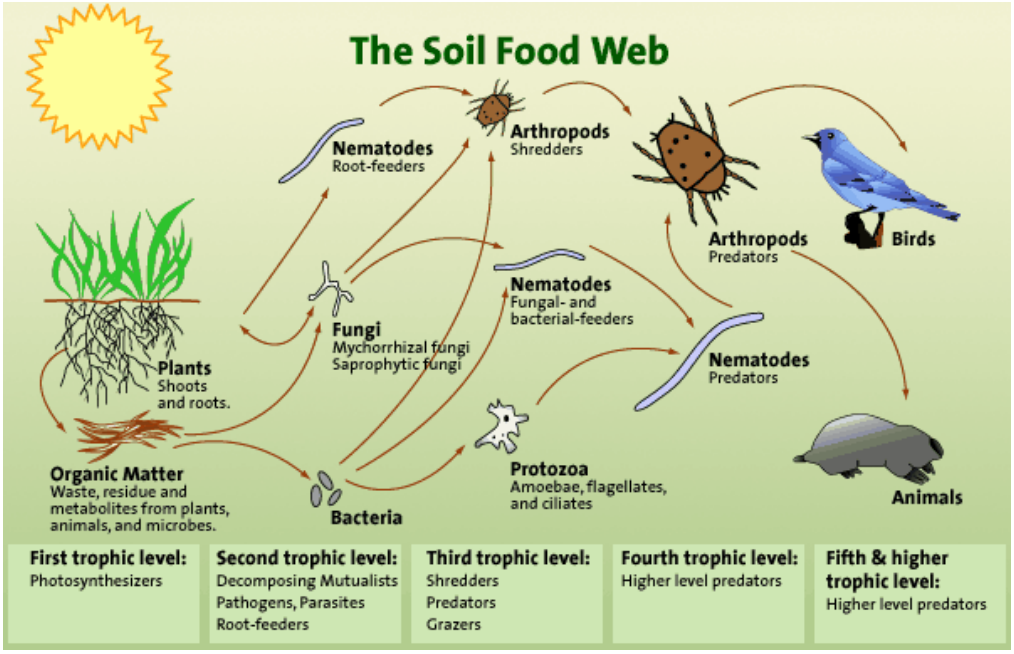
Key takeaway points from session 2: Soil health and a no dig approach

PLANT NUTRIENT UPTAKE

Nutrients are often in the soil in a chemical form not available for plants to absorb. The ecosystem of the microorganisms in the underground world, made of bacteria, fungi, nematodes, protozoa and microarthropods is necessary for nutrients to become available for plants. Some are predators and excrete nutrients in available forms, others are shredders, others also dig tunnels to aerate and move the soil. Soil biology does the work for us, if we don't disturb it, don't use synthetic fertilizers, and if we look after it.

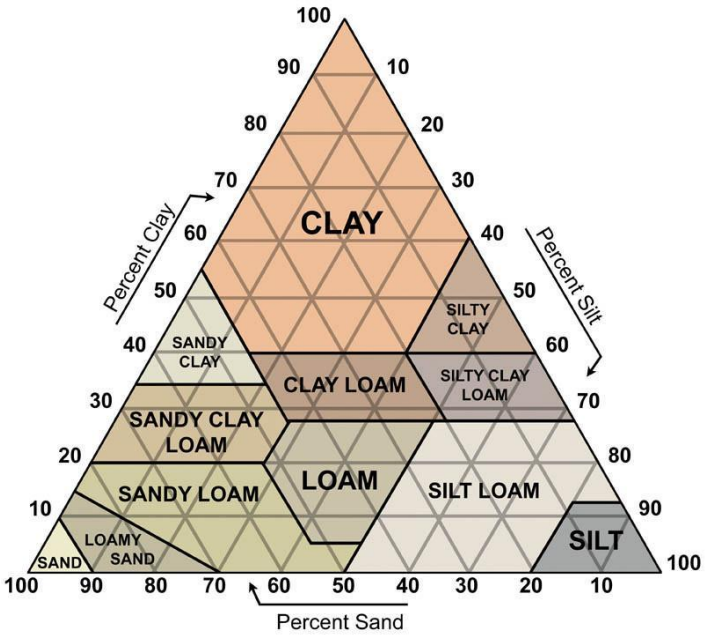
All these organisms form the soil food web:



SOIL COMPOSITION

Soil is made of water (≈25%), air (≈25%), mineral fraction (≈45%) and organic matter (≈5%)

> 'Mineral fraction' indicates the minerals that are present in your soil. They are usually a mixture of clay, sand and silt. Your soil might be predominantly clay or sandy, for example. This is called soil texture (what your soil is made of).



You can find out what your soil is made of with the bottle test (leave a few handfuls of soil in a jar with water for 48 hours and look at the layers) or the 'ribbon test' – see separate handout.

The way in which your soil particles aggregate together is called soil structure. In a way, this is more important to your gardening than the texture of your soil, and if you have clay soil, don't despair! Unless there are some serious waterlogging problems, clay can hold more water and more nutrients than sand or silt, and can retain heat for longer – all good things for your plants.

Compaction and erosion are two phenomena that damage and deplete the soil, by either depriving it of air and water, or progressively destroying the 'O horizon' and the rhizosphere of the soil. Using good compost (organic matter) on a regular basis can help to avert and / or improve the soil in both situations.

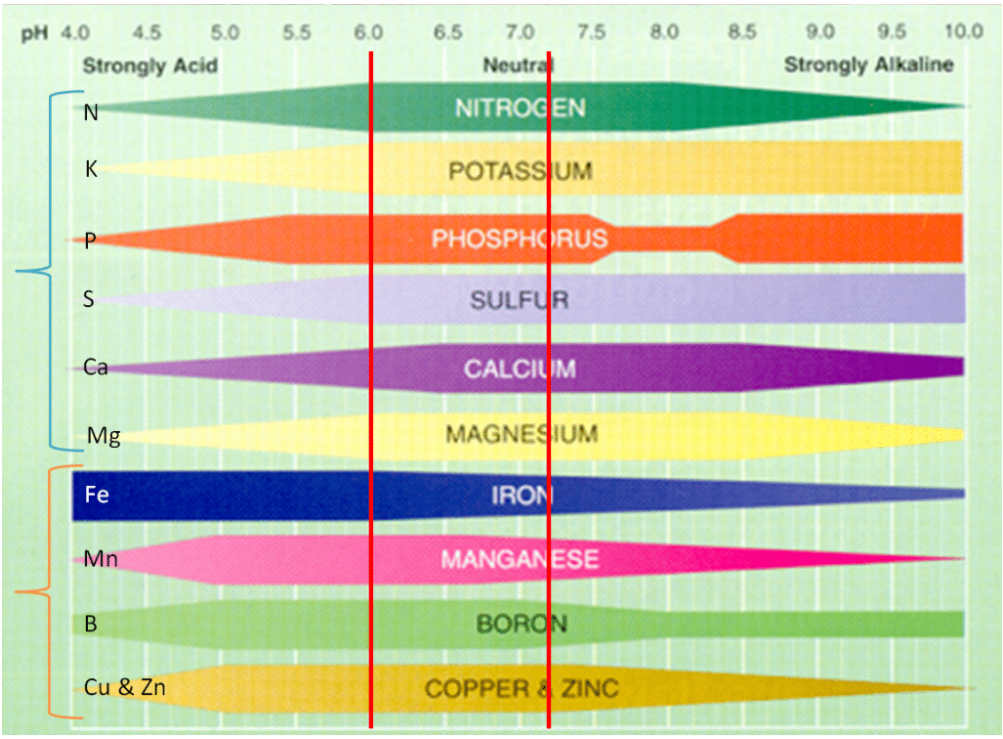
Soil pH

Soil pH is a measure of the acidity or alkalinity of a soil sample. It normally falls between 3 (acidic) and 10 (alkaline), with 7 being neutral. To put in in very simple terms, the value depends on whether the presence of hydronium ions (H+) is high or low: pH stands for 'potential hydronium ions', sometimes simplified to 'potential hydrogen'.

Soil pH affects many chemical processes, most notably nutrient availability in the soil (see table below). The optimum pH for most plants is between 5.5 and 7.5 with many perennials preferring slightly more acidic soils and most annuals preferring a neutral pH.

Soil pH depends on the parent material of the soil, but there are some factors that can influence soil pH:

- In warm and humid environments soil becomes more acidic over time as the products of weathering and erosions are progressively leached
- Rainfall raises the acidity of the soil, due to CO2 in the atmosphere and the consequent leeching of substances in the soil
- Acidic rain due to high CO2 emissions makes the soil more acidic
- The weathering of, or artificial addition of, certain minerals (silicate, aluminosilicate and carbonate) can raise the alkalinity of soil, e.g. the addition of limestone
- The regular use of Organic Matter (OM, or compost) can buffer the pH towards neutrality



FEEDING THE SOIL

Nature has a way of feeding the soil year after year, in what could be seen as a way of mulching the soil (applying a layer of protective and possibly nutritious substance to the surface of the soil). If left undisturbed, over time bacteria dominated environment (fields and grasslands) tend to become fungi dominated (woodlands and forests).

In a process of biomimicry (imitating nature), we can also protect and feed our soils with a choice of mulching agents, such as:

- Black polythene sheets
- Old carpets (wool only)
- Cardboard
- Biodegradable mulch film
- Leaves and grass clippings
- Wood or bark chips
- Straw or hay
- Green manures (living mulches)
- Compost

Remember that anything organic will also feed the soil, while inorganic materials will only ‘protect’ the soil.

NO DIG HORTICULTURE

Using compost as a form of mulch is closely aligned with a no-dig approach to horticulture, where again we imitate nature by feeding the surface of the soil, rather than ‘digging in’ the compost, with no tilling or ploughing either.

Some of the pioneers of a no dig (or ‘no-work’) approach are W.E. Shewell Cooper (1900 – 1982), Masanobu Fukuoka (1913 – 2008), Ruth Stout (1884 – 1980), Charles Dowding (no dig since 1982)

There are many advantages in switching to a no dig approach, such as:

- Your back is happier
- Ease of second or third cropping – intersowing / successional sowing / continuous cropping – no bed preparation needed
- Your soil health is better, there is no disturbance to its life and its ecosystems

- Plants root more easily and are stronger
- There are fewer weeds in your beds
- Less carbon goes into the atmosphere

Simply spread a 3–5 cm (1–2 in) layer of compost once a year (usually in early winter) over your beds
A larger amount of compost is needed in year one: 7–15 cm (3–6 in)

- You don't need to follow a traditional 4-year rotation plan, but do try and alternate / vary the crops you plant
- Weed little and often, and catch the weeds when they are very small, by hand-weeding or with a hoe
- Take care of your paths and use organic mulches if you can – this will feed the roots of the plants on the beds

How to get started:

Old dug bed:

- Stop digging and add compost

New bed with annual weeds:

- Create a layer of cardboard (remove all the tape first) bigger than the area you want to use and add a thick layer of compost. Hoe / hand-weed any weeds that might germinate from your compost

New bed with perennial weeds:

- Create a thick layer of cardboard (remove all the tape first) bigger than the area you want to use and add a thick layer of compost. 'Decapitate' all the weeds that might push through the cardboard and appear. This will exhaust them over time as they won't be able to photosynthesise

New bed with woody perennial weeds:

- Dig around the root and with a spade cut through the biggest roots. Then fill the hole with soil, add a thick layer of cardboard and a thick layer of compost. 'Decapitate' all the weeds that might push through the cardboard and appear. This will exhaust them over time as they won't be able to photosynthesise