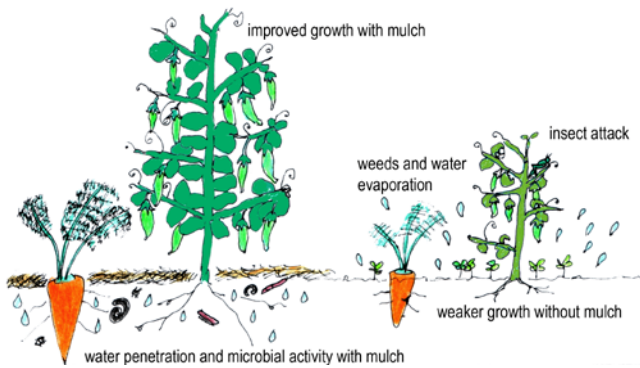


Soil

The heartbeat of your garden



Soil is a complex living organism. Partly made up of **micro-organisms** (from bacteria to worms), which help to build healthy soils which sustain life.

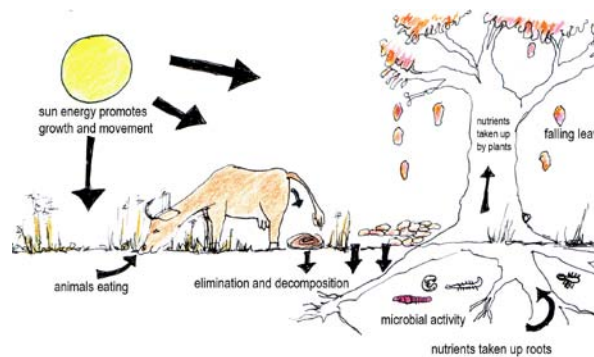
Illustrations by:



The nutrient cycle

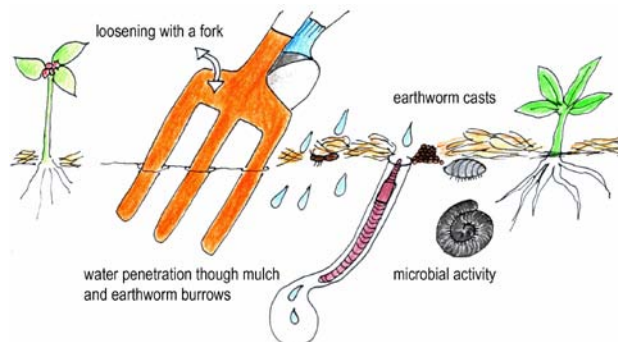
Soil is made up of minerals (from ground rock), rotted organic plant & animal matter (**humus**), living organisms (insects & worms), air and water. The mineral subsoil cannot be taken up by plants alone until it interacts with the **micro-organisms** closer to the surface. This happens over time. As these minerals are brought to the surface by **micro-organisms**, they become topsoil.

Topsoil is your most important layer of **soil**, which will be about 30cm deep. We can help this happen by adding **humus** in the form of **compost**.



We build strong **soil** to feed the plants.

Disturb the **soil** as little as possible. The micro-organisms are carefully ordered to make the **soil** fertile. Gently forking the **soil** is good to allow the mix of humus & water to penetrate. Turning & exposing the **soil** to sunlight kills these **micro-organisms** and the **soil** becomes fine dust which cannot absorb water or nutrients.



Avoid **soil** loss in heavy winds & rain, by **mulching**, creating **swales** to divert water, & planting natural barriers.

Your **soil** is the LIFE of your garden, so feed it and treat it with care. It will repay you in abundance.

What kind of soil do I have?

There are 4 main types of **soil** – each soil type is able to absorb and hold air, water & nutrients in different quantities. You can try this simple test.

Put a small amount of your **soil** in a bucket, and add a little water until it sticks together and can be picked up. Roll it out like a sausage, and slowly bend it. This is what you will find with different soil types:



Sand – grains will feel rough & hard in texture. Sand increases drainage, but will retain no nutrients or moisture. If you can roll into a sausage, you will not be able to bend it.

Loam – feels slightly rough, with more organic matter in it. Can be bent into a gentle curve.

Silt – feels like mud, with fine granules derived from rock. Can be bent half way.

Clay – feels smooth and sticky. Can be bent around into a circle.

Loam consists of sand, silt and clay, and is ideal for gardening.

Tip: The **soil** colour varies depending on its mineral content - from very pale (almost white), to brown through to orange, becoming almost black in colour. Poor **soil** is lighter in colour.

Test your **soil** regularly. You will have a better idea of what you need to add to build the ideal soil.

See the colour of your **soil** change over time as you improve it.

Clay & silt have many important minerals, but alone will get waterlogged, and not allow air to the roots. Adding organic matter will help your **soil** to keep in moisture & nutrients, or help to break up heavy **soils**. (growing lupins helps clay **soil**.)

How can I improve my soil?

Earthworms

Earthworms are a gardener's best friend. The small red variety, called 'red wigglers' are nature's ploughs, Create conditions which they like – moist organic matter under layers of **mulch** to keep them cool. Add **earthworms** to your **compost** once it has cooled to increase the speed with which your organic matter can break down.



You can add **earthworms** to your beds, or breed them in an old bath in the shade. They will merrily eat your kitchen waste, leaving **liquid manure** and '**casts**' which are worm manure (**humus**). **Casts** have a balance of minerals and hormones, producing healthy **soil** for healthy plants.

Earthworms burrow bringing minerals upward, allowing water and air to reach plant roots and collect organic matter from the surface, creating deeper **topsoil**.

Balancing and protecting your soil

Different **elements (minerals)** can be found in **soil**. Plants give off and take **elements** from the **soil**. If your **soil** is lacking in any **elements**, these can be added by **composting** or **green manuring**. Some of these **elements** can be released by plants. When the **green manure** plants are about to seed or fruit, they can be cut back. Put **mulch** the **green manure** on your beds to increase the **mineral** content.

Green manure or living mulch plants

Nitrogen (N) – for stem & leaf growth

Ideal: Cowpeas, Clover, Vetch, Bean, Pea, Nettle, Acacia

Potassium (K) & Phosphorus (K) – for disease resistance & improves quality of fruits & grain

Ideal: Nettle, Comfrey, Yarrow, Dock, Sunflower, Buttercup, Borage, Tansy

Calcium (Ca) – essential for cell division & multiplication (growth)

Ideal: Rhubarb, Cacti, Brassica family (eg. Cabbage), Comfrey, Dandelion, Nettle

Sulphur – amino acids, proteins, vitamins & enzymes

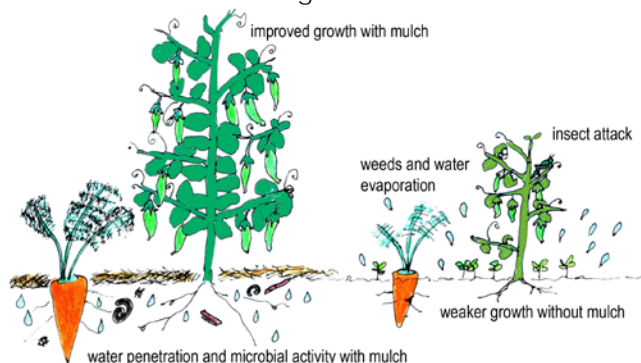
Ideal: Brassica & Allium (Onion) families, Marigold

Other Living Mulch plants:

Buckwheat, Canna, Choko, Cucumber, Creeping Thyme, Mints, Penny Royal Mints, Oregano, Zucchini, Pumpkin

Dry Mulch

This is THE most important thing in your garden. Grass, leaves, newspaper and cardboard make good **mulch**. Even stones are great **mulch**.



- **Mulch** keeps the **soil** cooler in summer and warmer in winter.
- **Mulch** protects against **soil** loss in heavy rains

WARNING: Do not **mulch** close to the stems as it can damage the plants. Be careful in fire risk areas, as **dry mulch** can burn.

Ground Cover

If there is ANY **ground cover** in your garden, don't remove it until you are ready to plant. The **soil** will be protected from harsh elements (sun, wind and rain). ANY **ground cover** is better than NOTHING.

Composting

Make compost to help what is taking place in your topsoil. Add waste from your garden, kitchen and animals to your **compost** heap. Feed your **compost** with balanced diet, as if it were a living creature. It will make great **humus** for your garden. Remember - plant your **green manure** close to your **compost** heap. (See the leaflet on **CREATING COMPOST**)

Natural liquid fertiliser – liquid manure



Many plants can be used to make **liquid manure or tea**. Different plants add different nutrients. **Comfrey** has a good balance of all the **elements**. Grow **Comfrey** near your **compost** area. Divide **Comfrey** by its roots and plant around your garden. It is a healing plant which is used for the treatment of bruising, burns, sprains & bone fractures (not on open wounds). It attracts birds and bees. A magic plant!

To make **Comfrey tea**, you need a container with a lid, a sack, a strong stick, a piece of rope, water, and **Comfrey** leaves and/or roots. Half fill the sack with leaves, and tie it to the stick. Fill your container with water, and submerge the bag. Place the lid on your container to prevent the smell escaping. It can be ready within 1-2 weeks. When you use it, dilute it by a ratio of 1 part of comfrey liquid, to 10 parts of water. Ideal for seedlings, fruiting and sick plants. It can be used weekly.

Top tip: Why dig, when you've got **earthworms**? Let **earthworms** do the work for you! Why buy fertiliser when you can grow comfrey?