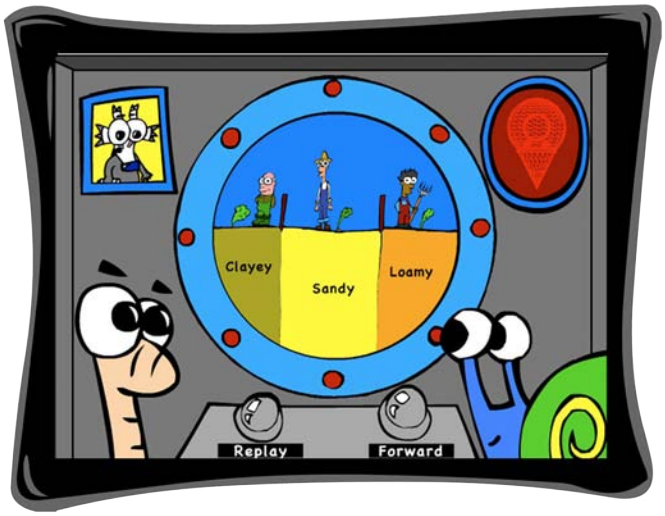
Topic 6: Properties of Soil

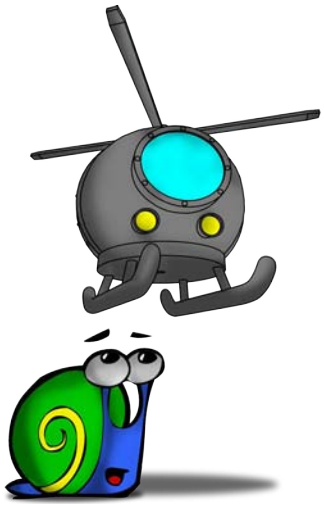
Introduction Soils have many different properties, including texture, structure or architecture, waterholding capacity and pH (whether the soils are acid or alkaline). These properties combine to make soils useful for a wide range of purposes. Soil properties govern what type of plants grow in a soil or what particular crops grow in a region. Here are some of the main soil properties that are important.



Texture When you take some moist soil in your hand and rub it between your fingers, you will feel the texture of the soil. In particular, you will be able to detect whether the soil feels rough or coarse, in which case it is probably a sandy soil, or whether it feels smooth which is the feel of a clayey soil. The amounts of sand, silt, clay and organic matter in a particular soil play a large part in the way that it behaves, how it can be managed and what it can be used to grow. Sandy soils are easy to cultivate but tend to hold little water and may be droughty, whereas clay soils are more difficult to cultivate, hold a lot of water and can become waterlogged, especially in winter.

With the agreement of your parents, why not take some of your garden soil, make sure it is moist and then rub it between your fingers. You can then experience the feel or texture of the soil and perhaps tell your parents whether it is sandy, clayey, or, something in between, loamy.

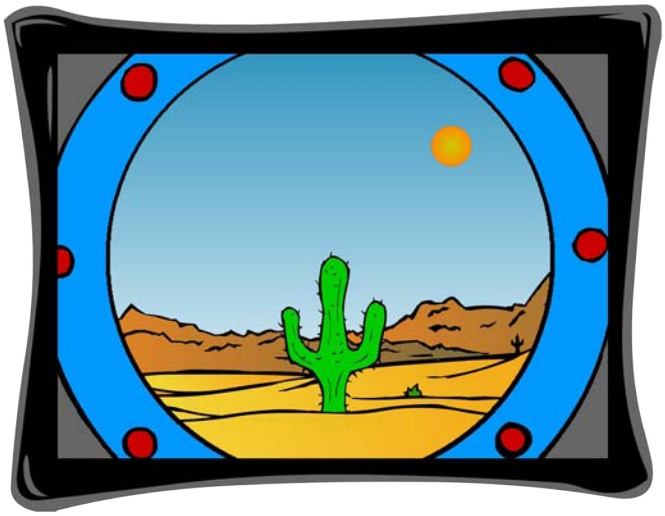
Soil Structure Just as houses and buildings have a structure or architecture, so also does the soil. The particles of sand and clay that make up the soil rarely occur as separate particles but are more or less loosely combined into aggregates. The type of structure in soil depends to a large extent on the texture and the amount of organic matter in the soil and the way the land is managed. The aggregates that make up the structure may be as small as a few millimetres, such as granules and crumbs, or as large as several centimetres, such columns and prisms. The granular or crumb structure is the one favoured by farmers and gardeners as it makes a better bed for the seeds they plant.



Did you know? ? www.soil-net.com

Unfortunately nature does not always provides soils with the best structure for growing things and farmers around the world have to make do with the soils that they have on their farm or modify their properties to suit the crops to be grown.

Waterholding Capacity All soils have the ability to hold water in their pores and on the surfaces of mineral grains and structural aggregates. This ability varies from soil to soil and relates closely to the texture of the soil. Sandy soils, while easy to cultivate, often suffer from the fact that they cannot hold onto much water and have a poor waterholding capacity. They are often known as thirsty soils. Clay soils by contrast have lots of small pores in which they can store water. This means that they always have some water for the plants that grow in them and thus have a good waterholding capacity.

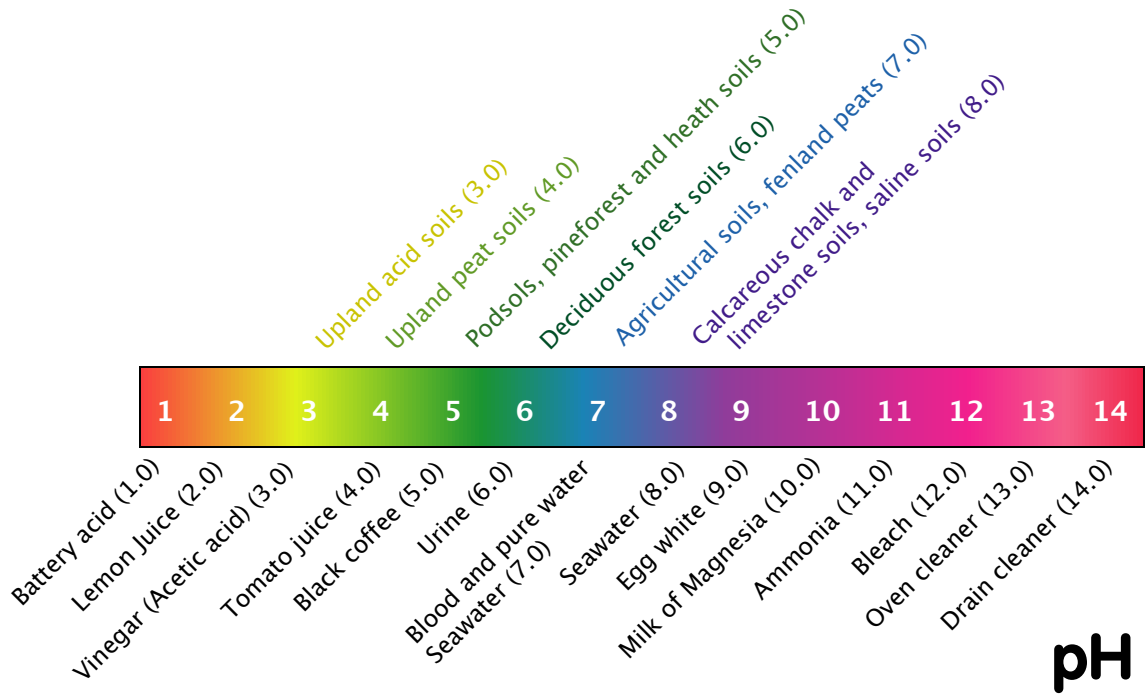


Fantastic Facts Wow! www.soil-net.com

Think of the sponge in your bath and how that can hold water. Well the soil is a bit like a sponge. When it rains the soil will absorb a lot of the rainwater, like a sponge does bathwater.

Acidity and Alkalinity The term pH is used to indicate the level of acidity or alkalinity of a soil. It is important to try to understand pH because it helps you decide what is the best plant or crop for a particular soil. The range of pH values in soils is usually between 3 and 8 though most world soils are between 5.5 and 7.5. Below pH 7 the soils are termed acid and above pH 7 alkaline. The pH of the soil is important in determining the type of vegetation that will grow in the soil and the type of organisms that will live there. For example some types of earthworm prefer acid conditions (low pH) while others prefer more alkaline conditions (higher pH).

Many gardeners and farmers buy a meter with which to measure pH. They can then be sure that the soil is at the right pH for the crops they wish to grow. It will also help them to decide whether that should add fertiliser to the soil. Do you know the pH of your home garden soil or the school garden soil?



pH Scale

Organic matter plays an important part in most topsoil properties, particularly structure and waterholding capacity. This is why gardeners are keen to add compost and farmers to add manure.

Also where there is organic matter, there will also be numerous organisms helping to convert it back to nutrients and these organisms help to create a crumb or granular structure, ideal for cultivation.

Partly because of the organic matter there and also the organisms, topsoil structures tend to be much smaller than subsoil structures. Subsoil structures, such as are found below about 20 cm of the surface, tend to be coarser and the structural blocks can be several centimetres in size.

Soil water is held in the pores in the soil with different degrees of strength. In sandy soils most of the water is not held very strongly and therefore they can be droughty, whereas in clay soils, because they have many very small pores, it is held much more strongly and water is retained for longer.