

JOB ROLE – GARDENER

Sector – Agriculture

(Qualification Pack Code: AGR/Q0801)

PPT's for Class XI



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UNIT 5: SOIL MANAGEMENT AND FIELD PREPARATION

Session 1: Soil and Its Properties

Content

Title	Slide No.
Session Objectives	04
Introduction	05
Importance of Soil	07
Soil Properties	08-15
Soils of India	16-20
Summary	21

Session Objectives

The student will be able to :

- Describe the soil and its importance.
- Describe soil particles.
- Explain the soil types.

Introduction

The word 'soil' is derived from the Latin word *solum*. Soil is formed from weathered material of parental rocks and contains minerals, organic matter, water and air in various proportions. These elements serve as nutrients to plants. Hence, soil serves as a medium for growing plants. Soil health is important for sustainable crop production, and existence of flora and fauna.

Soil

Definition: Soil may be defined as a dynamic natural body developed as a result of pedogenic processes that take place during and after the weathering of rocks, in which plants and other forms of life grow.

Soil genesis: Transformation of rocks into agricultural land is called 'soil formation' or 'soil genesis'. Weathered material of rocks further undergoes changes and results in the formation of agricultural land. It is a slow process. Five factors are responsible for soil genesis climate, parent material, topography, plants and animals, life and time.

Importance of Soil

Soil provides nutrients to plants for help in their growth. It provides support to growing plants by holding their roots. It holds moisture and water for a long time and serves as a habitat for many micro and macroorganisms. Soil also provides heat, air and water to growing organisms living in or over it. It is the most important natural resource of a country.

Soil Properties

Physical properties

Soil colour: The colours of the soil black, yellow, red and gray are due to the presence of organic matter minerals and colour of the parent rock. Soil colour is an indicator of organic matter content, soil fertility, soil reaction, drainage, aeration and the ecosystem living beneath it.

Porosity: These inter-particle spaces of soil are pores and carry air and water. The quantity and size of pores show porosity of the soil. Soil having more or large pores is called 'porous soil'. Such soils have good drainage and aeration. Soil with small but more pores shows better water-holding capacity.

Soil Properties

Physical properties

Soil texture: It refers to the size of soil particles that make the soil. Clay particles are the finest and are smaller than 0.002 mm in diameter. Loam particles are 0.002–0.02 mm in diameter. Silt particles have 0.02–2.0 mm diameter. Particles larger than 2 mm are sand.

Soil consistency: The ability of the soil to change the shape or moulding when wet is known as 'soil consistency'. It also ensures pulverising action by implements when dry or the resistance of soil particles to crushing.

Soil Properties

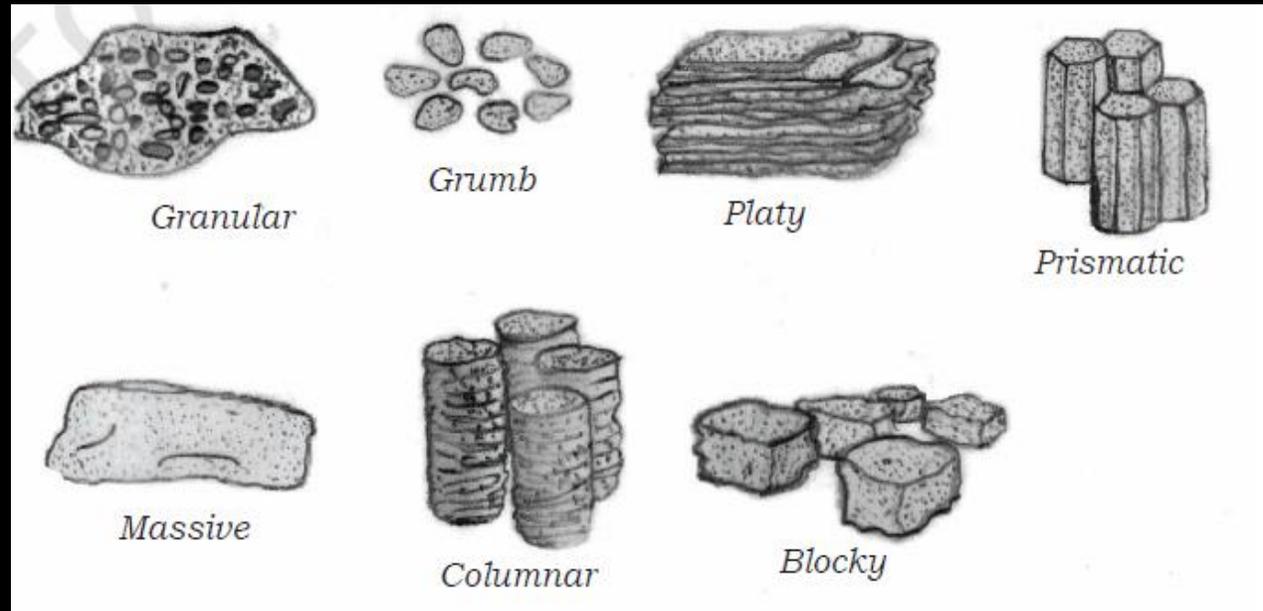
Physical properties

Soil density:

The density of soil is weight per unit volume and it can be shown in two ways — bulk density and particle density.

Soil structure: Soil structure refers to the way individual soil particles are arranged to make up the mass of soil .

1. Platy: Horizontally arranged particles are placed one above the other around a plane



Soil Properties

Physical properties

Soil structure:

- 2. Prism-like or prismatic:** Vertically arranged particles or aggregates around a vertical axis
- 3. Columnar:** These structures are similar to prismatic except slightly rounded vertical faces
- 4. Spheroidal or granular:** Particles arranged around a point with a curved or an irregular surface
- 5. Block-like or blocky:** Particles arranged around a point with a round or flat surface

Soil Properties

Physical properties

Soil temperature: Low as well as high soil temperatures are found harmful for crops and regulated by the Sun and it helps in the decomposition process within the soil. . The crops slow down their growth as the temperature falls below 9° C and ceases when it reaches 50° C. Microorganisms of the soil are very active at a range of 27° C to 32° C.

Soil Properties

Chemical properties

It is related with the ability of the soil to supply nutrients to plants and these properties govern soil fertility.

Soil pH: pH of soil shows potentiality of H^+ ion. It determines acidic or alkaline reaction of the soil. Maximum plant nutrients are available to the crops, when the pH ranges from 6.5 to 7.0. The pH of soil can be measured by soil pH metre, pH scale, etc. pH scale has a range from 0–14 pH.

Buffering capacity of soil: The capacity of soil that resists sudden change in the pH of soil is called buffering capacity of soil.

Soil Properties

Chemical properties

Soil colloids: These may be clay or humus. Various types of clay found in soil are known as inorganic colloids; while humus is 'organic colloid'. The soil colloids attract positively charged cations because they are negatively charged (anions).

Cation exchange capacity: It is the measure of the potential of a soil to hold nutrient cation, such as potassium (K^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), *etc.* for plant absorption. Highly fertile soils, containing high organic matter have more cation exchange capacity.

Soil Properties

Biological properties

The soil is inhabited by various types of small living organisms and microorganisms. These are crabs, snails, earthworms, mites, millipedes, centipedes, fungi, bacteria, actinomycetes, protozoa and nematodes.

They make channels and burrow inside the soil, and thus, increase aeration and enhance the percolation of water due to their activities.

Soils of India

There are different types of soil in India, which can be classified on the basis of their colour and characteristics.

Black soil

These soils are poor in nitrogen, phosphate and organic matter but rich in potash, calcium and magnesium. The pH of black soil is 7.0 to 8.5. Black soils are predominant in Maharashtra, Madhya Pradesh, western Andhra Pradesh, southern Tamil Nadu and northern Karnataka.



Soils of India

Red soil

These are porous, friable and neutral to acidic in nature. These soils are poor in nitrogen, phosphate, lime and humus. pH of red soil is more than 5. These are found in parts of Tamil Nadu, Karnataka, NE Andhra Pradesh, eastern parts of Madhya Pradesh, Bihar, West Bengal and Rajasthan.



Soils of India

Alluvial soil

These are productive soils which are formed due to the deposition of silt by the Ganga and Brahmaputra rivers due to meandering of the river course, a rich deposit of alluvial soil develops. These are suitable for the cultivation of vegetables, flowers and fruits. These soils are found in all States along the rivers.

Lateritic soil (laterite)

It is acidic character with pH of 5 to 6. Soils are porous and have low water holding capacity. Lateritic soils are deficient in nitrogen, phosphorus, potash, magnesium and lime. These are found in eastern Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh, Odisha, Assam and Ratnagiri district of Maharashtra.

Soils of India

Desert soil

These soils are sandy and found in low rainfall areas. These are alkaline soils with high pH value and are unproductive. These are rich in soluble salts and poor in nitrogen and organic matter content. These soils are found in semi-arid areas of Bihar and parts of Rajasthan.



Forest and hilly soil

Soils of higher and lower elevation found on hills. These are stony and infertile. The pH of such soil is 4.

Soils of India

Saline-alkaline soil: Soils show white incrustation of salts on the surface. Such soils are, generally, infertile and poor in drainage. These result from saline irrigation water, and over irrigation for long time, which raises the water table of the soil. These are rich in sodium content and are imporous.

Peat and marshy land

Soils are highly acidic in nature and black in colour. Excessive wetness of the soil, causing decay and degradation of dead vegetation, forms a layer of partially decomposed organic matter.

Summary

In this session you have learnt about the soil and its importance, soil particles and soil types in India.

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