

# **JOB ROLE – FLORICULTURIST (OPEN CULTIVATION)**

Sector – Agriculture

(Qualification Pack Code: AGR/Q0701)

PPT's for Class XI



PSS Central Institute of Vocational Education  
Shyamla Hills, Bhopal – 462 013 , Madhya Pradesh, India

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# **UNIT 4: FIELD PREPRATION AND CULTURAL OPERATIONS**

## **Session 1: Selection of Site for Cultivation of Ornamentals Crops**

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# Session Objectives

The student will be able to :

- Select site for cultivation of ornamental crops.
- Describe the soil and its importance.
- Describe soil particles.
- Explain the soil types in India.

# Introduction

Before taking flower crops in an open field situation, there are various tasks to be performed for the sustainability of land and other resources. One of these actions involves initial land preparation and various cultural operations, which should be done prior to sowing or transplanting of the plant material. The main purpose of land preparation is to provide necessary soil conditions and enable the plant escape biotic and abiotic stress. This will enhance the successful establishment of the crop and ensure quality produce.

# Selection of Site

Climate, soil and location are the prime natural components in choosing a site on which the future of flowers depends.

The location of the site determines its distance from the market, exposure of the Sun, nearness to the road, availability of irrigation water, topography, etc. The land with a gentle slope is more suitable for successful and profitable flower cultivation.

# Necessity for Selection of Site

Knowledge about the effect of climatic conditions and various types of soil on flower cultivation is important for successfully growing flower. Different flower crops differ widely in their soil and climatic requirements. Soil for open flower cultivation should be fertile and rich in organic matter, nearness to a soft water source and well-drained. Soil pH range should also be neutral or near to neutral.

# Optimum Conditions for the Cultivation of Flower Crops

Most of the commercial crops grow comfortably at a temperature from 15 to 30° C, such as rose, carnation, gerbera, gypsophila, statice, marigold, chrysanthemum, heliconia, bird of paradise, amaryllis and hippeastrum, and so on. Other ornamentals flower crops grow at or above 40° C, such as celosia, amaranth, *kochia*, gaillardia, gomphrena, zinnia, torch lily, cosmos, etc.

Sandy loam soils with ample humus and a pH range of 5.5– 7.5 and roughly EC 1 is preferred usually for flower crops.

# 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 macro organisms. 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 and Its Properties

Soil is the upper loose layer of the earth crust rich in nutrients and minerals upon which plants grow and depend for nourishment.

Pedologist James Samuel Joffe defined soil as— “The soil is a natural body of minerals and organic constituents differentiated into horizons of variable depth, which differs from the materials below, in morphology, physical make up, chemical properties, composition and biological characteristics.”

# Soil and Its Properties

The properties of soil are helpful in understanding the nature and kind of the soil. Properties of soil can be categorised as physical, chemical and biological.

## 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. The colour of the surface soil might differ from the colour of its lower layers. Soil colour is an indicator of organic matter content, soil fertility, soil reaction, drainage, aeration and the ecosystem living beneath it.

# Soil and Its 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 and Its 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.

**Particle density:** It refers to the actual density of soil solids. It is defined as mass per unit volume of soil solid only. The average value of particle density is about  $2.65 \text{ g/cm}^3$ .

**Bulk density:** It is defined as the mass per unit volume, which includes the volume occupied by solids, as well as, pore space. It is, usually, expressed grams per cubic centimetre ( $\text{g/cm}^3$ ).

# Soil and Its Properties

## Physical properties

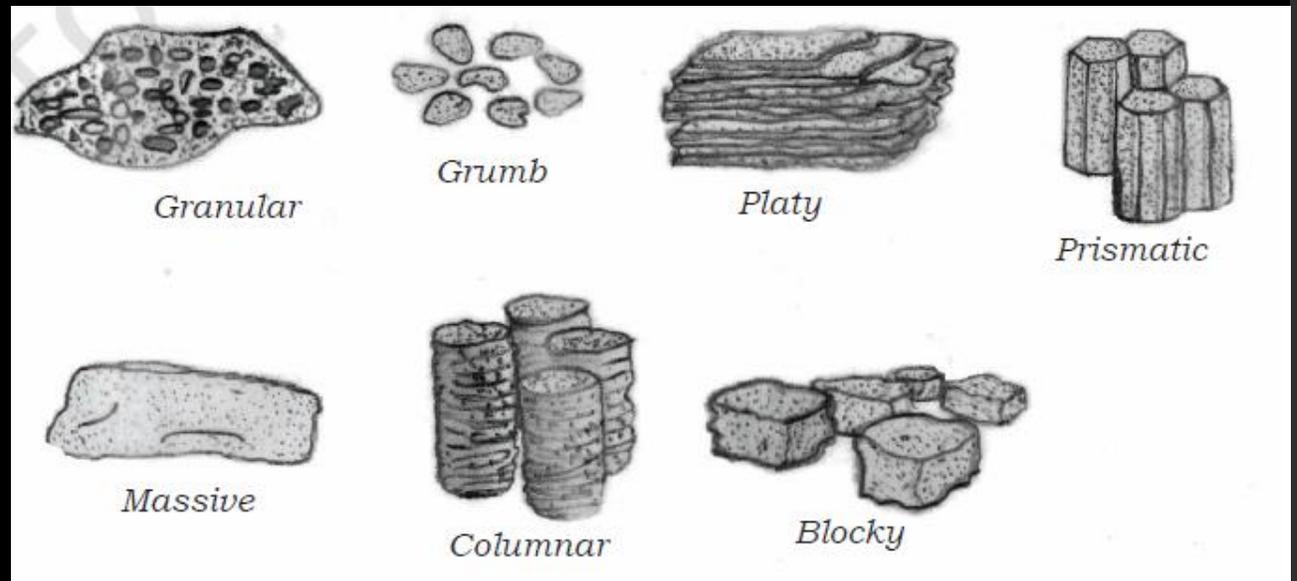
**Porosity:** These inter-particle spaces of soil are pores and carry air and water. The quantity and size of pores show porosity of the soil. Soil having more or large pores is called 'porous soil'. Such soils have good drainage and aeration. Soil with small but more pores shows better water-holding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

# Soil and Its Properties

## Physical properties

**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



**Types of soil structure**

# Soil and Its 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 and Its 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  $9^{\circ}\text{C}$  and ceases when it reaches  $50^{\circ}\text{C}$ . Microorganisms of the soil are very active at a range of  $27^{\circ}\text{C}$  to  $32^{\circ}\text{C}$ .

# Soil and Its 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. Soils with minimum pH are more acidic. Similarly, as the pH increases above 7, alkaline reaction of the soil increases with the concentration of  $OH^-$ -ion. Such soil is called alkaline soil.

# Soil and Its Properties

## Chemical properties

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

**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).

# Soil and Its Properties

## Chemical properties

**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 ( $Mg^{2+}$ ), sodium ( $Na^+$ ) aluminum ( $Al^{3+}$ ), iron ( $Fe^{2+}$ ), manganese ( $Mn^{2+}$ ), zinc ( $Zn^{2+}$ ), hydrogen ( $H^+$ ) and copper ( $Cu^{2+}$ ) for plant absorption.

Highly fertile soils, containing high organic matter have more cation exchange capacity.

# Soil and Its 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 such as black, red, laterites, alluvial, desert, forest and hilly, peaty and marshy and saline and alkaline soil.

## 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. The pH of alluvial soil ranges from 6.5 to 8.4. These are suitable for the cultivation of vegetables, flowers and fruits. These soils are found in all States along the rivers.

# Soils of India

## 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

## 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.



# Soils of India

## 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.

## 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.

# Soils of India

## Acidic and salt affected soil

**Acidic soil:** Such soils are a result of the parent material. These develop from the weathering of acidic rock, like granite. Soil acidity has a toxic effect on root tissues and affects the permeability of cations.

**Saline soil:** These are mostly found in arid and dry regions, where the rate of evaporation is too high. Salinity of soil is due to excess of calcium and magnesium chlorides, sulphates and carbonates. High evaporation of moisture from soil and low rainfall are the main causes of soil salinity. The exchangeable sodium in saline soil is less than 15% and the pH is below 8.5. The value of electrical conductivity is 4 m mhos/cm, or more at 25° C.

# Soils of India

## Acidic and salt affected soil

**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. The exchangeable sodium in saline soil is more than 15% and the pH is 8.5 or more. The name of electrical conductivity is more than 4 m mhos/cm at 25° C.

# Soils of India

## Acidic and salt affected soil

**Alkaline soil:** These are poor in aeration and drainage. The pH of the soil lies between 8.5 and 10. The exchangeable sodium is more than 15%. The value of Electrical Conductivity is less than 4 m mhos/cm at 25° C. High sodium content is often toxic for crop growth.

# Summary

In this session you have learnt about the select site for cultivation of ornamental crops, soil and its importance, soil particles and soil types in India.

**Project Coordinator : Dr. Rajiv Kumar Pathak**

**Assistance**

**Dr. Sanvar Mal Choudhary**

**Dr. Narendra Vasure**



**Joint Director**

**PSS Central Institute of Vocational Education  
Shyamla Hills, Bhopal – 462013 , Madhya Pradesh, India**

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**E-mail: [jdpsscive@gmail.com](mailto:jdpsscive@gmail.com)**

**Tel. +91 755 2660691, 2704100, 2660391, 2660564**

**Fax +91 755 2660481**

**Website: [www.psscive.ac.in](http://www.psscive.ac.in)**