CHAPTER 9 SOIL

MODULE 1 / 2

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What is soil ??

- The uppermost layer of the earth is known as soil.
- This layer consists of sand, mud, and rock particles.
- **What is humus??**
- Consists of dead and decayed plants and animal remains called humus.

Soil is a mixture of weathered rock particles and other materials.

SOIL COMPOSITION

- Weathered rock particles (main ingredient)
- Water (20-30%)
- Air (20-30%)
- Organic matter (5%)

Organic means, "coming from living organisms." Organic matter in soil comes from the remains and waste products of plants, animals, and other living organisms.

**Soils differ depending on what types of rock the rock particles came from.*

- Humus comes from decayed organic matter.
- Different soils are made up of different ingredients and different amounts of each ingredient.
- The black humus on the left contains much more plant material and water than the red soil on the right.

1) Importance of soil :-

i) Soil is an important natural resource.

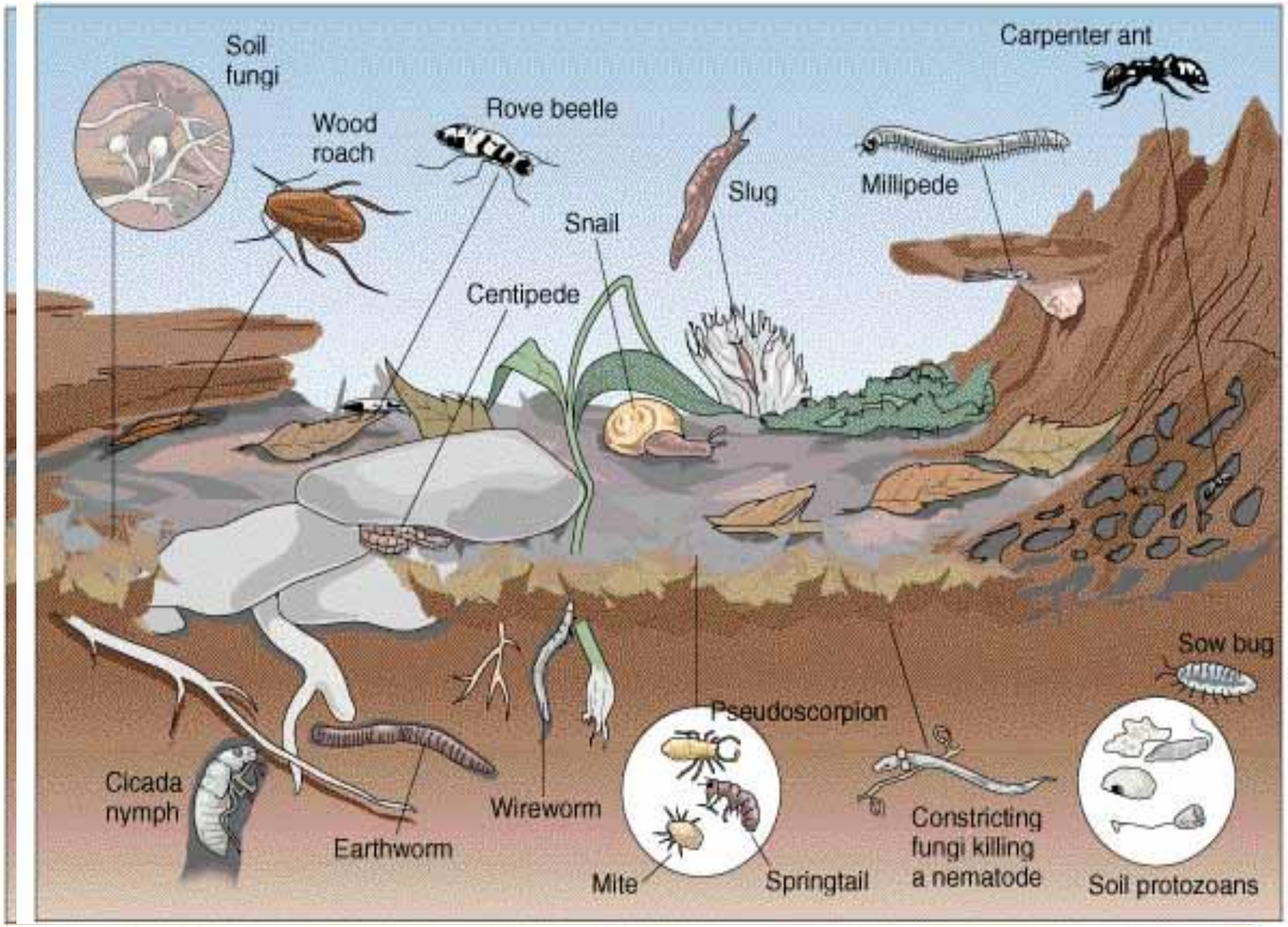
ii) Soil helps in the growth of plants by holding the roots and supplying water and nutrients.

iii) Soil is essential for agriculture which provides us food, clothing and shelter.

iv) Soil is a habitat for several organisms like ants, earth worms, snails, centipeds, millipeds, snakes, rats, beetles etc.




Living organisms found in the soil



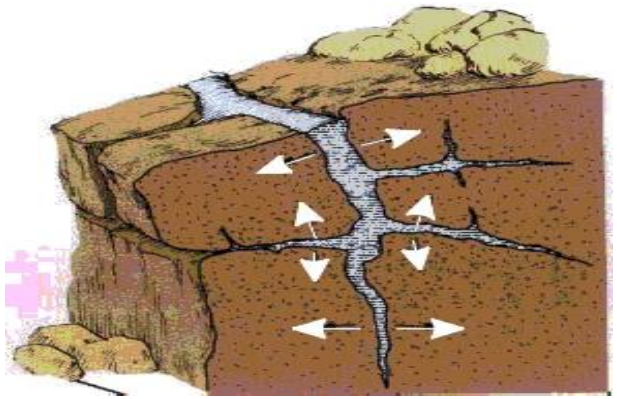
5) Formation of soil and types of soils :-

a) Formation of soil :-

Soil is formed formed by the breaking down of rocks into smaller particles by the action of wind, water and climate. This process is called weathering.

Soil is a mixture of rock particles and humus.



Soil formation stages

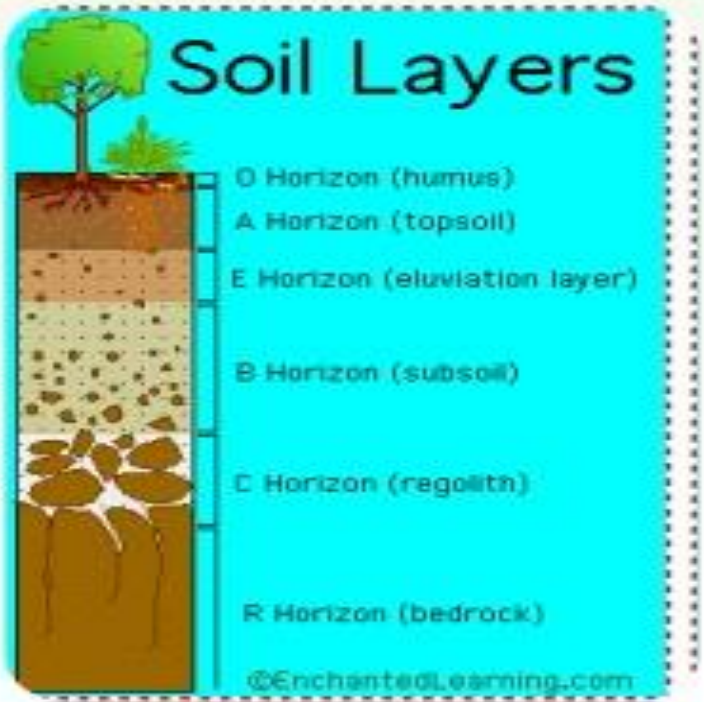
step 1: Weathering is the physical or chemical process.

Step 2: small rocks continue to undergo weathering, causing large pieces of parential rocks.

Step 3: minerals and salts seep deeper into the ground along with water.

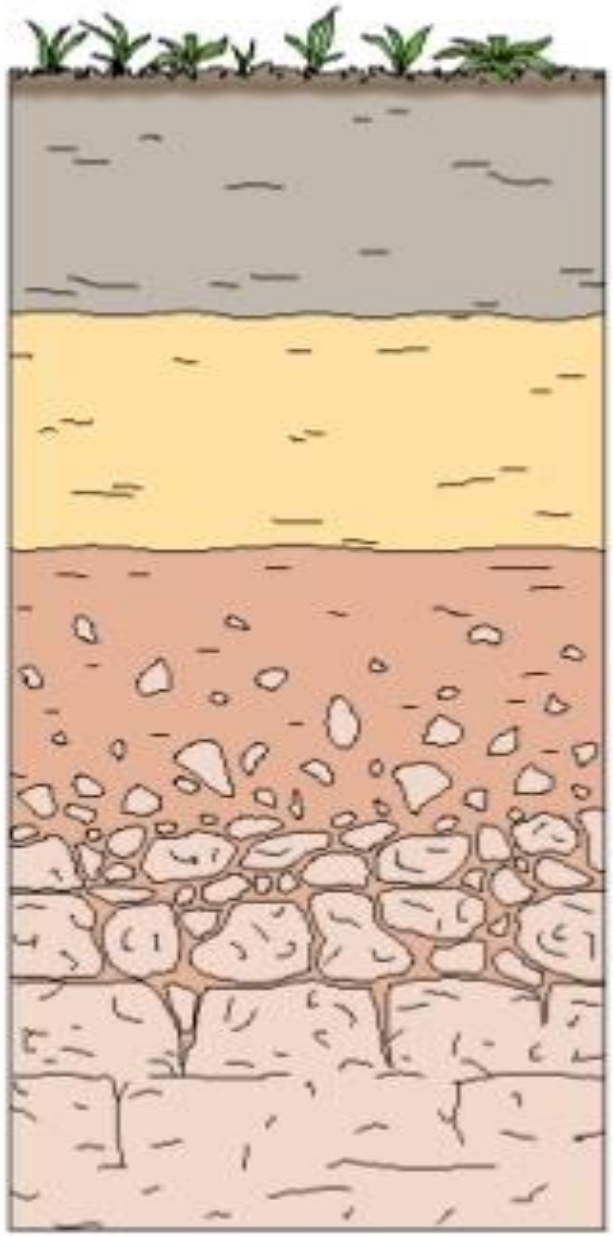
What is a Soil Profile?

- A **Soil Profile** is a vertical cross-section of layers of soil found in a given area. Below are **two examples** of soil profiles.



Soil horizons

- Soil develops in a series of horizontal layers called horizons.
- Deeper soil looks different than that on top.
- Further down you will find larger, less weathered rock particles and less organic matter.



Soil horizons

O Humus

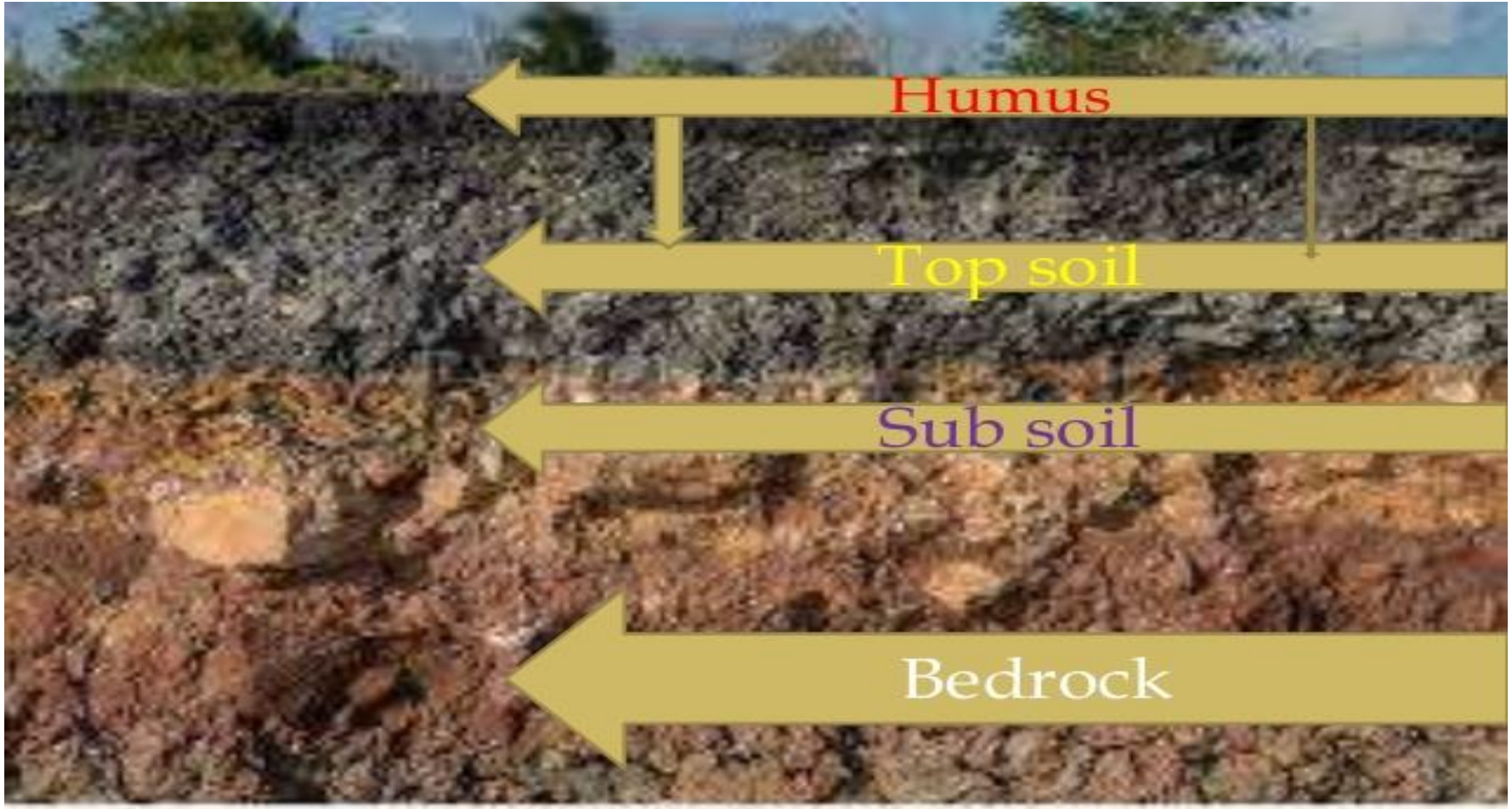
A Zone of leaching of soluble salts (top soil)

B Zone of accumulation of salts (subsoil)

C Weathered parent material (bedrock)

Gradational contact

Fresh parent material (bedrock)


Humus
Top soil
Sub soil
Bedrock
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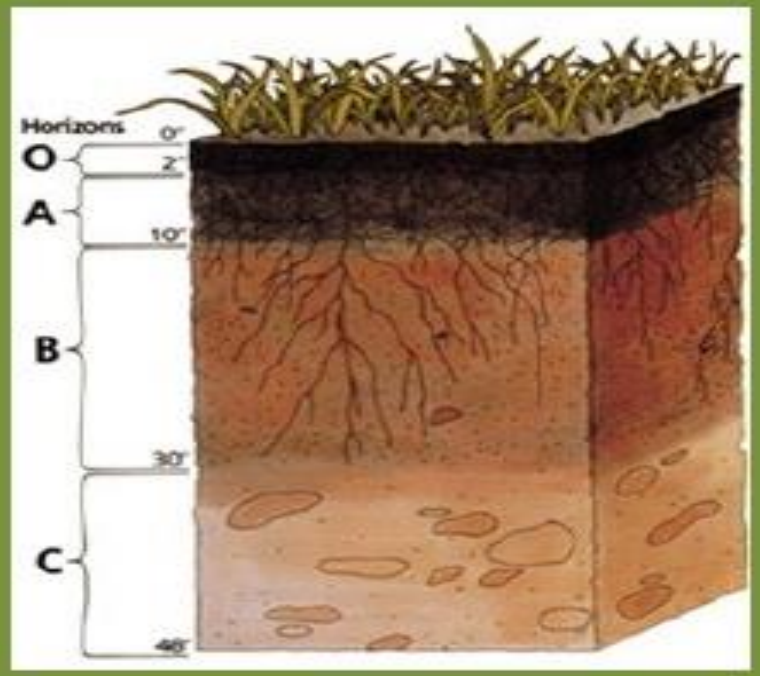
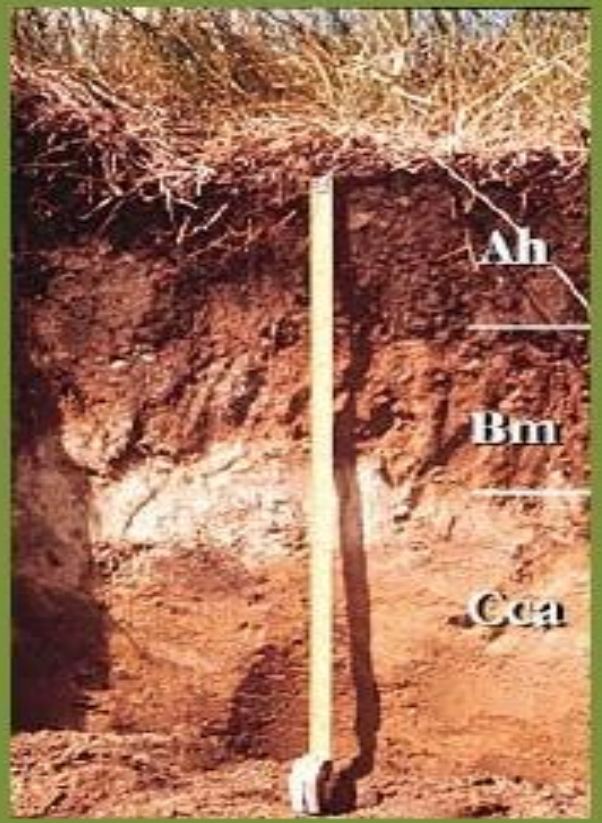
Main horizons are labeled A, B, C

- The A Horizon- The upper layer of soil commonly called topsoil. Often includes more organic matter (humus) and, therefore, is darker in color.



- The B Horizon- Just below the A horizon. It has little organic matter and is usually brownish or reddish in color. Contains clay and minerals that wash down from above.



- The C Horizon- The deepest layer of soil. It contains the largest and least-weathered rock particles. Typically they are light yellowish-brown.

3) Layers of soil :-

Activity :-

Take a glass tumbler three quarters filled with water. Add a handful of soil in a glass tumbler. Stir it well with a glass rod and leave it undisturbed for some time. We can see different layers of particles of different sizes.

The rotting dead plant and animal remains at the top is humus. Below it are layers of clay, sand and gravel.

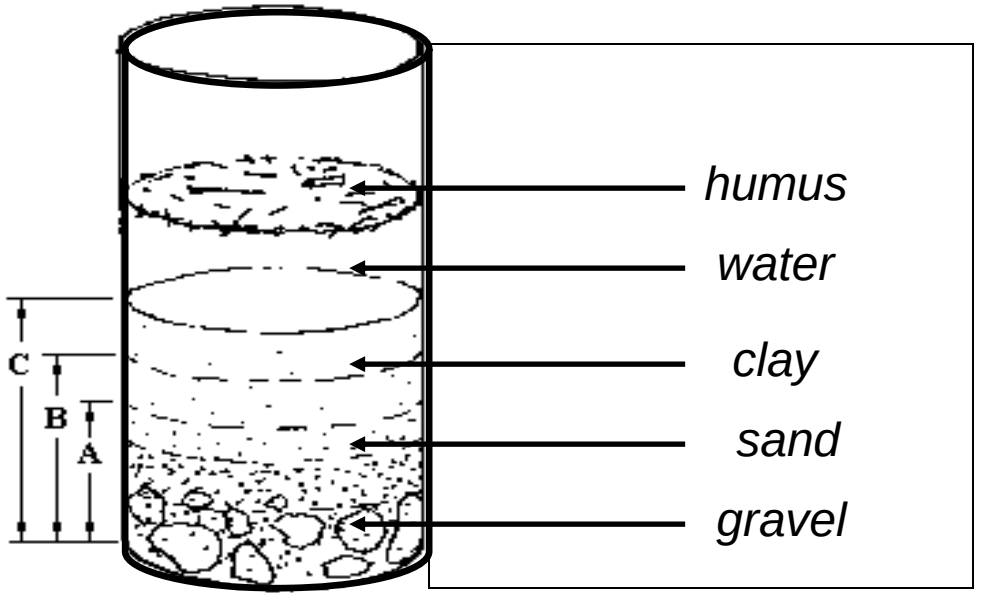


Figure 1 - Test for the composition of the soil.
(The sizes are in mm)

TYPES OF SOIL

Types of Soil

The kind of soil that forms in an area depends on:

- The kind of rock in the area
- The area's climate (overall weather pattern)
- The landforms in the area (mountains, valleys)
- The plant cover in the area
- The animals and other organisms in the area
- Time

**The composition of the soil determines what you can grow in it, what you can build on it and what happens to the rainwater that falls on it.*

b) Types of soil :-

There are three main types of soil. They are sandy soil, clayey soil and loamy soil.

i) **Sandy soil** :- In sandy soil the particles are large in size. They have more space between the particles filled with air. They do not retain water and are light and dry.

ii) **Clayey soil** :- In clayey soil the particles are smaller. They have less space between the particles and has less air. They retain more water and are heavy and wet.

iii) **Loamy soil** :- In loamy soil the particle size is between those of sand and clay. It contains humus and has the right water holding capacity. So it is the best soil for the growth of plants.

Sandy soil

Loamy soil

Clayey soil

Sandy soil :

- Sand soils are often dry, nutrient deficient and fast-draining. They have little ability to transport water from deeper layers through capillary transport.
- tillage of sandy soils in the spring should be kept to a minimum in order to retain moisture in the seedbed.
- meaning of tillage :the preparation of land for growing crops. the preparation of land for growing crops.

Particles size of construction

Particles	Diameter
Clay	Less than 0.002
Slit	0.002 – 0.05
Sand	0.05 – 2.00
Fine bebbles	2.00 – 5.00
Medium pebbles	5.00 – 20.00
Coarse pebbles	20.00 - 75.00

Clayey soil

- **Clay** is a fine-grained natural rock or soil material that combines one or more clay minerals with traces of metal
- variable amounts of water trapped in the mineral structure. Depending on the content of the soil, clay can appear in various colours, from white to dull gray or brown to a deep orange-red.

Loamy soil

- **Loam** is soil composed mostly of sand and a smaller amount of clay.

- Use in farming !!
- Loam is considered ideal for gardening and agricultural uses because it retains nutrients well and retains water while still allowing excess water to drain away

Pictures of 1.sandy soil , 2.clayey soil , 3.loamy soil.


Thank you