

SOIL

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Soil is the upper most layer of earth crust.

➤ COMPOSITION OF SOIL

Mineral Particles : Soil contains mainly three types of particles : Gravel, sand and clay. These particles determine the texture as well as type of the soil.

Inorganic Substances : Soil contains nitrates, sulphates, phosphates and carbonates of potassium, magnesium, sodium and iron. These salts are derived from the parent rock from which the soil is formed.

Organic substances (Humus) : Organic substances are added to the soil by the activities of plants and animals. Their death and decomposition add organic material to the soil. The completely decomposed product of plants and animals is called humus. It makes the soil fertile and improves its water holding capacity. It also encourages the growth of useful microbes in the soil.

Water : All types of soils generally contain water in the spaces present between the soil particles. Water is needed for plant growth. The type of soil

determines its water holding capacity or the amount of water contained in that type of soil.

Air : Air is also present in the soil in the spaces between the soil particles. It is needed for respiration of plants as well as for other living organisms in the soil.

➤ SOIL PROFILE

A side view of the vertical section cut through the soil to the underlying solid through the soil to the underlying solid rocks shows a soil profile (fig.). Most of the soil profiles consist of three layers which are called horizons. These horizons are lettered as A, B and C, the details of which are given below :

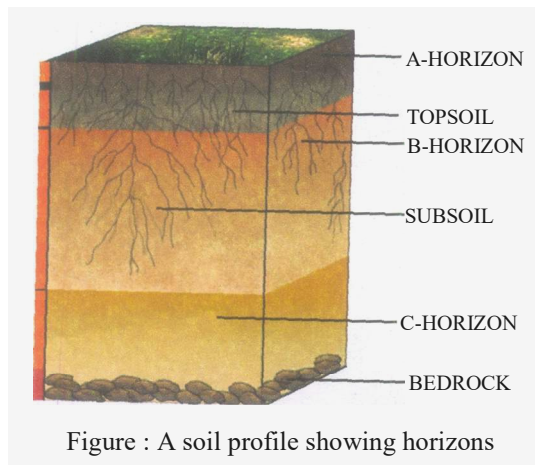


Figure : A soil profile showing horizons

◆ A-Horizon :

It is the uppermost layer and is usually the darkest in colour. It contains a lot of humus. Humus makes the soil fertile. Many living microorganisms are also seen in this layer. The soil here is porous, soft and has more water holding capacity than the other layers. The roots of many plants absorb their food from this layer. This layer of soil is also known as the topsoil.

◆ **B-Horizon :**

It lies under the layer of topsoil and is comparatively harder and more compact. This is also called the subsoil. It is lighter in colour and is often grey or red. It contains more sand and also some stones. Only a few plants or trees have roots long enough to reach the subsoil. Subsoil is not suitable for plant growth as it contains very little organic matter.

◆ **C-Horizon :**

It is the lowermost part of the soil and lies beneath the subsoil. It is made of stones and rocks. It contains no organic matter. However, minerals are found in this layer. Beneath this layer lies solid rock called bedrock.

➤ **SOIL AS A NATURAL RESOURCE**

Soil is the most important natural resource available to man. It is considered a valuable resource because of the following reasons :

◆ **A Base for Growing Crops :**

It is the base on which all plants grow. All plants get anchorage, minerals, water and air from the soil.

◆ **Storehouse of Minerals :**

A large number of minerals are present in the soil. These minerals are extracted and made use of in a large number of industries. Some of the common minerals found in the soil are **saltpetre, rocksalt, gypsum, bauxite, haematite** and **calcite**.

◆ **Allows Activities that are a source of employment :**

Soil is used for various purposes. It is used for the construction of buildings, roads, bridges, industries, dams, etc. It is also used for cultivation of crops. All these activities give employment to thousands of people.

◆ **Soil as a Raw Material :**

Soil is used as a raw material for making bricks, mortar, pottery and other materials. It is also used in building huts and sheds.

◆ **Habitat for Microorganisms :**

Soil makes a very good natural habitat for various microorganisms. These microorganisms form humus and make the soil fertile.

Among the animals living in the soil are insects, while ants, grasshoppers, centipedes, millipedes, scorpions, beetles, earthworms and sandworms. Big animals like moles, rats and rabbits build their homes in the soil. Earthworm is popularly known as the **farmer's friend** or as **nature's ploughman** because of its activities in the soil. It makes burrows into the soil, thus mixing the soil, well, and its excreta called **wormcast** enriches the soil with nitrogen.

◆ **Water storage :**

Rainwater percolates through the soil and accumulates above bedrock to form the water table. This water is pumped out by us for domestic or agricultural uses.

➤ **SOIL EROSION**

Process of carrying away of topsoil by natural forces like water and wind is called soil erosion.

◆ **Causes of soil Erosion :**

- Large scale cutting of trees (deforestation)
- Overgrazing by animals in forest.
- Improper farming practices.
- Heavy rains or floods.
- Forest fires.

◆ **Prevention of soil Erosion :**

- Grow more trees on a large scale (afforestation)
- Flood control.
- Allow restricted animal grazing.
- Follow terrace farming.
- Construct bunds.



SOIL POLLUTION

The contamination of soil with excess use of fertilizers, insecticides, herbicides, weedicides etc., and dumping of industrial waste, sewage and garbage is called soil **pollution**. Any substance which lowers the fertility of the soil is a **soil pollutant**.

◆ Causes of soil pollution :

- Excessive use of chemical fertilisers and pesticides.
- Dumping of garbage and sewage waste in the soil.
- Chemical wastes from industries, mines, and factories, etc.
- Waste materials like plastics and metals.

◆ Preventing soil Pollution :

- Dispose off sewage properly.
- Recycle waste.
- Use organic manure or vermicompost.
- Treat industrial effluents before discharge.



TYPES OF SOIL

◆ Sandy soil :

This contains more than 60 per cent sand along with some clay. The water holding capacity of sandy soil is very poor. There is a lot of air present in this type of soil. This type of soil is not suited for the growth of plants as it does not retain water of humus in it and is poor in nutrients. Usually, gram, barley, jowar and maize are grown in sandy soils as rainfed crops.

◆ Clayey Soil :

It consists mostly of clay particles, the sand particles being far less in proportion. Clayey soil is very sticky and so tilling is difficult. It is usually used for making pots and toys.



Figure : Earthen pot made of clay

This soil has very good water holding capacity. It is badly aerated and is easily water logged. However, clayey soil is rich in minerals which make it good for the growth of plants. This type of soil is good for crops like paddy which required a lot of water.

◆ Loamy Soil :

It consists of a good mixture of sand, clay and humus. It has good water holding capacity. It has sufficient aeration. Plants get sufficient mineral salts from this soil. Therefore, loamy soil is the best soil for growing plants. Crops like wheat, barley, mustard, pulses, cotton, fruits and vegetables can be profitably grown in loamy soils.

EXERCISE # 1

A. Single Choice Type Questions

- Q.1** The best soil for healthy growth of plant is -
(A) sandy (B) clayey
(C) loamy (D) all
- Q.2** Loam is a mixture of -
(A) sand and clay (B) sand and slit
(C) clay and slit (D) clay and gravel
- Q.3** Soils differ according to their -
(A) colour (B) texture
(C) aeration (D) all
- Q.4** Which of the following is an agent of weathering ?
(A) water (B) plant roots
(C) glaciers (D) all
- Q.5** Which of the following is rich in humus ?
(A) topsoil (B) subsoil
(C) bedrock (D) parent rock
- Q.6** A soil can hold very little water is -
(A) clayey (B) loamy
(C) sandy (D) parent rock
- Q.7** The water holding capacity is highest in -
(A) sandy soil
(B) loamy soil
(C) clayey soil
(D) mixture of sandy and loamy soil
- Q.8** Rock particles of soil is -
(A) gravel (B) sand
(C) clay (D) loam
- Q.9** Large scale of planting of trees is called -
(A) afforestation (B) deforestation
(C) soil erosion (D) soil pollution
- Q.10** Suitability of a soil growing crops depends upon its -
(A) texture (B) type
(C) colour (D) all of these
- Q.11** Which of the following is an inexhaustible natural resource ?
(A) Air (B) Water
(C) Coal (D) None of these
- Q.12** Soil is composed of -
(A) mineral + water + air
(B) mineral + organic matter + air
(C) mineral + organic matter + air + water
(D) organic matter + water
- Q.13** Use of pesticides and fertilizers causes -
(A) soil pollution (B) air pollution
(C) both A & B (D) none of these
- Q.14** Primary source of energy in an ecosystem is -
(A) sugar stored in plants
(B) heat liberated during respiration
(C) solar energy
(D) heat liberated by fuel burning
- Q.15** Growth of root in the soil is -
(A) Geotropism (B) Phototropism
(C) Chemotropism (D) None
- Q.16** Which component of soil gets deficient due to excess supply of water ?
(A) Nutrients (B) Air
(C) Minerals (D) Manure
- Q.17** Which of the following decompose the organic matter to produce manure ?
(A) Protozoa (B) Bacteria & Fungi
(C) Only Bacteria (D) Only Fungi

B. Fill in the blank

- Q.18** Loamy soil is in colour.
- Q.19** No humus is present in horizon.
- Q.20** Wheat and rice grow best in soil.
- Q.21** soil is poorly aerated with high water property.
- Q.22** is the finest of all soil particles.

EXERCISE # 2

A. Very Short Answer Types Questions

- Q.1** Name any five living organisms found in soil.
- Q.2** Name the three layers of soil.
- Q.3** What does soil consists by bedrock ?
- Q.4** Write the name of three layers of soil profile in terms of horizons.
- Q.5** Name any five living organisms found in soil.
- Q.6** What name is given to the removal of topsoil by wind and water ?

B. Short Answer Types Questions

- Q.7** What is sandy soil ? Give any two properties of sandy soil.
- Q.8** name the most fertile soil for growing plant. Why is it so ?
- Q.9** How can you prevent soil erosion ? Name four steps only.
- Q.10** How is soil polluted ?
- Q.11** Name four common minerals found in the soil.
- Q.12** What are the agents that bring about soil erosion ?
- Q.13** Why is earthworm called a farmer's friend ?
- Q.14** What is meant by afforestation ?
- Q.15** What is terrace farming and how is it useful ?

C. Long Answer Types Questions

- Q.16** Why is soil regarded as our most important natural resource ?
- Q.17** Describe soil profile in brief with a neat and labelled diagram.
- Q.18** State two differences between clayey soil and sandy soil.
- Q.19** Describe soil profile in brief with a neat, labelled diagram.
- Q.20** How is soil useful to us ?