

## Class – 7 Ch: 8: Soil

### E. Answer the following in brief.

1. Why is the uppermost layer of soil generally dark in colour?

Ans: The uppermost layer of soil is dark in colour as it has humus. Humus is made up of dead and decaying remains of plants and animals. It is rich in nutrients and improves the fertility of soil. It improves the texture and the water-holding ability of soil. It encourages the growth of useful microorganisms in soil.

2. Discuss various soil types and the crops that can be grown in them.

Ans: The various soil types and the crops grown in them are:

- i) Alluvial soil is found near streams and rivers. It is rich in humus, nutrients and has good water-holding capacity. It is used to cultivate crops such as paddy and jute.
- ii) Black soil is dark in colour and rich in nutrients such as calcium, magnesium and potassium. It does not hold too much water. It is used to cultivate crops such as cotton, tobacco, chilly, oilseeds, jowar and ragi.
- iii) Red soil is rich in iron but has less humus and low water-holding capacity. It is used to cultivate various pulses, groundnut and castor seeds.
- iv) Sandy soil has few nutrients and poor water-holding capacity. However, in areas with sufficient rainfall, coconut and cashew trees can be grown in this soil.

3. Write any three effects of soil erosion.

Ans: The three effects of soil erosion are:

- i) Desertification: Once the fertile topsoil is lost by erosion, very few plants survive and the land becomes desert-like. The process by which vegetation and soil are lost and land turns into barren land or desert is called desertification. It is very difficult and often impossible to restore desertified land to a fertile state.
- ii) Loss of cultivable land: When the fertile topsoil is lost due to soil erosion, plants cannot grow well in the remaining soil. Hence, the size of cultivable land reduces.
- iii) Increase in floods: Erosion causes the land to lose its ability to retain water. This leads to flooding becoming more common.

4. List two causes of soil pollution.

Ans: Two causes of soil pollution are:

- i) The excessive use of chemicals such as fertilizers, pesticides and insecticides in agriculture
- ii) Improper disposal of solid wastes generated in homes, agricultural fields and various industries

5. Write any three methods of soil conservation.

Ans: The three methods of soil conservation are:

- i) Organic farming: Excessive use of pesticides and fertilizers should be avoided and natural manures and organic fertilizers should be used instead.
- ii) Proper disposal of solid waste: Harmful solid wastes generated in various industries should not be dumped on land. There should be proper treatment before disposal.
- iii) Proper treatment of industrial wastewater: Wastewater from industries (industrial effluents) should not be directly released into water bodies. Industrial effluents not only harm the water bodies and various organisms living in them, but the chemicals present in it enter the soil and pollute it.

## F. Answer the following in detail.

1. What is weathering? Describe any two types of weathering.

Ans: Weathering is the natural process of the breaking down of rocks into smaller particles by the action of wind, water, temperature changes, plants and animals.

Chemical weathering involves chemical reactions taking place between the material of the rock and rainwater. Rainwater becomes acidic when it dissolves acidic gases present in the atmosphere, such as carbon dioxide and sulphur dioxide. It falls to the ground as acid rain. This rainwater chemically reacts with minerals in rocks and gradually breaks down the rocks into pieces. Soil formed by chemical weathering is therefore different in chemical composition from the original rock.

Physical weathering involves the physical breakdown of rocks into particles by agents such as wind, water or change in temperature. It is also known as mechanical weathering as there is no change in the chemical composition of the rock. For example, the surfaces of rocks are warmed by sunlight during the day and become cool at night. This repeated warming and cooling cause unequal expansion and contraction of rocks due to which cracks are formed over time. Eventually, the rock is broken down into fine particles.

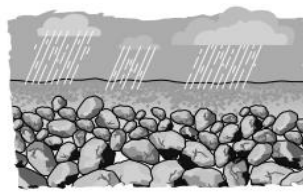
2. Explain how soil is formed with a labelled diagram.

Ans: Soil formation takes place in three main stages.

**Stage 1:** Parent rocks get broken down into smaller particles by the various agents of weathering.



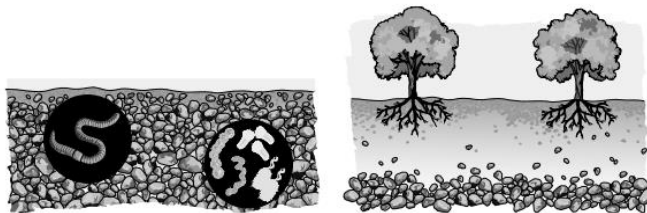
(a) Effect of sun



(b) Effect of rain

**Stage 2:** Weathering continues as rock pieces are further weathered into smaller particles. The remains of dead plants and animals present in the soil are decomposed by microorganisms to form humus. Humus makes the soil more fertile.

**Stage 3:** Minerals and salts from weathered rocks are dissolved by rainwater and slowly added to the soil, making it more fertile. This supplies plants with nutrients so that they can grow.



3. Draw a labelled diagram of a soil profile and explain various layers of soil.

Ans: The main horizons in a soil profile are:

**O horizon:** This is the top layer of soil. It is rich in nutrients and contains some partially decomposed organic matter.

**A horizon:** It is the uppermost layer of soil and is also called the topsoil. The layer is dark in colour, soft, porous, rich in humus, and has very fine or small soil particles. Humus makes this soil fertile. It also improves the texture of the soil and allows water and air to move in and out of the soil easily. Therefore, the topsoil supports the growth of plants as it has the nutrients, air and water required. It is also the habitat of many insects and small animals.

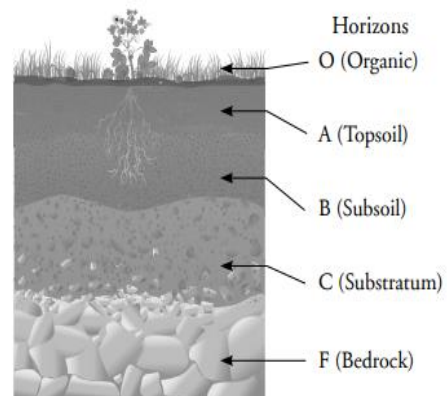
**B horizon:** This layer lies below the topsoil and is called subsoil. It is harder, more compact and richer in minerals than the topsoil. Subsoil is also lighter in colour and contains more sand and stones. Nutrients present in this layer can only be drawn by plants having roots long enough to reach this layer. This layer has very little humus and is not suitable for the growth of most plants.

**C horizon:** This layer lies below the subsoil. It is made up of partially weathered rocks with a lot of cracks and rock fragments. Further weathering over time may convert this layer into B and A horizons. Therefore, this layer is also referred to as parent material as it represents the first stage in soil formation. The roots of plants do not penetrate this layer.

**R horizon:** This is the lowermost layer of the soil profile and is called bedrock. It is made of hard rocks that provide material for the formation of C and B horizons. Bedrock is non-porous and does not allow water to seep through it.

4. What is soil composed of?

Ans: Soil is complex in nature and the major components present in the soil are parent material, water, air, minerals, humus and soil organisms.



- i. **Parent material:** This consists of rock particles of different sizes made up of gravel, sand, clay and silt.
  - Gravel:** These are small and coarse stones or rock fragments.
  - Sand:** These are coarse particles that are smaller than gravel.
  - Clay:** These are very fine particles.
  - Silt:** These are medium-sized particles that are larger than clay but smaller than sand.
- ii. **Water:** Water is retained in the spaces between soil particles. The ability of soil to absorb and retain water is called its water-holding capacity.
- iii. **Air:** The spaces between soil particles contain air. This air is used by the roots of plants and soil-dwelling organisms to stay alive.
- iv. **Minerals:** Sand and clay particles consist of minerals such as silica, quartz, feldspar, mica and oxides of calcium, magnesium, potassium and phosphorus. These minerals are derived from parent rocks. They are absorbed as solutions in water by the roots of plants and used for growth.
- v. **Humus:** Humus is made up of dead and decaying remains of plants and animals. It is rich in nutrients and improves the fertility of soil. It improves the texture and the waterholding ability of soil. It encourages the growth of useful microorganisms in soil.
- vi. **Soil organisms:** These microorganisms decompose organic matter into humus. Bacteria, fungi and other small animals such as millipedes, ants, earthworms and snails play an important role in maintaining the quality of soil.

5. What is soil erosion? Describe its causes and effects.

Ans: The gradual removal of the fertile topsoil by the action of running water and wind is called soil erosion.

Causes of soil erosion:

- i. Deforestation:** The large-scale cutting down of forest trees is called deforestation. Roots of trees hold the soil together and prevent it from getting exposed to wind and running water. With the removal of trees, soil becomes loose and gets eroded easily with moving winds and running water.
- ii. Overgrazing:** Grazing of the animals on the same land over and over again without allowing plants to grow back is called overgrazing. Due to overgrazing, the grass and plants covering the soil vanish exposing the soil. This exposed soil is easily carried away with the moving wind and running water.
- iii. Improper farming:** Improper farming methods such as not making proper embankments around the agricultural lands lead to soil erosion mainly in hilly areas. Effects of soil erosion:
- iv. Desertification:** Once the fertile topsoil is lost by erosion, very few plants survive and the land becomes desert-like. The process by which vegetation and soil are lost and land turns into barren land or desert is called desertification. It is very difficult and often impossible to restore desertified land to a fertile state.
- v. Loss of cultivable land:** As the fertile topsoil is lost as a result of soil erosion, plants cannot grow well in the remaining soil. Hence, the size of cultivable land reduces.
- vi. Increase in floods:** Erosion causes the land to lose its ability to retain water. This makes flooding more common.
- vii. Effects on waterbodies:** Soil that is eroded from land gets carried by rainwater runoff into rivers, streams, lakes and other waterbodies.