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WHAT IS SOIL?

Soil is the upper most layer of the earth's crust. It provides a foundation for a vast number of plants and serves as a storehouse of water and minerals needed for their growth. Soil also provides shelter to many animals that live on it. Without soil there would be no grass, no crop, no tree and no food for us and our animals. There are many places on the earth which have no soil. Many large areas of the Arctic and Antarctic continents are covered by ice and snow and have no soil for plants to grow. In this unit, we shall learn the composition of soil, texture of soil and soil profile.

Do You Know ?

Earthworms live in the soil. Their burrows act as tunnels allowing water to move quickly and provide pathways for roots to grow. They also decompose dead plants and animals matter adding to the humus. Their castings are valuable as fertilizers. The burrowing activity also helps to turn the soil and aerate it.

Formation of Soil

Long ago, there was no soil on the earth. It has taken thousands of years for soil to form. The formation of soil is an on going process. The entire surface of the earth was covered with rocks.

During the day, the sun warmed the surface and at night the surface cooled. Moreover, when it rained the rocks cooled suddenly. Due to repeated heating and cooling the rocky surface of the earth developed



Plants need soil to grow

cracks. As time went by, the rocks widened and the upper layer of the rocky surface began to break into pieces. Natural forces like rain and wind converted pieces of rock, into sand and clay. For millions of years the tremendous force of the flowing water has crushed rocks into smaller pieces. The sand on the seashore is formed by the waves, similarly, sand and pebbles on the river bank are formed by the force of flowing river water.

Certain other natural processes also contribute to the process of forming soil. In cold regions, water entered the rocks and forced exerting pressure to widen the cracks. Roots of trees growing on the rocks also pressure to widen the rocks.

Soil Profile

The colour of soil changes as we dig it deeper. The size of the bits of rocks changes too. The main layers of soil are top soil, sub soil and parent rock.

Top Soil

Humus and the smallest particles of the rock from upper layer of soil is called top soil. The presence of humus gives it a dark colour. It is the layer with the most nutrients for plants. The roots of most plants are confined to this layer. Humus makes the layer porous and fertile.

Sub Soil

This is the layer below the top soil. Sub soil does not have much humus and therefore it is lighter in colour than top soil. It is made up of rock bits and some nutrients such as minerals and iron oxides. Rain water collects in this layer.

Parent Rock

Below the subsoil, the parent rock exist. It consists small pieces of rocks with cracks and crevice. The particles of rocks found in soil come from weathered rock in the horizon. Below this layer, solid rock is called bed rock. It is non-porous. Rain water gathers over it to form the water table.

TYPES OF SOIL

- 1. Black soil :** This type of soil is found in Madhya Pradesh, Gujarat, Maharashtra and Andhra Pradesh. It is derived from the lava of volcanic eruptions and is rich in minerals containing iron and magnesium. It is suitable for growing cotton and sugarcane.
- 2. Alluvial soil :** This type of soil consists of a mixture of clay, sand and silt and loamy in texture. It is found in the plains of Uttar Pradesh, Bihar, Haryana, Punjab, Coastal Orissa and Andhra Pradesh where it is deposited by fast flowing rivers. It is very fertile and very good for wheat, rice and sugarcane.
- 3. Laterite soil :** It is found in humid tropical regions of India such as the western Ghats and parts of Orissa, Assam, Tamil Nadu and Andhra Pradesh. It is red in colour and good for crop of tea, coffee and coconut. It is also used to make bricks.

- Sandy soil :** It is grey to brown in colour. It is mainly found in Rajasthan and Gujarat. This soil is sandy and porous and cannot hold much water. Only some thorny bushes and cacti can grow naturally in such soil.
- Mountain soil :** This soil is found in the region of Himalayan and in North-East India. It has the highest humus content and it is also very fertile.

Component of Soil

- Water in the soil :** Sandy soil cannot hold much water because of the large spaces between the soil particles. On the other hand, clay soil holds a lot of water. Where there is a lot of clay in the soil, stagnant water collects above the soil whenever there is rain. This is known as water logging. In marshy areas, the soil is always water logged.

Rain water that seeps through the soil collects above the bedrock. This level of ground water is called the water table.

- Mineral salts in the soil :** Rocks are made up of minerals. Soil also contains minerals, such as, calcium, potassium. These are essential nutrients for growth of plants.
- Air in the soil :** Air is present in the spaces between soil particles. The roots of plants need air to breathe. It is also needed for soil organisms to survive and for dead and decaying matter to be converted to humus.
- Humus in the soil :** A variety of dead and decaying organisms form humus. Decaying leaves of the plants play a very important role to form humus. It makes the soil fertile by providing organic nutrients. It also provides food to earthworms and other animals living in the soil. It improves, the texture of the soil and prevents minerals being washed away by water.
- Living organisms in the soil :** Many organisms live in the soil such as earthworms, ants, centipedes, fungi and bacteria. They play an active role to make soil fertile. Earthworms are called farmer's friend. They improve the texture of soil. They loose the soil to allow the air and water enter into it. Bacteria and fungi in the soil feed on dead remains of plants and animals and help to form humus. Some bacteria convert nitrogen of the air used by plants. This is known as fixing of nitrogen.

SOIL IS A NATURAL RESOURCE

A natural resource is anything that comes from the earth and is used by us. Soil is our most important natural resource and it is useful in many ways :

We depend on the soil for clay which is the raw material used to make bricks, tiles, pottery and porcelain.

Plants give us food, shelter, medicines fuel, paper, oil, wood and many other things and plants grow in the soil.

Water seeps through soil and is stored as



Potter making pots



Making bricks

underground water. This water is used for drinking, washing, irrigation and in many other activities.

Do You Know ?

Worldwide soil erosion is estimated between 30 to 83 billion tonnes per year on farm lands. In Africa and Asia, soil is lost at a rate of 13 to 17 tonnes per acre compared to less than 0.1 tonne per acre for natural forests.

SOIL EROSION

The removal of top layer of land by water, wind or air is known as erosion. Plant roots firmly bind the soil. In the absence of plants, soil becomes loose. So it can be moved by wind and flowing water.

Erosion of soil is more severe in areas of little or no surface vegetation such as desert or bare lands. So, cutting of trees and deforestation should be prevented and efforts should be made to increase the green areas.



Soil erosion

Know the Keywords :

Soil : Soil is a natural resource of life.

Loam : A mixture of sand, silt and clay with humus in it, is called loam.

Soil erosion : The removal of land surface by water, wind or air is known as soil erosion.

Point to Remember

- Soil is the upper most layer of the earth's crust.
- Humus and the smallest particles of the rock from upper layer of soil is called top soil.
- Sub soil does not have much humus and therefore it is lighter in colour than top soil.
- A natural resource is anything that comes from the earth and is used by us.
- The removal of top layer of land by water, wind or air is known as erosion.

EXERCISE TIME

A. Answer the following questions :

1. How soil is formed ?
2. What is soil profile ?

3. Write the various type of soils.
4. What is water logging ?
5. What is soil erosion and what are the reasons of it ?
6. Why is soil regarded as our most important natural resource ?

B. Give reasons :

1. Water drains quickly from the sandy soil.
2. Sandy soil is not suitable for growing crops.
3. Chemical fertilizers damage soil.
4. Deep wells have clean water.
5. Humus is beneficial to plants.

C. Answer the following questions in one word :

1. Which retains more water, sandy soil or clay ?
2. Which layer of soil contains the largest rock pieces ?
3. Which is the best top soil for growing plants ?
4. Which soil is good for rice and sugarcane ?
5. Which soil is regarded as our most important natural resource ?
6. Which soil is used to make pots ?

D. Tick (✓) the correct option :

1. Humus and the smallest particles of a rock form the :
(i) top soil (ii) parent rock (iii) sub soil
2. Which kind of soil is best for growing cotton ?
(i) red soil (ii) mountain soil (iii) black soil
3. Which of these has the smallest size of particles ?
(i) silt (ii) sand (iii) gravel
4. Which soil has the highest humus content ?
(i) mountain soil (ii) laterite soil (iii) black soil



Creative Work

- **Construct a soil profile model using clay, pebbles, thermocol, sand etc. You could use a glass container to hold your model.**