

Soil structure: an introduction

Composition of soil

Soil is a mixture of solid particles surrounded by water with pockets of trapped air. The solid particles may be inorganic, organic or a mixture of both.

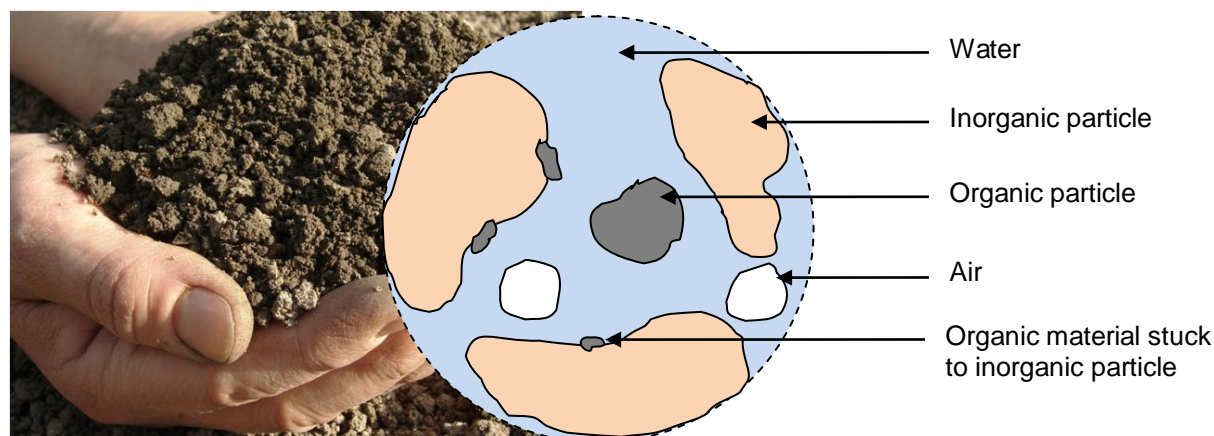


Figure Soil is a heterogeneous mixture.

Inorganic particles in soil

Inorganic particles, often called mineral particles, are formed by the break-up of much larger rocks by physical, chemical and biological weathering. This process has happened over millions of years.

They are three main types of inorganic particles. They differ in their size and chemical composition.

Type	Diameter (mm)	Chemical composition
Sand	0.05 – 2.0	Mostly quartz (silicon dioxide, SiO_2); some limestone, granite and shale
Silt	0.002 – 0.05	Mainly quartz with fine organic material
Clay	less than 0.002	Silicates and metal oxides/hydroxides, e.g. iron and manganese

Different types of soil contain different proportions of these three types of particles.

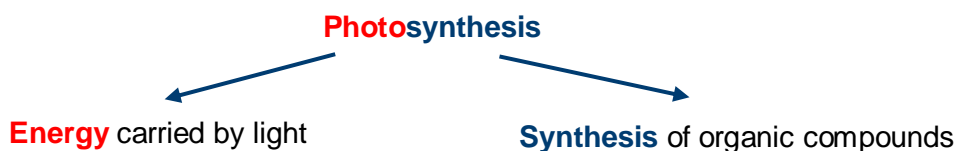
Organic particles

Organic particles consist of material found in the ground that was formed by the decay of organisms such as plant and animals. Decay happens at the end of every food chain.

This material (often called organic material) is a mixture of organic compounds. Organic compounds are made from atoms of the elements carbon and hydrogen. These are called hydrocarbons. Some organic compounds are made from atoms of carbon, hydrogen and other elements, such as oxygen and nitrogen.

Food chains

Plants and some micro-organisms use energy from sunlight to make organic compounds from inorganic compounds. Photosynthesis is a key process. It can be summarised:



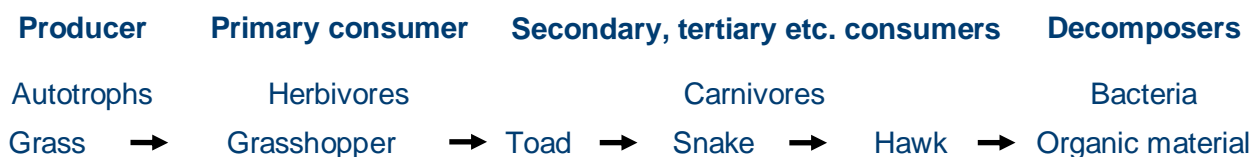
Photosynthesis transfers energy stored in sunlight to energy stored in plants and micro-organisms. Food chains show how this stored energy is transferred through an ecosystem.

See *Photosynthesis: an introduction* and related sheets for more information.

These plants and micro-organisms (producers) are food for animals to eat. Herbivores are animals that eat only plants. They are called primary consumers. Carnivores are meat eaters. They feed on herbivores and are called secondary consumers. Carnivores that feed on other carnivores are tertiary (or higher) consumers.

When producers and consumers die they decompose, with the help of bacteria which are called decomposers. This series of events is a food chain.

An example of a food chain:



See *Making compost* for more information.

The end of the food chain

Rotting and decaying organic waste can be used as compost. However, this is not the same type of compost that is used as a growing medium. Compost formed from rotting and decay is used to add organic matter to soil to improve the water-holding capacity of light soils and the drainage of heavier soils.

Finding out

How may the percentage of sand, silt and clay in soil be determined?

How well or how badly it drains is an important property of a growing medium.

- What happens to plants in soil that drains too quickly and soil that has very poor drainage?
- How is particle size measured in soil?
- Devise a way to compare how well different soils and composts drain.