

## Chapter 4 – Soil

Soil is seen in – Plants, Gardens, Mountains, Sea bed and Roads.

Soil is the uppermost layer of the earth.

- It supports plants which provide food to all the living things of the planet.
- It also supports many micro organisms like bacteria and worms.
- All life on earth depends on soil.

### **FORMATION OF SOIL**

- **When earth was formed there was only Sun, water, air and hard rocks.**
- The sun heated the rock, the rain made them cold and wind blew over them for thousands of years.
- Hence, rocks broke into smaller and smaller pieces.
- They were carried around by wind and water.
- They rubbed against each other till the tiny particles.
- Over a very long time these became a fine powder / loose material which we called soil.
- So Heat and cold, rain, wind and ice are some things that break up rocks which finally becomes soil.

### **COMPOSITION OF SOIL**

Soils contain four basic things:

- Soil particles
- Water
- Air
- Organic Matter ( This consists of Humus, Roots, Different types of living organisms )

### **HUMUS**

When living things die, their bodies decay. This decayed matter is called humus. It mixes in the soil, making it rich in minerals. Plants grow well in soil that has lots of humus; this kind of soil is called fertile.

## EARTHWORMS

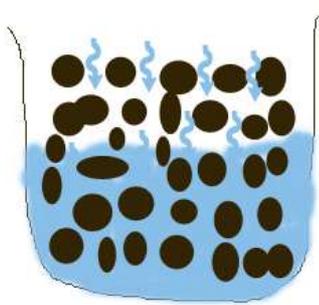
No Eyes / no legs / no teeth  
Have strong mouth muscles.

Dig soil, leaves which enter from its mouth and move through its digestive system. The things that they excrete from their body are called Castings. These castings make the soil fertile.

## SOIL PROFILE

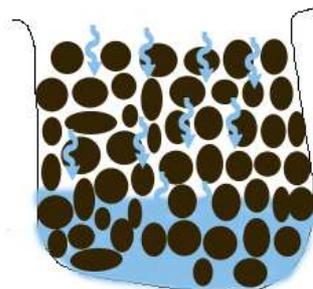
### **KINDS OF SOIL**

There are different kinds of soil. The difference in there texture, affects the water and air holding capacity of soil and hence decides the ease or difficulty in growing plants on it.



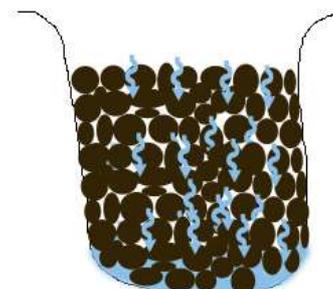
### **Sandy Soil**

- cannot hold air & water



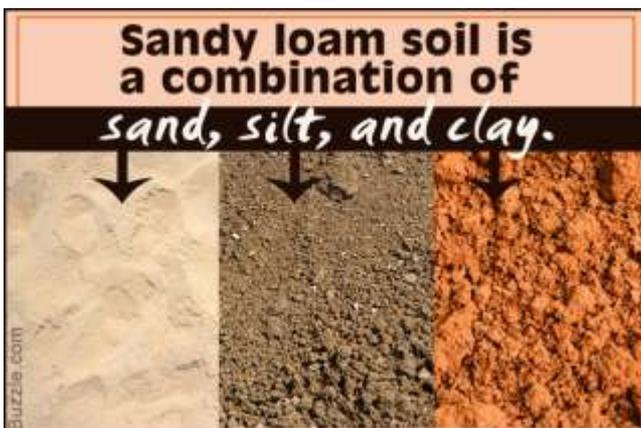
### **Silt Soil**

- Can hold more H<sub>2</sub>O than Sandy Soil, Fertile but gets blown away.



### **Clayey Soil**

- Brown, less space, less air but most water, water logged & Sticky



There are different kinds of soil:-

1. SANDY SOIL

- The particles in this soil are big in size, are rough and have lots of space between them.
- Hence this type of soil allows air into the soil but it is not able to hold water and nutrients.
- The roots of the plants also cannot hold on to this soil.
- This sandy soil is found on beaches near the sea and in the desert.
- However some plants are able to grow into this sandy top layer because they put their roots deep into the subsoil below. For e.g. Cactus.

2. SILT

- This soil is light and its particles are finer than sand.
- It is commonly found in flood plains.
- This soil is blown away in the storms and carried downstream in flood.
- It is fertile but erodes easily.

3. CLAYEY SOIL

- Clay is a sticky grey brown soil, which is heavy and dense.
- It consists of very fine particles. The spaces between the particles is very less due to which the roots of the plants cannot push through it and also no air can get into it from the surface.
- Hence this soil is not good for growing plants.
- However since it has the capacity of holding water and is sticky it is used by potters to make clay objects.
- Rice is a common plant that grows well in clayey water – logged fields.

4. LOAM = SAND + SILT + LITTLE CLAY

- This soil is the perfect soil for plants.
- It has a combination of sand and silt along with very little clay.
- It has enough large and small spaces for air and water to flow through it and has the right amount of clay which also allow the particles to stick together.
- It also holds humus on its surface due to which plants can grow well in it.
- Gardeners and farmers also add natural manure and fertilizers to this soil.

## **SOIL COLOUR**

- Soils vary in colour depending on the area where they are found and depending upon their composition.
- They could be red or yellow due to presence of iron and aluminium.
- Presence of humus makes the soil black.
- They could be greenish / grey blue.
- Presence of organic content gives many soil a brown colour etc.

## **ANIMALS IN THE SOIL**

Soil is the home for many animals.

- On rainy days earthworms that live under the ground come up. This is because their underground tunnels get filled with water and the amount of air becomes less. The earthworms dig up the soil, drag leaves into their tunnels and also excrete in these tunnels. These all things decay and form humus. This makes the soil fertile and that is why earthworms are called the “farmer’s friend”. ( The excreta of earthworm are called casts. The earthworms take in soil and organic matter and excrete out casts. )
- Soil can also contain germs like tetanus bacteria that can get into our body through cuts and wounds.
- Vegetables specially those which are eaten raw should be washed since their surface might have tiny worms or their eggs which would make us ill.

## **SOIL EROSION**

Soil erosion is the process of removal of the topmost layer of the soil due to - wind, rain, running water or by human activity like deforestation, over grazing, construction works etc.

- As a result of soil erosion the topmost layer which is otherwise fertile is lost and hence land loses its fertility.
- Heavy rains cause floods – this results in removal of top soil.
- Running water washes the soil from hills slopes – this makes slopes unfit for cultivation
- Wind blowing in desert and semi-desert regions blows away a lot of top soil with it – this causes a lose and plant tend to die away.
- Humans also cause soil erosion – this happens because of deforestation due to which the soil becomes loose and is easily carried away + construction activities / housing.
- Overgrazing of cattle also causes soil erosion.
- Farming on hill slopes is yet another a factor of soil erosion.

## **SOIL CONSERVATION**

The process of prevention and protection of soil from getting eroded is called soil conservation.

Soil erosion can be prevented in many ways: -

1. Afforestation – Afforestation means planting more and more trees so that the roots of the trees / plants hold on to the soil firmly.
2. Terrace farming – Terrace farming consist of building a series of steps like benches in hilly areas. Each step slows down the flow of water in the hills.

Terraces hold the water since they are flat and hence reduce the amount of soil washed away.

3. Building of Bund/Embankment on the sides of the river. This will prevent the water from overflowing on the land on the both the sides of the river. This will prevent floods and also soil erosion.
4. The land on which the farmers grow crops is prevented from soil erosion by planting cover crops. After harvesting and before planting the next crop the field becomes bare. This is when the wind can blow off the top soil. So to prevent the soil from getting blown away, farmers grow cover crops like grass and creepers. The roots of plants of these cover crops hold the soil particles together and prevent them being blown away. Trees and bushes are also grown along the boundary of the fields as it also acts as a protection against strong winds.
5. We should also not put harmful chemical substances / garbage / plastics as they can pollute the soil and make it less fertile.

## Percolation rate of water in Soil

The rate at which water moves through soil is called the percolation rate of water in the soil.

In the loamy soil, water is uniformly distributed. It also drains well. For its ability to retain water and drain well, loamy soil is best suited for growing crops.

Some of the common crops and their soil requirements are described below:

**Paddy:** paddy can be grown in all types of soils, except sandy soil. However, due to its high water-holding capacity, soil rich in clay is best suited for rice cultivation.

**Wheat:** Loamy soil and clayey loam are considered good for growing wheat.

**Lentils:** Lentils and pulses require soil with good water drainage. Thus, loamy soils are best suited for these crops.

**Cotton:** Cotton needs soil that drains well and can hold air. Sandy soil meets this requirement.

**Sugarcane:** Sugarcane can grow in different types of soils ranging from sandy soils to clayey loams.