JSS 1 HORTICULTURE AND CROP PRODUCTION LESSON NOTES

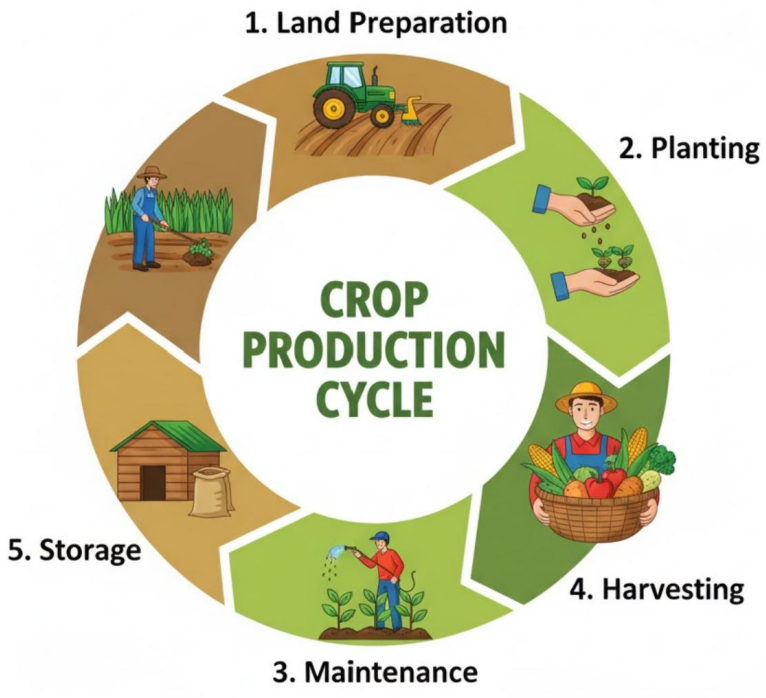
FIRST TERM

WEEK 1: INTRODUCTION TO CROP PRODUCTION

Introduction

Crop production is one of the oldest and most important activities of humankind. It refers to the growing of crops for food, raw materials, and other useful products that support human life. From ancient times, people cultivated the land to produce grains, vegetables, and fruits to meet their daily needs. Today, crop production has become a modern and scientific process that supports not only individuals but also the entire national economy.

In this lesson, we will learn the meaning of crop production, its importance to national development, and the different ways it contributes to food security, employment, and industrial growth.



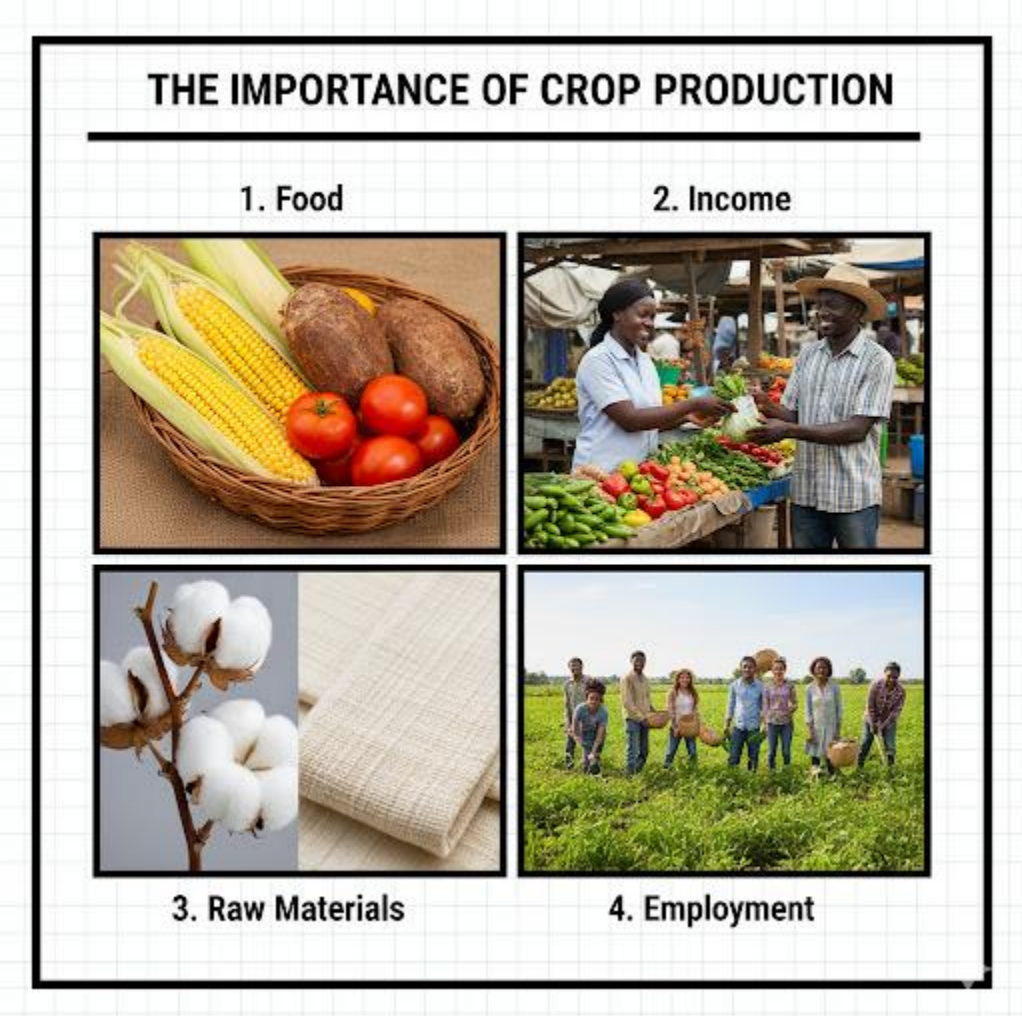
Meaning of Crop Production

Crop production is the branch of agriculture that deals with the cultivation of crops for food, fibre, and industrial use. It includes all the processes involved in growing plants — such as land preparation, planting, weeding, fertilizer application, pest control, harvesting, and storage.

Crops are plants grown mainly for consumption or commercial purposes. Examples include:

- **Food crops:** maize, cassava, rice, yam, beans, millet.
- **Cash crops:** cocoa, cotton, oil palm, groundnut, rubber.
- **Vegetable crops:** tomato, okra, pepper, cabbage, lettuce.

Crop production ensures the steady supply of food and raw materials needed by people and industries all over the world.



Importance of Crop Production to the National Economy

1. **Source of Food**

   Crop production provides food for both humans and animals. Staple crops such as maize, yam, rice, and cassava supply carbohydrates, while legumes like beans and groundnut provide proteins needed for body growth and repair.

2. **Source of Raw Materials for Industries**

   Many industries depend on crops for their raw materials. For example, cocoa is used in chocolate production, cotton in textile industries, sugarcane for sugar and ethanol, and oil palm for soap and cosmetics.

3. **Employment Opportunities**

   Crop production provides jobs for farmers, labourers, traders, transporters, and factory workers in agro-allied industries. It reduces unemployment and promotes economic stability.

4. **Source of Income and Foreign Exchange**

   Farmers earn money by selling their crops locally or exporting them to other countries. Exportation of crops like cocoa, groundnut, and palm oil brings foreign exchange that helps to develop the nation.

5. **Contribution to National Development**

   Agriculture contributes to the Gross Domestic Product (GDP) and helps in building the nation's economy. The revenue earned is used to provide public services such as roads, schools, and hospitals.

6. **Encouragement of Rural Development**

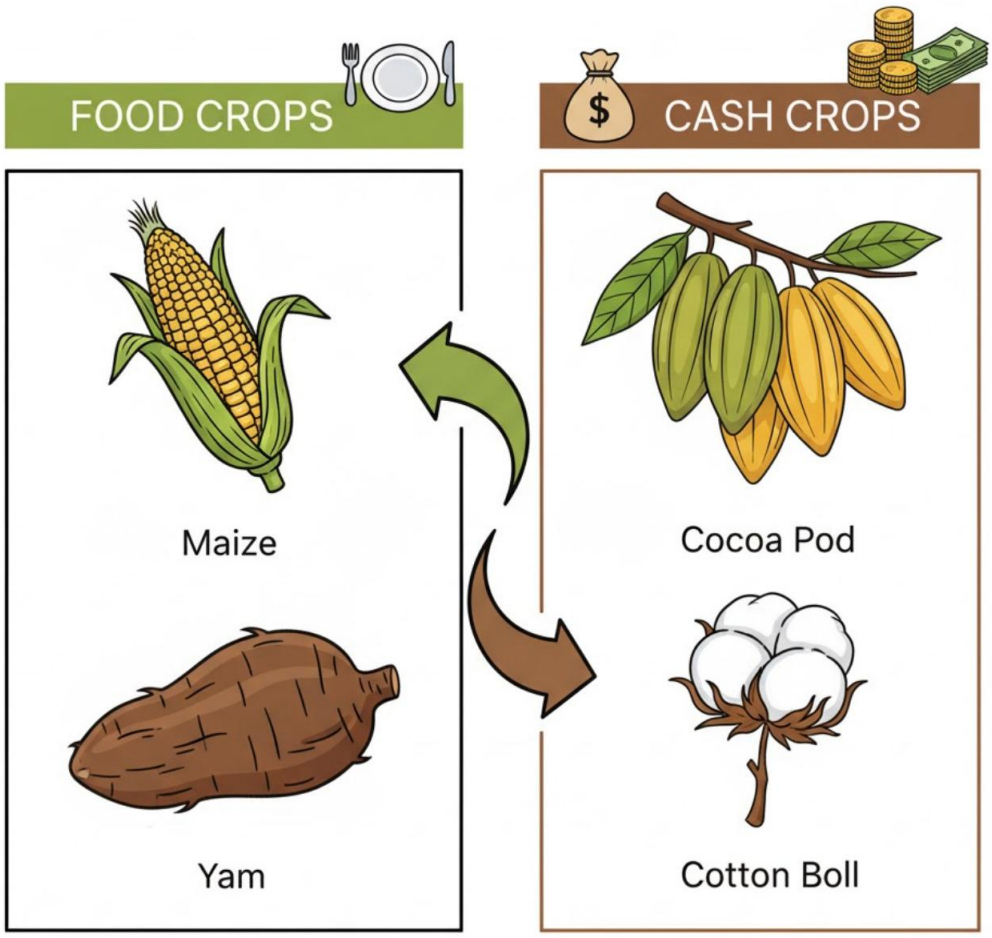
   The presence of farms encourages the building of rural infrastructure such as roads, markets, and electricity. This improves the living standards of people in rural areas.

7. **Promotion of Trade and Commerce**

   Crop production supports both local and international trade. Farmers sell their produce in

markets, while exporters trade crops across countries, promoting business and wealth creation.

8. **Environmental Benefits**
   Crops play a major role in protecting the environment. They prevent soil erosion, enrich the soil with organic matter, and release oxygen during photosynthesis.



Careers in Crop Production

There are several career opportunities in the field of crop production, such as:

- Agronomist

- Horticulturist
- Soil Scientist
- Farm Manager
- Agricultural Extension Officer
- Crop Researcher

These professionals work together to improve crop yields, manage farmland, and ensure sustainable agricultural practices.

Summary

Crop production is the foundation of agriculture and the main source of food, raw materials, and employment in most developing countries like Nigeria. It has helped in reducing hunger, supporting industries, and improving the standard of living for many people. Without crop production, human survival and national development would be impossible.

Evaluation

1. Define crop production.
2. Mention five importance of crop production to the national economy.
3. Give three examples each of food crops and cash crops.
4. List three career opportunities in crop production.
5. Explain two ways in which crop production helps in rural development.

Assignment

1. Write short notes on three environmental benefits of crop production.
2. Discuss how crop production contributes to industrial development.

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3. Make a list of ten crops grown in your locality and classify them into food crops and cash crops.

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WEEK 2: FARM TOOLS AND SAFETY MEASURES

Introduction

Every successful farmer needs the right set of tools to work efficiently on the farm. Farm tools are simple implements or instruments used by farmers to carry out different operations such as clearing, planting, weeding, and harvesting. These tools make farm work faster, easier, and more productive.

However, the use of farm tools also comes with certain risks. Farmers must therefore learn how to use them correctly, maintain them properly, and observe necessary safety precautions to avoid injuries and accidents. This lesson will explain the types of farm tools, their uses, how to maintain them, and important safety measures to follow while working on the farm.



Meaning of Farm Tools

Farm tools are simple hand-held implements used by farmers to perform various agricultural tasks. They are usually manually operated and made of strong materials like metal, wood, or

plastic. Some are traditional tools used by local farmers, while others are modern versions designed for improved efficiency.

Farm tools can be grouped according to their functions, such as:

- **Cutting tools** – e.g., cutlass, knife, sickle.
- **Digging tools** – e.g., hoe, spade, shovel.
- **Lifting and carrying tools** – e.g., wheelbarrow, head pan.
- **Measuring tools** – e.g., tape, measuring cylinder, weighing scale.

Common Farm Tools and Their Uses

Tool	Description	Uses
Cutlass	A long metal blade with a handle.	Used for cutting grasses, weeds, and small trees during land clearing.
Hoe	A metal blade attached to a long wooden handle.	Used for digging, making ridges, weeding, and mixing soil.
Spade	A flat metal blade with a handle.	Used for digging, turning soil, and lifting sand.
Shovel	Similar to a spade but has a curved blade.	Used for moving soil, manure, or gravel.
Rake	A tool with long metal or wooden teeth.	Used for gathering leaves, stones, and leveling the soil.
Hand Fork	A small tool with short metal prongs.	Used for loosening soil around crops and removing weeds.
Watering Can	A metal or plastic container with a spout.	Used for watering crops, especially in nursery beds.

Wheelbarrow	A metal container with one or two wheels and handles.	Used for carrying loads such as manure, seedlings, or harvested crops.
Sickle	A curved blade with a short handle.	Used for harvesting grasses and cereal crops.
Garden Shears	Scissors-like tool.	Used for trimming flowers, hedges, and shrubs.
Axe	A heavy tool with a sharp blade.	Used for cutting down trees or large branches.

Maintenance of Farm Tools

Proper maintenance ensures that tools last long, work effectively, and remain safe for use. The following are common ways of maintaining farm tools:

1. **Clean after use:** Wash tools to remove dirt, mud, and plant materials.
2. **Dry properly:** Always dry metal tools after washing to prevent rust.
3. **Sharpen edges regularly:** Tools like hoes, cutlasses, and sickles should be sharpened to make them more effective.
4. **Oil metal parts:** Apply light oil or grease to prevent rusting.
5. **Store properly:** Keep tools in a clean, dry place or hang them on racks.
6. **Repair damaged tools:** Replace broken handles and tighten loose bolts immediately.
7. **Avoid misuse:** Use each tool for its correct purpose to prevent breakage and accidents.



Safety Precautions on the Farm

Farm safety means protecting yourself and others from injuries or harm while working. Safety rules should always be observed when using farm tools and machinery.

Safety Rules and Precautions:

1. Always wear protective clothing such as gloves, boots, hats, and overalls.
2. Handle sharp tools carefully and always point them downwards when walking.
3. Do not play or run around with tools.
4. Keep tools away from children or untrained persons.

5. Use tools only for their intended purpose.
6. Avoid using damaged or blunt tools.
7. Do not leave tools carelessly on the ground — store them properly after use.
8. Be cautious when working under hot sun or during rainfall.
9. Report injuries or accidents immediately for first aid treatment.

First Aid and Emergency Procedures

Accidents may occur on the farm despite all precautions. Knowing basic **first aid** is important for quick response and safety.

Meaning of First Aid:

First aid is the immediate care or treatment given to a person who is injured or suddenly taken ill before professional medical help arrives.

Common Farm Accidents:

- Cuts and wounds from sharp tools
- Burns from fire or chemicals
- Insect bites or stings
- Falls or slips on wet ground

Basic First Aid Steps:

1. Stop any bleeding by applying pressure with a clean cloth or bandage.
2. Clean minor wounds with antiseptic solution.
3. Bandage the wound properly to prevent infection.
4. For serious injuries, burns, or snake bites, call for help and take the victim to a nearby clinic or hospital.

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5. Always have a **first aid box** on the farm containing items like bandages, cotton wool, antiseptics, scissors, plasters, and gloves.

Summary

Farm tools are essential for efficient agricultural work. They help farmers to clear land, plant crops, weed, and harvest easily. Proper use and maintenance of tools increase their lifespan and improve farm productivity. Observing safety precautions and knowing first aid procedures help prevent and manage farm accidents effectively. A careful and well-prepared farmer is a successful farmer.

Evaluation

1. Define farm tools.
2. Mention five common farm tools and their uses.
3. List three ways of maintaining farm tools.
4. State four safety precautions that should be observed when working on the farm.
5. Explain what first aid means and mention three items found in a first aid box.

Assignment

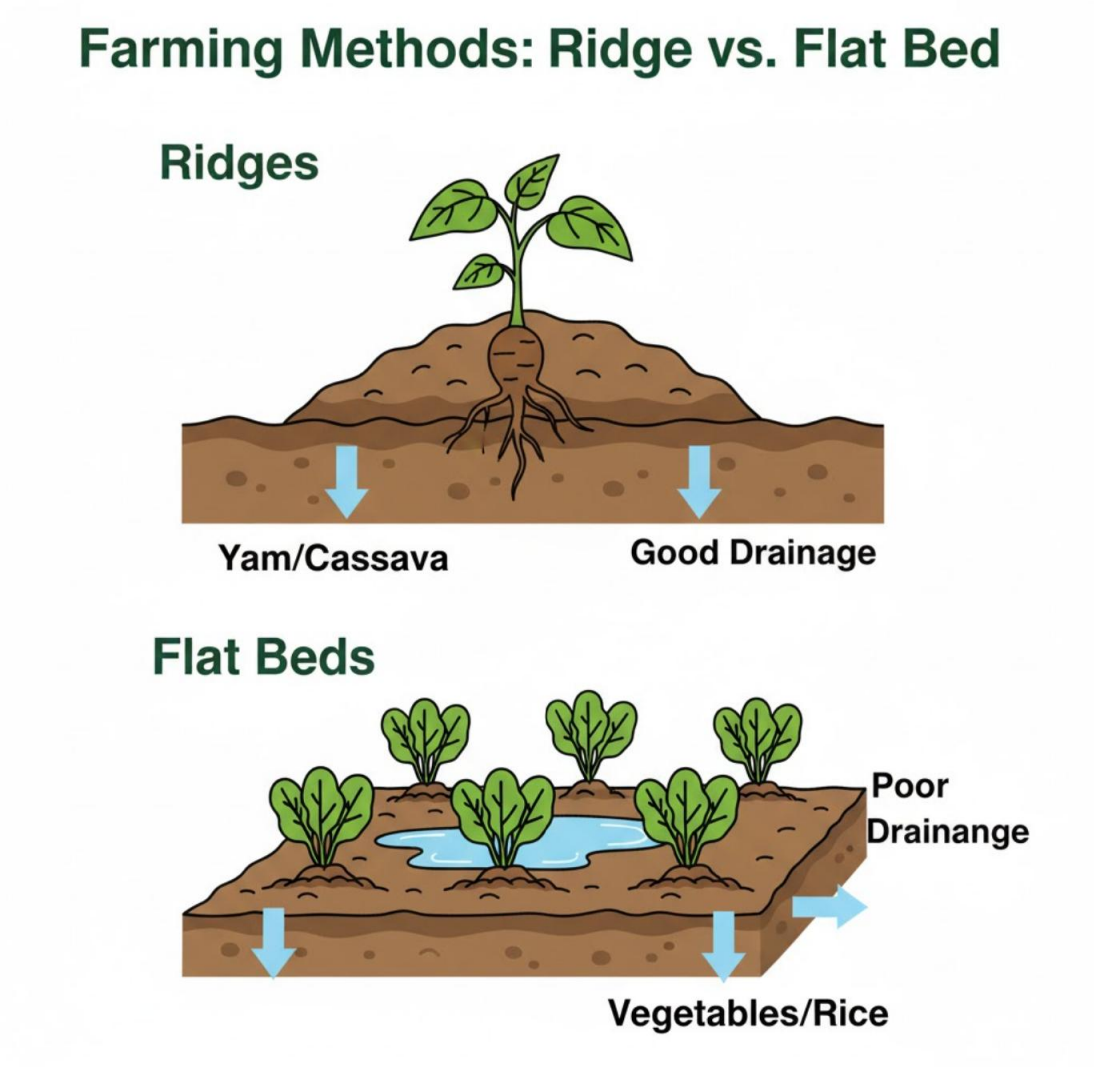
1. Draw and label any five common farm tools.
2. Describe how to maintain a hoe, cutlass, and watering can.
3. List and explain any four emergency procedures to take after a farm accident.

WEEK 3: FARMLAND PREPARATION PRACTICES

Introduction

Before planting any crop, the farmer must prepare the land properly. Farmland preparation is the process of making the soil ready for planting crops. It involves a series of activities such as clearing, ploughing, harrowing, and ridging. Each stage helps to improve soil structure, remove unwanted materials, and create a suitable environment for healthy crop growth.

Proper land preparation is the foundation of successful crop production. It ensures that crops receive enough air, water, and nutrients and that weeds and pests are minimized. In this lesson, you will learn the importance of farmland preparation, the different stages involved, the tools used at each stage, and how to layout a farm correctly.



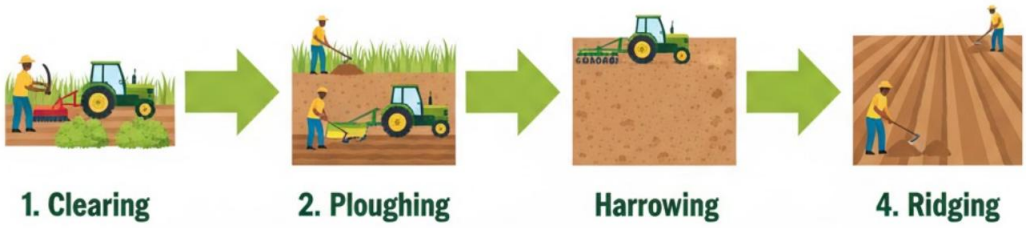
Meaning of Farmland Preparation

Farmland preparation refers to all the activities carried out on a piece of land before planting crops. It is aimed at improving soil conditions and making the land suitable for cultivation. These activities include clearing vegetation, breaking and loosening the soil, removing stumps and stones, and forming ridges or beds for planting.

Importance of Farmland Preparation

1. **Weed Control:** Clearing and tilling the soil help to remove weeds that compete with crops for nutrients, water, and sunlight.
2. **Soil Aeration:** Tilling breaks up compact soil, allowing air and water to penetrate easily.
3. **Improved Root Growth:** Loose soil makes it easier for plant roots to grow deep and spread widely.
4. **Ease of Planting:** Well-prepared land makes planting faster and more accurate.
5. **Pest and Disease Control:** Turning the soil exposes pests and disease-causing organisms to sunlight and predators.
6. **Better Water Infiltration and Drainage:** Well-prepared soil absorbs and drains water properly, preventing waterlogging or erosion.
7. **Enhanced Soil Fertility:** Mixing organic matter and fertilizers during preparation enriches the soil with nutrients.
8. **Neat and Organized Farm Layout:** Land preparation ensures the farm is well-arranged for efficient crop management and harvesting.

Stages of Farmland Preparation



1. **Clearing**
    - This is the first stage in land preparation. It involves removing unwanted vegetation such as grasses, shrubs, trees, and debris from the land.
    - **Methods of Clearing:**
        - *Manual clearing:* using cutlass, hoe, or axe.
        - *Mechanical clearing:* using bulldozers or tractors for large areas.
        - *Chemical clearing:* using herbicides to kill weeds.
    - **Tools used:** Cutlass, hoe, axe, and rake.
2. **Ploughing**
    - This involves turning and loosening the topsoil using tools or machines. It helps to bury weeds and mix organic matter with the soil.
    - **Methods:** Manual ploughing with hoe, or mechanical ploughing with tractor and plough.
    - **Tools used:** Hoe, spade, or plough (animal or tractor-drawn).
3. **Harrowing**
    - After ploughing, the soil may still contain large lumps or clods. Harrowing breaks these lumps and makes the soil fine and smooth for planting.
    - **Tools used:** Harrow (animal- or tractor-drawn).

4. **Ridging or Bed Formation**
    - Ridges, mounds, or beds are formed depending on the type of crop. For example:
        - Ridges – for yam, maize, and cassava.
        - Mounds – for cocoyam or sweet potatoes.
        - Flat beds – for vegetables and rice.
    - **Importance of ridging:**
        - Prevents waterlogging.
        - Makes weeding and harvesting easier.
        - Enhances root development and soil drainage.
    - **Tools used:** Hoe, shovel, or ridger.
5. **Farm Layout and Land Demarcation**
    - After preparing the soil, the land is divided into sections (plots) for easy management.
    - **Farm layout** means arranging the different parts of the farm such as plots, roads, buildings, and irrigation lines in an orderly way.
    - **Land demarcation** involves marking out the plots with pegs, ropes, or sticks to show boundaries and crop spacing.
    - **Importance:**
        - Promotes good organization of farm activities.
        - Helps in record-keeping and monitoring.
        - Prevents overcrowding of crops and reduces wastage of space.

Tools Used in Each Stage of Land Preparation

Stage	Tools Used
Clearing	Cutlass, hoe, axe, rake
Ploughing	Hoe, spade, plough
Harrowing	Harrow, rake
Ridging	Hoe, shovel, ridger
Layout/Demarcation	Pegs, rope, measuring tape

Precautions During Land Preparation

1. Avoid working on waterlogged or overly dry soil.
2. Do not burn vegetation excessively as it destroys soil nutrients.
3. Use the right tools for each stage to avoid accidents.
4. Ensure proper spacing between ridges or beds.
5. Follow safety measures while using sharp tools.

Summary

Farmland preparation is the first and most important stage of crop production. It involves clearing the land, tilling the soil, and arranging it into suitable structures like ridges or beds for planting. Proper land preparation helps crops to grow well by improving soil aeration, drainage, and fertility. It also makes planting, weeding, and harvesting easier. Every successful crop farm begins with careful and well-planned land preparation.

Evaluation

1. Define farmland preparation.
2. State five importance of farmland preparation.

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3. Mention and explain four stages involved in preparing farmland.
4. Identify three tools used in land clearing and two used for ridging.
5. Explain what is meant by farm layout and land demarcation.

Assignment

1. Draw and label the tools used for clearing, ploughing, and ridging.
2. Describe how ridges are formed and list three crops grown on ridges.
3. Explain why proper farm layout is important in crop production.

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WEEK 4: SOIL AND ITS PROPERTIES

Introduction

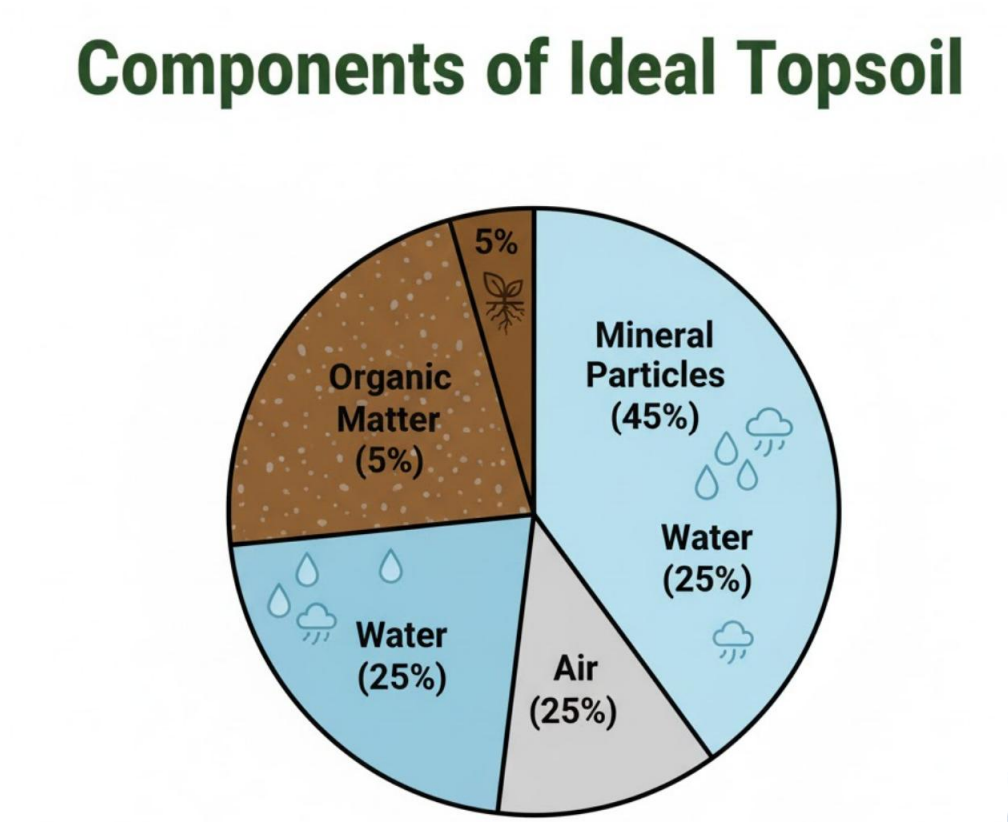
Soil is one of the most important natural resources on earth and the foundation of all agricultural activities. Without soil, crop production would not be possible because plants depend on soil for support, water, and nutrients. Understanding the nature and properties of soil helps farmers choose the right crops to grow and adopt proper management practices to improve soil fertility.

In this lesson, you will learn the meaning and types of soil, the importance of soil in crop production, the physical properties of soil, and how soil characteristics affect the growth of crops.

Meaning of Soil

Soil is the top layer of the earth's surface that supports the growth of plants. It is formed from the weathering (breaking down) of rocks and the decay of organic matter such as leaves, dead plants, and animals. Soil contains minerals, water, air, organic matter, and living organisms.

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Soil can be described as a mixture of:

1. **Mineral particles** (from rocks)
2. **Organic matter** (from decayed plants and animals)
3. **Water**
4. **Air**
5. **Living organisms** such as earthworms, insects, and microorganisms

Types of Soil

Soil is generally classified into **three main types** based on the size of particles and texture:



1. **Sandy Soil**
    - Made up of large particles and feels rough or gritty when touched.
    - Does not hold water well because it has large spaces between particles.
    - It warms up quickly and is easy to work with.
    - Common crops grown: groundnut, watermelon, and cassava.
2. **Clay Soil**
    - Made up of very small particles that stick together when wet.
    - It holds water for a long time and becomes sticky during the rainy season.
    - It is heavy and difficult to till.
    - Common crops grown: rice and sugarcane.
3. **Loamy Soil**
    - A mixture of sand, clay, and organic matter.
    - It is the **best soil for farming** because it holds water and nutrients well but still allows air to enter.
    - It is dark in colour, fertile, and easy to cultivate.

- Common crops grown: maize, yam, and vegetables.

Importance of Soil to Crop Production

1. **Anchorage:** Soil holds the roots of plants firmly, preventing them from falling over.
2. **Nutrient Supply:** It provides essential minerals like nitrogen, phosphorus, and potassium needed for plant growth.
3. **Water Supply:** Soil stores water that plants absorb through their roots.
4. **Air Supply:** Pores in the soil contain oxygen and carbon dioxide needed for plant respiration.
5. **Habitat for Organisms:** Soil provides a home for beneficial organisms like earthworms, bacteria, and fungi that improve soil fertility.
6. **Support for Human Activities:** Soil supports buildings, roads, and farm structures.
7. **Filtration of Water:** It helps purify rainwater as it passes through layers underground.

Physical Properties of Soil

The physical properties of soil determine how suitable it is for crop growth. The major physical properties include:

1. **Soil Colour**
    - Colour gives information about the type and fertility of the soil.
    - Dark brown or black soils usually contain more organic matter and are more fertile.
    - Red or yellow soils may contain iron oxide and are often less fertile.
2. **Soil Texture**

- Refers to the size of soil particles (sand, silt, and clay) and how they feel when touched.
- Determines how much water and air the soil can hold.
- Loamy soil has a balanced texture suitable for most crops.

3. **Soil Structure**
   - Refers to how soil particles are arranged or grouped together.
   - Good soil structure allows roots, water, and air to move freely.
   - Poor soil structure (compacted soil) restricts root growth and water movement.
4. **Soil Porosity**
   - The spaces or pores between soil particles where air and water can move.
   - Sandy soils have large pores, while clay soils have small pores.
5. **Soil Temperature**
   - Affects seed germination and root development.
   - Sandy soils heat up quickly, while clay soils remain cool longer.
6. **Water-Holding Capacity**
   - The ability of soil to retain water for plant use.
   - Clay holds more water than sandy soil, but loamy soil maintains the right balance.

Effects of Soil Properties on Crop Growth

Soil Property	**Effect on Crops**
Texture	Determines drainage and nutrient-holding capacity.
Structure	Affects root penetration and air circulation.

Colour	Indicates fertility; dark soils are usually rich in humus.
Porosity	Influences how easily roots access air and water.
Temperature	Affects seed germination and growth speed.

Good understanding of soil properties helps farmers decide which crops to grow and which fertilizers or organic matter to apply for better yields.

Factors Affecting Soil Formation

Soil does not form instantly; it takes many years through natural processes. The major factors that influence soil formation are:

1. **Parent Material** – the type of rock from which the soil is formed.
2. **Climate** – rainfall and temperature affect the rate of rock weathering.
3. **Living Organisms** – plants and animals contribute organic matter.
4. **Topography** – slope and drainage affect soil depth and fertility.
5. **Time** – soil formation takes hundreds to thousands of years.

Summary

Soil is a natural resource made up of minerals, organic matter, water, and air. It provides plants with support, nutrients, and moisture needed for growth. There are three major types of soil — sandy, clay, and loamy — each with unique properties. Understanding soil types and their physical characteristics helps farmers make better decisions about what crops to grow and how to manage the land effectively.

Evaluation

1. Define soil.

2. Mention and describe the three main types of soil.
3. State four importance of soil to crop production.
4. List and explain any three physical properties of soil.
5. Mention two factors that affect soil formation.

Assignment

1. Draw and label the three main types of soil.
2. Explain how soil colour and texture affect crop growth.
3. Make a table showing five differences between sandy soil and clay soil.

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WEEK 6: SOIL TEXTURE AND STRUCTURE

Introduction

Soil texture and soil structure are two important physical properties that determine how soil behaves, how much water it can hold, and how well it supports plant growth. A farmer who understands these properties can select suitable crops, improve soil fertility, and increase yield.

This lesson explains the meaning of soil texture and structure, their importance, how they are determined, and how they affect crop production.

Meaning of Soil Texture

Soil texture refers to the relative proportions of sand, silt, and clay particles that make up the soil. These particles differ in size:

- **Sand** – the largest particles, coarse and gritty.
- **Silt** – medium-sized particles, smooth to touch.
- **Clay** – the smallest particles, sticky when wet.

The combination of these three determines the texture of the soil and affects how water and air move through it.

Classes of Soil Based on Texture

There are different classes of soil texture depending on the proportion of sand, silt, and clay.

1. **Sandy Soil**
    - Contains a high amount of sand and very little clay or silt.
    - Feels rough and loose when handled.
    - Drains water quickly and dries out fast.
    - Low in nutrients because they are easily washed away.

- Suitable for crops like groundnut, watermelon, and cassava.

2. **Clay Soil**
    - Contains a large amount of clay and little sand.
    - Feels smooth and sticky when wet, and hard when dry.
    - Poor in drainage; holds water for a long time.
    - Rich in nutrients but difficult to work with.
    - Suitable for crops like rice and sugarcane.
3. **Loamy Soil**
    - Has a balanced mixture of sand, silt, and clay.
    - Feels smooth and slightly sticky; easy to cultivate.
    - Retains enough water and nutrients for plants.
    - Best soil for most crops such as maize, yam, and vegetables.

Importance of Soil Texture

1. **Determines Water-Holding Capacity:** Clay holds water for a long time; sandy soil drains water quickly.
2. **Affects Air Circulation:** Sandy soils allow more air movement, while clay soils have poor aeration.
3. **Influences Nutrient Retention:** Clay soils retain nutrients longer than sandy soils.
4. **Determines Soil Workability:** Sandy soils are easy to cultivate, while clay soils are heavy and sticky.
5. **Affects Root Development:** Roots grow better in loose soils with balanced texture.

Determining Soil Texture

The texture of soil can be determined using two common methods:

1. **By Feel Method (Touch Method)**
    - Take a moist sample of soil and rub it between the fingers.
    - Sandy soil feels rough, clay soil feels sticky, and loamy soil feels smooth and slightly sticky.
2. **Sedimentation Method (Jar Test)**
    - Mix a soil sample with water in a transparent jar, shake well, and allow it to settle.
    - After a few hours, sand settles at the bottom, silt in the middle, and clay on top.
    - The proportion of each layer shows the texture of the soil.

Meaning of Soil Structure

Soil structure refers to the way soil particles (sand, silt, and clay) are arranged or grouped together to form aggregates or crumbs.

These aggregates form pores or spaces through which air, water, and roots can move. The arrangement affects the soil's ability to hold water, nutrients, and support plant roots.

Types of Soil Structure

1. **Single-Grained Structure**
    - Found mostly in sandy soils.
    - Particles are loose and not bound together.
    - Water drains very quickly.
2. **Crumb or Granular Structure**

- Found in loamy soils.
- Particles are grouped into small rounded crumbs.
- Very good for plant growth; allows air and water movement.

3. **Blocky Structure**
   - Found in clay soils.
   - Soil particles form blocks that fit together.
   - Moderate water movement; common in subsoil.
4. **Platy Structure**
   - Soil particles are arranged in thin plates or layers.
   - Restricts root growth and air movement.
5. **Prismatic or Columnar Structure**
   - Soil particles form vertical columns or pillars.
   - Found in clay-rich soils; moderate drainage.

Importance of Soil Structure

1. **Facilitates Water Movement:** Good soil structure allows proper drainage and prevents waterlogging.
2. **Improves Air Circulation:** Helps oxygen reach plant roots easily.
3. **Enhances Root Penetration:** Roots can move and spread freely.
4. **Prevents Soil Erosion:** Well-aggregated soils resist erosion by wind or water.
5. **Supports Soil Organisms:** Provides suitable living conditions for earthworms and microorganisms.
6. **Improves Soil Fertility:** Proper structure helps retain nutrients for longer periods.

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Differences Between Soil Texture and Soil Structure

Feature	Soil Texture	Soil Structure
Definition	Refers to the proportion of sand, silt, and clay particles.	Refers to how soil particles are arranged or grouped together.
Nature	Determined by particle size.	Determined by arrangement of particles.
Can it be changed?	Difficult to change naturally.	Can be improved by adding organic matter or cultivation.
Example	Sandy, clayey, or loamy soil.	Crumb, blocky, or platy structure.
Importance	Affects drainage and water-holding ability.	Affects air movement, root growth, and fertility.

Improving Soil Structure and Texture

1. Add **organic matter** such as compost or manure.
2. Avoid excessive **tillage** which destroys soil aggregates.
3. Practice **crop rotation** and **cover cropping**.
4. Prevent **soil erosion** through contour farming and mulching.
5. Use **irrigation and drainage systems** appropriately.

Summary

Soil texture and structure are key physical properties that determine how well soil supports plant growth. Texture describes the size of soil particles, while structure refers to how those particles are arranged. Loamy soil with a crumb structure is best for crop production because it retains

water, allows air movement, and supports healthy root growth. Farmers can improve poor soil by adding organic matter and adopting good soil management practices.

Evaluation

1. Define soil texture.
2. Mention the three main classes of soil based on texture.
3. Explain two methods used to determine soil texture.
4. Define soil structure and list its five main types.
5. State three ways soil structure can be improved.

Assignment

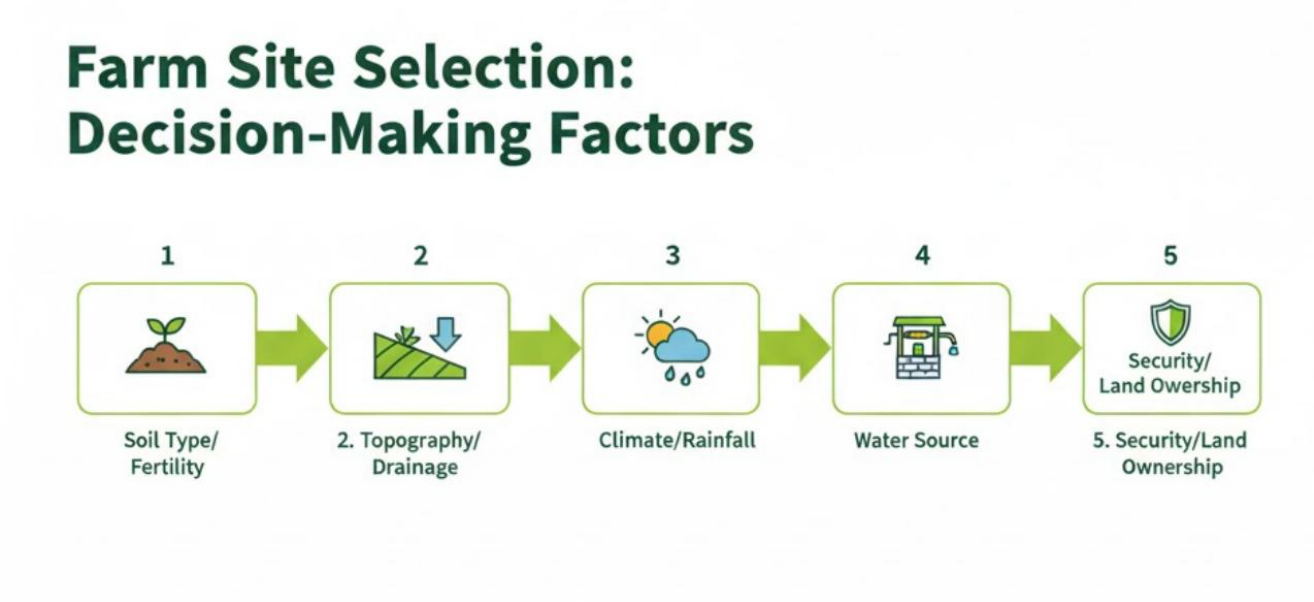
1. Draw and label a diagram showing the sedimentation test for soil texture.
2. Make a table showing three differences between sandy soil and clay soil based on texture.
3. Describe any two types of soil structure and give examples of crops that can grow in them.

WEEK 8: SITE SELECTION AND CROP TYPES

Introduction

Before planting any crop, it is very important to choose the right place or site for the farm. The success of any crop production activity depends largely on selecting a suitable site with good soil, adequate sunlight, proper drainage, and access to water. Site selection also determines what type of crop can be grown and how productive it will be.

This lesson explains the factors that influence site selection, the different types of crops based on lifespan and use, and how to match crops to the right types of land for maximum yield.



Meaning of Site Selection

Site selection is the process of choosing the best piece of land for farming activities. It involves studying and evaluating the physical and environmental conditions of a particular area to determine whether it is suitable for crop production.

Selecting a good site helps to prevent waste of labour, time, and money. It also improves crop yield, reduces pest and disease attacks, and ensures long-term soil productivity.

Factors Influencing Site Selection

1. **Soil Type and Fertility**
    - The soil must be rich in nutrients and suitable for the type of crop to be planted.
    - Loamy soil is generally considered the best for most crops because it retains moisture and nutrients without becoming waterlogged.
2. **Topography (Shape of the Land)**
    - The slope or flatness of the land affects water flow and soil erosion.
    - Flat or gently sloping land is best for mechanized farming and reduces erosion risk.
3. **Drainage**
    - A good farm site should allow excess water to drain easily.
    - Poor drainage can lead to waterlogging, which damages roots and reduces yield.
4. **Climate and Rainfall**
    - Temperature, rainfall, and sunlight determine what crops can grow well.
    - For example, rice thrives in swampy areas, while maize and cassava do better in moderate rainfall areas.
5. **Availability of Water Source**
    - Access to water for irrigation is essential, especially in dry seasons.
6. **Accessibility and Location**
    - The site should be close to roads or markets to make transportation of farm produce easier.
7. **Vegetation and Land Cover**
    - Lightly vegetated areas are easier to clear and prepare than thick forests.
8. **Pest and Disease History**
    - Avoid sites previously affected by pests or diseases, as they may reoccur.

9. **Security and Land Ownership**
    - The land should be legally owned or leased to prevent disputes.
    - Secure areas protect crops and equipment from theft or damage.

Classification of Crops

Crops can be classified in different ways depending on their purpose, lifespan, and growth pattern.

1. Classification Based on Lifespan

Type of Crop	Description	Examples
Annual Crops	Complete their life cycle within one year	Maize, rice, beans, groundnut
Biennial Crops	Take two years to complete their life cycle	Carrot, onion, cabbage
Perennial Crops	Live and produce for many years	Cocoa, oil palm, banana, rubber

2. Classification Based on Use or Economic Importance

Type of Crop	Description	Examples
Food Crops	Grown for human consumption	Maize, yam, cassava, rice
Cash Crops	Grown mainly for sale or export	Cocoa, cotton, oil palm, rubber
Industrial Crops	Provide raw materials for industries	Sugarcane, tobacco, groundnut
Horticultural Crops	Includes fruits, flowers, and vegetables	Tomato, mango, pepper, pineapple
Forage/Fodder Crops	Grown for feeding livestock	Guinea grass, alfalfa, elephant grass

3. Classification Based on Growing Environment

Type of Crop	Description	Examples
Arable Crops	Grown on dry land and harvested yearly	Maize, millet, sorghum
Plantation Crops	Large-scale permanent crops grown for export	Cocoa, rubber, oil palm
Horticultural Crops	Fruits, vegetables, and ornamental plants	Pineapple, cabbage, rose, hibiscus

Suitable Sites for Different Crops

Crop Type	Ideal Site	Remarks
Rice	Lowland or swampy area	Requires plenty of water
Cassava and Yam	Loamy soil on gentle slopes	Well-drained and rich in nutrients
Cocoa and Oil Palm	Humid tropical regions	Require high rainfall and shade
Vegetables (Tomato, Pepper)	Open and sunny areas	Need regular watering and fertile soil
Maize and Groundnut	Flat or slightly sloped land	Moderate rainfall and good drainage

Selecting the right site ensures that each crop grows under the best environmental conditions for optimal yield.

Importance of Proper Site Selection

1. Ensures healthy and high-yielding crops.
2. Reduces the risk of erosion, flooding, and waterlogging.

3. Minimizes pest and disease attacks.
4. Saves labour and cost during farm operations.
5. Increases the lifespan of farmland and promotes sustainability.

Summary

Site selection is the process of choosing a suitable land for crop cultivation. It depends on factors like soil fertility, drainage, topography, climate, water supply, and accessibility. Crops can be classified by their lifespan, use, or growing environment. Proper site selection helps ensure healthy plant growth, high yield, and efficient management of resources.

Evaluation

1. Define site selection.
2. List five factors to consider when selecting a farm site.
3. Mention and explain three types of crops based on lifespan.
4. Give three examples of cash crops and their uses.
5. State three reasons why site selection is important in crop production.

Assignment

1. Draw a table showing three classes of crops with two examples each.
2. Explain how climate and soil type affect the selection of a farm site.
3. Describe an ideal site for planting rice, maize, and tomato.

WEEK 9: CROP CLASSIFICATION

Introduction

Crops are the foundation of agriculture, and they can be grouped or classified based on different features such as their use, lifespan, and the environment in which they are grown. Understanding crop classification helps farmers decide what crops to plant, when to plant them, and how to care for them properly.

This lesson will explain the different ways crops are classified, their characteristics, and examples of each type. It will also discuss the importance of crop classification in agriculture and farm management.

Meaning of Crop Classification

Crop classification is the process of grouping crops into different categories based on their characteristics, such as their use, life span, structure, or the type of soil and climate they require.

Classification makes it easier for farmers and agricultural scientists to study, manage, and plan crop production.

Major Bases for Classifying Crops

Crops can be classified under several main headings:

1. **According to Use or Economic Importance**
2. **According to Life Span**
3. **According to the Type of Land or Environment Where They Grow**
4. **According to Botanical Family** (for advanced classification)

1. Classification According to Use or Economic Importance

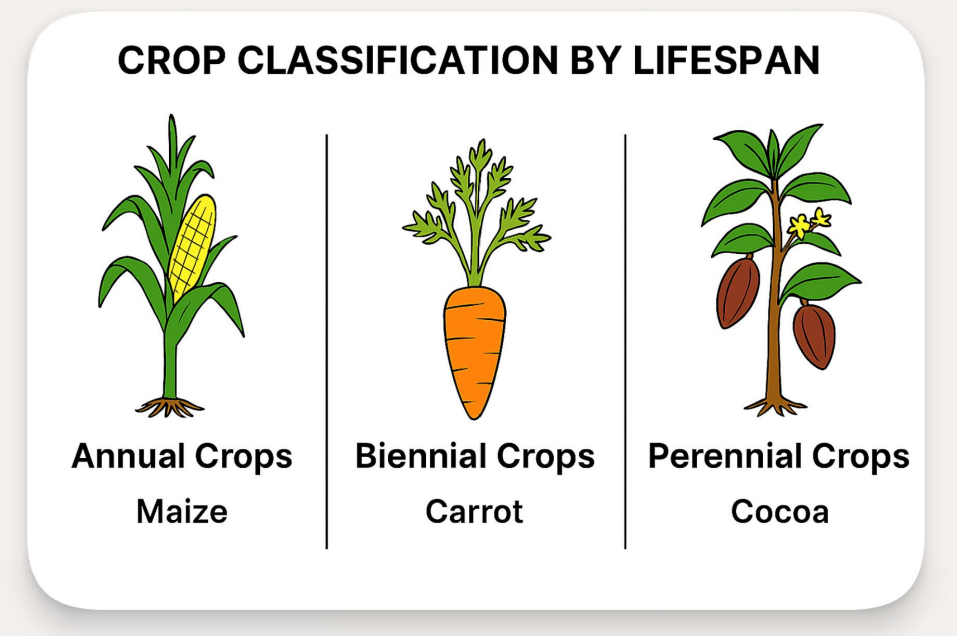
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Type of Crop	Description	Examples
Food Crops	Grown mainly for human consumption.	Maize, yam, cassava, rice, beans.
Cash Crops	Grown mainly for sale or export to generate income.	Cocoa, cotton, oil palm, rubber, groundnut.
Industrial Crops	Provide raw materials for industries.	Sugarcane, tobacco, cotton, rubber.
Forage/Fodder Crops	Grown to feed livestock.	Elephant grass, alfalfa, guinea grass.
Horticultural Crops	Include fruits, vegetables, and flowers used for food or decoration.	Tomato, pineapple, cabbage, rose, hibiscus.
Beverage Crops	Used to produce drinks.	Coffee, tea, cocoa.
Oil Crops	Grown for oil extraction.	Groundnut, oil palm, soybean, coconut.
Fiber Crops	Produce materials used for making cloth or rope.	Cotton, jute, kenaf, flax.
Spice Crops	Used to add flavour to food.	Ginger, pepper, turmeric, onion.
Latex Crops	Produce latex used in rubber manufacturing.	Rubber, fig tree.

2. Classification According to Life Span

Type of Crop	Description	Examples
Annual	Complete their life cycle within one year or one season.	Maize, rice, beans,

Crops	They germinate, grow, mature, produce seeds, and die in the same year.	groundnut, millet.
Biennial Crops	Take two years to complete their life cycle. The first year is for vegetative growth (roots and leaves), and the second year is for flowering and fruiting.	Carrot, onion, cabbage, sugar beet.
Perennial Crops	Live and produce for many years without replanting. They continue to grow and bear fruits season after season.	Cocoa, oil palm, banana, rubber, mango, citrus.



3. Classification According to the Type of Land or Environment Where They Grow

Type of Crop	Description	Examples
Arable Crops	Grown on dry or upland fields and usually harvested yearly.	Maize, yam, groundnut, cassava, rice (upland type).
Plantation Crops	Large-scale permanent crops grown mainly for export and industrial use.	Cocoa, oil palm, rubber, tea, coffee.

Horticultural Crops	Grown in gardens for fruits, vegetables, and flowers.	Tomato, lettuce, pineapple, orange, hibiscus.
Aquatic Crops	Grow in water or swampy environments.	Rice (swamp variety), water lettuce, water yam.

4. Classification According to Botanical Family (Advanced Knowledge)

Crops can also be grouped scientifically into families based on plant characteristics such as flower type, fruit, and seed structure. Examples include:

Botanical Family	Example of Crops	Common Features
Gramineae (Poaceae)	Maize, rice, millet, sorghum	Grass family, produces grains.
Leguminosae (Fabaceae)	Beans, groundnut, soybean	Pod-bearing plants that fix nitrogen.
Solanaceae	Tomato, pepper, garden egg	Flowering plants with edible fruits.
Cruciferae (Brassicaceae)	Cabbage, carrot, mustard	Leafy or root vegetables.
Palmae (Arecaceae)	Oil palm, coconut, date palm	Tree crops with oil-rich fruits.

Importance of Crop Classification

1. **Improves Farm Planning:**
   Helps farmers to select suitable crops for different seasons or land types.
2. **Facilitates Scientific Study:**
   Makes it easier for agricultural scientists to study and improve crops.
3. **Guides Crop Rotation:**
   Enables farmers to plan effective crop rotation by knowing which crops belong to different families.
4. **Aids Marketing and Storage:**
   Helps in organizing and packaging crops for trade and processing.

5. **Promotes Efficient Land Use:**
   Farmers can select the right crop for each soil and climate condition.
6. **Supports Pest and Disease Control:**
   By knowing crop families, farmers can avoid planting similar crops that attract the same pests.

Summary

Crop classification is the systematic grouping of crops based on their characteristics such as use, lifespan, and the environment where they grow. It helps farmers, students, and scientists understand crop behavior, improve production, and plan better farm operations.
Crops can be annual, biennial, or perennial; food, cash, or industrial; and may be grown on arable fields, plantations, or gardens. Understanding these classifications promotes sustainable and profitable farming.

Evaluation

1. Define crop classification.
2. List and explain three major bases of classifying crops.
3. Mention five examples of cash crops and their uses.
4. Differentiate between annual and perennial crops.
5. Give two reasons why crop classification is important in agriculture.

Assignment

1. Prepare a chart showing five classes of crops according to their economic importance and give two examples for each.
2. List ten crops grown in your locality and classify each by its lifespan.

3. Write short notes on the following families:
   a. Leguminosae
   b. Gramineae
   c. Solanaceae

WEEK 10: FARM RECORDS AND MANAGEMENT

Introduction

Farm management is the process of planning, organizing, and controlling all activities on a farm to achieve maximum production and profit. To manage a farm effectively, the farmer must keep accurate and detailed **farm records**.

Farm records provide valuable information about everything that happens on the farm — including crop planting, input purchases, labour used, and sales made. Keeping proper records enables the farmer to know whether the farm is making progress or running at a loss.

Meaning of Farm Records

Farm records are written or documented statements of all activities, transactions, and events that take place on the farm.

They show what has been done, when it was done, how it was done, and how much was spent or earned. Farm records help in planning, decision-making, and management of both crops and livestock.

For example, if a farmer keeps a record of the quantity of fertilizer applied and the harvest obtained, he can decide whether to use the same quantity next season or adjust it.

Meaning of Farm Management

Farm management is the process of organizing and coordinating all the resources of the farm (such as land, labour, capital, and management) to achieve specific goals like increased production and profit.

It involves:

- **Planning:** Deciding what crops to grow, when to plant, and what inputs to buy.
- **Organizing:** Arranging all farm activities and workers in an orderly way.

- **Directing:** Supervising workers and ensuring tasks are done properly.
- **Controlling:** Checking progress and making corrections where necessary.
- **Evaluating:** Assessing whether farm goals were achieved at the end of the season.

A good farmer is also a good manager — one who uses farm records to guide decisions and improve performance.



Importance of Farm Records and Management

1. **Helps in Planning:**
   Farm records provide data needed to plan for future farming seasons.
2. **Enables Profit Determination:**
   By comparing income and expenses, the farmer can calculate profit or loss.

3. **Improves Decision-Making:**
   Records show which crops or activities are most profitable.
4. **Facilitates Loan and Insurance Applications:**
   Banks and insurance companies often require accurate records before giving financial support.
5. **Aids Accountability:**
   Helps the farmer track all money and materials used on the farm.
6. **Simplifies Tax Assessment:**
   Proper records make it easier for government officials to assess farm tax correctly.
7. **Helps Detect Waste or Loss:**
   Records can show where resources are being misused or wasted.
8. **Guides Farm Expansion:**
   Successful operations can be identified and expanded based on record analysis.

Types of Farm Records

Farm records vary depending on the nature of the farm (crop or livestock), but the following are the most common types:



1. **Farm Diary**
    - A daily record of all farm activities in chronological order.
    - Example entries: land clearing date, planting, fertilizer application, weeding, harvesting, etc.
    - It serves as a reference for future planning.
2. **Financial Record (Cash Book)**
    - Records all money that comes in (income) and goes out (expenses).
    - Helps determine whether the farm is making profit or loss.
3. **Input Record**
    - Contains details of all materials used on the farm such as seeds, fertilizers, chemicals, tools, and labour.

- Example: Quantity of maize seeds planted and the cost per kilogram.

4. **Production Record**
    - Shows the quantity of crops or produce harvested from the farm.
    - Used to assess yield performance and compare results from season to season.
5. **Sales Record**
    - Documents all items sold, their quantities, prices, buyers' names, and total income received.
    - Helps monitor market trends and profit.
6. **Inventory Record (Stock Record)**
    - Contains a list of all items owned by the farm, both fixed and current assets.
    - Example: tractors, hoes, fertilizers, seeds, pesticides, etc.
7. **Labour Record**
    - Records all workers engaged on the farm, type of work done, hours spent, and wages paid.
8. **Farm Equipment Record**
    - Keeps track of tools and machinery, their purchase dates, maintenance, and repairs.

Simple Example of a Farm Record Table

Farm Diary Sample (for a maize farm)

Date	Activity	Materials Used	Quantity	Remarks
10th March	Land clearing	Cutlass, hoe	—	Completed
15th March	Planting	Maize seeds	5 kg	Germination good

2nd April	Weeding	Hoe	—	Done
10th May	Fertilizer application	NPK 15:15:15	20 kg	Yield improved
30th July	Harvesting	—	8 bags of maize	Good harvest

Importance of Keeping Simple Farm Records in School Farms

In school farms, record keeping is essential because:

- It helps students learn how to manage agricultural projects.
- It provides data for agricultural science experiments.
- It helps teachers and students track the performance of different crops.
- It serves as evidence for evaluating students' practical work.

Summary

Farm records and management are vital for the success of any farming enterprise. Keeping accurate records helps the farmer monitor all farm activities, make informed decisions, and plan for future seasons. Good management ensures that all farm resources are properly utilized to achieve the best possible results.
Without proper records, a farmer cannot determine whether the farm is performing well or poorly. Therefore, every farmer must keep detailed records of income, expenses, production, sales, and daily operations.

Evaluation

1. Define farm records.
2. Mention and explain four types of farm records.
3. State five reasons why farm records are important.

4. What is farm management?
5. List and explain three functions of a farm manager.

Assignment

1. Prepare a simple farm diary showing five activities on a vegetable farm within one week.
2. Draw a sample table for a sales record showing date, crop sold, quantity, price per kg, and total income.
3. Describe four ways in which farm records help in improving farm management.

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WEEK 11: REVISION

Introduction

The revision for this term covers all the major topics discussed from Week 1 to Week 10. These topics introduced students to the foundation of horticulture and crop production — the branch of agriculture concerned with the cultivation of crops for food, raw materials, and other uses.

This revision will help students recall the key concepts, definitions, processes, and practices they have learned, and prepare them adequately for their end-of-term examination.

Summary of Key Topics Covered

1. Introduction to Crop Production

- **Crop production** is the branch of agriculture concerned with growing crops for human and animal use.
- It is important because it provides food, employment, raw materials, income, and contributes to the nation's economy.
- Examples of crops: maize, yam, rice (food crops); cocoa, rubber, oil palm (cash crops).

2. Farm Tools and Safety Measures

- **Farm tools** are simple implements used by farmers to carry out various operations on the farm, such as cutting, digging, weeding, and planting.
- Common tools include hoe, cutlass, rake, shovel, wheelbarrow, spade, axe, and watering can.
- **Maintenance** of tools involves cleaning, oiling, sharpening, and proper storage.
- **Safety measures** include wearing protective clothing, using tools correctly, handling sharp objects with care, and having a first aid box available on the farm.

3. Farmland Preparation Practices

- Preparing the land makes it suitable for planting crops.

- **Stages of land preparation:** clearing, ploughing, harrowing, and ridging.
- Each stage has its tools and purpose.
- Proper land preparation improves soil aeration, removes weeds, and promotes good crop growth.

4. Soil and Its Properties

- **Soil** is the upper layer of the earth where plants grow.
- **Types:** sandy, clayey, loamy.
- **Properties:** colour, texture, structure, and water-holding capacity.
- Loamy soil is the best for most crops because it retains water and nutrients while allowing good drainage.

5. Soil Texture and Structure

- **Soil texture** refers to the size of soil particles (sand, silt, and clay).
- **Soil structure** is how these particles are arranged or bound together.
- The texture and structure determine the soil's fertility and its suitability for different crops.
- **Soil testing** helps farmers know the nutrients available and decide what fertilizer to use.

6. Site Selection and Crop Types

- Choosing a good site for farming depends on several **factors:** soil type, rainfall, sunlight, drainage, and topography.
- **Crop classification by lifespan:** annual, biennial, and perennial crops.
- **Types of crops:** arable (maize, cassava), horticultural (fruits, vegetables), and plantation (oil palm, cocoa).

7. Crop Classification

- Crops are classified based on use, growth pattern, or life span.

- **Food crops:** provide food (rice, yam).
- **Cash crops:** grown for sale (cocoa, rubber).
- **Industrial crops:** used as raw materials (cotton, sugarcane).
- Crop classification helps in planning, research, and marketing.

8. Farm Records and Management

- **Farm records** are written accounts of all activities and transactions on a farm.
- **Types of farm records:** farm diary, input record, sales record, labour record, financial record, and inventory record.
- **Farm management** is the organization of all farm activities for maximum productivity.
- Good record keeping helps in decision-making, planning, and profit determination.

Key Concepts and Their Meanings

Concept	Meaning
Horticulture	The branch of agriculture dealing with the cultivation of fruits, vegetables, and ornamental plants.
Crop	A plant cultivated by humans for food, raw materials, or other purposes.
Soil	The natural material on the earth's surface that supports plant growth.
Loamy Soil	A mixture of sand, silt, and clay; most fertile soil type.
Farm Tools	Simple implements used to carry out farm operations.
Farm Record	Written evidence of activities and financial transactions on the farm.
Farm Management	The process of planning and controlling farm resources for productivity.

Summary of Key Learning Points

- Crop production sustains life through food and income generation.
- Proper use and maintenance of farm tools improve efficiency and safety.
- Soil management and land preparation are crucial for healthy crop growth.
- Farm records and good management practices ensure accountability and long-term success.
- Horticulture adds beauty, nutrition, and economic value to agriculture.

Evaluation

1. What is crop production?
2. Mention four importance of crop production to national development.
3. List four common farm tools and state one use of each.
4. Explain two stages of land preparation.
5. Define soil and list three types of soil.
6. State three factors to consider in selecting a farm site.
7. Mention three ways of classifying crops with one example each.
8. Define farm records and list three examples.
9. State three importance of keeping farm records.
10. Explain what farm management means.

Assignment

1. Write a short note on the role of crop production in Nigeria's economy.
2. Draw and label any five farm tools studied during the term.

3. Prepare a simple farm record table showing daily activities for one week on a school garden project.

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WEEK 1: INTRODUCTION TO HORTICULTURE

Introduction

Horticulture is an important branch of agriculture that focuses on the cultivation of fruits, vegetables, flowers, and ornamental plants. Unlike large-scale crop farming that often involves staple foods like rice, maize, or yam, horticulture is mainly concerned with the production of high-value crops that improve nutrition, beautify the environment, and generate income.
This lesson introduces students to the meaning, branches, importance, and career opportunities in horticulture.

Meaning of Horticulture

Horticulture is derived from two Latin words — *hortus* meaning "garden" and *cultura* meaning "cultivation."
It therefore means the **art and science of growing garden crops**, which include fruits, vegetables, flowers, and ornamental plants.
Horticulture is a science-based field that applies principles of biology, chemistry, and environmental science to improve plant growth, productivity, and quality.

Horticulture deals with:

- The growing of plants in gardens, greenhouses, and nurseries.
- The improvement of plants through selection, breeding, and management.
- The protection and conservation of ornamental landscapes.

In essence, horticulture is both a **science** (because it involves research and experimentation) and an **art** (because it involves creativity in design and cultivation).

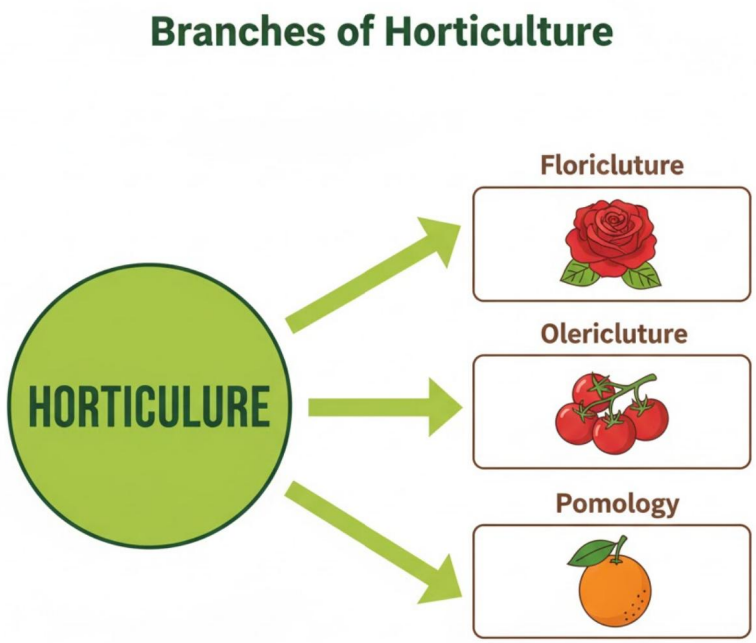
Branches of Horticulture

Horticulture is divided into several branches based on the types of plants cultivated and their uses. The main branches are:

1. **Floriculture:**
    - This branch deals with the growing and management of flowering and ornamental plants for decoration and landscaping.
    - Examples of plants grown: roses, hibiscus, marigolds, lilies, and sunflowers.
    - Floriculture products are used in parks, gardens, weddings, and beautification of homes and offices.
2. **Olericulture:**
    - This is the cultivation of **vegetables** used for human consumption.
    - It involves crops like tomatoes, pepper, onions, cabbage, okra, and spinach.
    - Olericulture emphasizes planting, irrigation, pest control, and harvesting of vegetables for local and commercial purposes.
3. **Pomology:**
    - Pomology focuses on the **production of fruits** such as mango, citrus, pineapple, banana, and pawpaw.
    - It covers planting, pruning, fertilizing, and harvesting of fruit crops.
    - Pomology also includes fruit storage, packaging, and marketing.

Other related branches sometimes included are:

- **Post-harvest Technology:** Handling, preservation, and storage of horticultural produce.
- **Landscape Horticulture:** Design and maintenance of parks, lawns, and recreational gardens.



Importance and Scope of Horticulture

Horticulture plays a vital role in food security, health, environmental conservation, and the economy. Its importance includes:

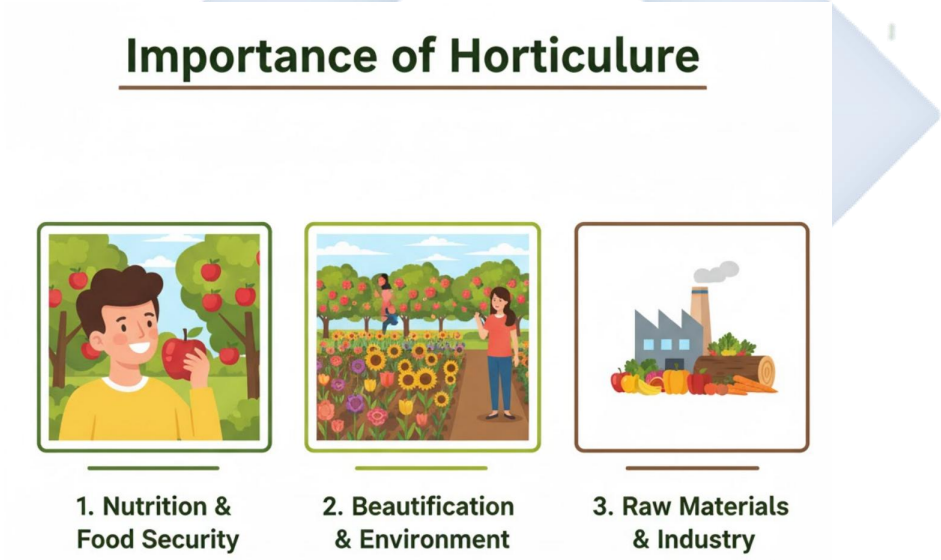
1. **Source of Nutrition:**
   Fruits and vegetables are rich in vitamins, minerals, and fiber, which are essential for good health.
2. **Income Generation:**
   Farmers and traders earn income through the sale of horticultural products such as vegetables, flowers, and fruits.
3. **Employment Opportunities:**
   Horticulture provides jobs for gardeners, nursery operators, florists, landscapers, marketers, and exporters.
4. **Beautification of the Environment:**
   Ornamental plants and flowers improve the appearance of surroundings and create relaxation areas in parks and gardens.

5. **Promotion of Export Trade:**
   Many countries earn foreign exchange from exporting horticultural produce like fresh fruits and cut flowers.

6. **Raw Materials for Industries:**
   Fruit processing industries use horticultural produce to make juice, jam, wine, and cosmetics.

7. **Improvement of Air Quality:**
   Plants absorb carbon dioxide and release oxygen, helping to purify the air and support a healthy environment.

8. **Education and Research:**
   Horticulture serves as a subject for agricultural education and scientific study in schools, colleges, and research institutions.



The scope of horticulture therefore extends beyond food production to include environmental management, landscaping, and industrial development.

Career Opportunities in Horticulture

Horticulture offers numerous career paths to individuals with interest in plants and environmental management. Examples include:

1. **Horticulturist** – Specializes in the science and technology of plant cultivation.
2. **Floriculturist** – Grows and manages flowering plants and ornamental gardens.
3. **Pomologist** – Works with fruit crops to improve yield and quality.
4. **Olericulturist** – Specializes in vegetable production and management.
5. **Landscape Designer/Architect** – Designs and maintains beautiful outdoor environments.
6. **Nursery Manager** – Oversees the propagation and care of young plants.
7. **Agricultural Extension Officer** – Provides technical advice and training to farmers.
8. **Research Scientist** – Studies plant genetics, soil fertility, and pest control methods.

These careers can be pursued in government ministries, research institutes, universities, and private agricultural enterprises.

Summary

Horticulture is the science and art of cultivating fruits, vegetables, flowers, and ornamental plants.
It is divided into branches such as floriculture (flowers), olericulture (vegetables), and pomology (fruits).
Horticulture is important because it provides nutrition, income, jobs, beauty, and raw materials for industries.
It also contributes to environmental conservation and national economic growth.

Evaluation

1. Define horticulture in your own words.
2. Mention and explain three main branches of horticulture.
3. List four importance of horticulture.

4. State three career opportunities in horticulture.
5. Differentiate between floriculture and olericulture.

Assignment

1. Explain the meaning of horticulture and give two examples of horticultural crops.
2. List and describe the three major branches of horticulture.
3. Mention five ways horticulture contributes to the national economy.
4. State four career paths available in horticulture and their roles.
5. Give three reasons why horticulture is important to environmental sustainability.

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WEEK 2: NURSERY ESTABLISHMENT (PART 1)

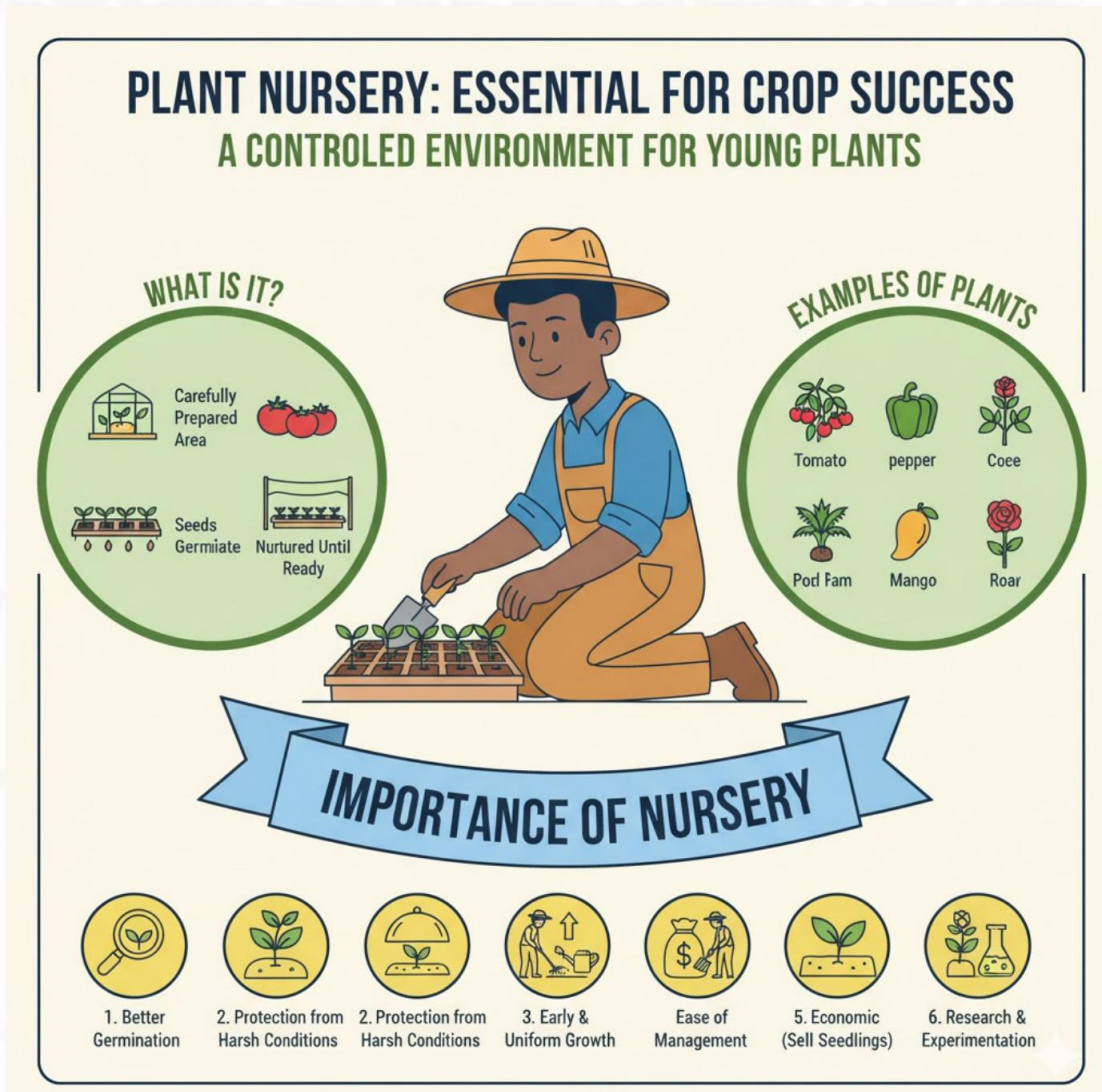
Introduction

A nursery is an essential part of horticulture and crop production where young plants are raised under controlled conditions before being transplanted to the main field.
It serves as a temporary home for seeds or seedlings, providing them with proper care and protection until they are strong enough to survive outdoor conditions.
In this lesson, we will learn the meaning, importance, types, site selection, and steps involved in establishing a nursery.

Meaning of Nursery

A **nursery** is a carefully prepared area or structure where young plants are grown, nurtured, and managed until they are ready for transplanting.
It provides a favourable environment for the germination of seeds and early growth of seedlings.
Nurseries can be found on farms, gardens, or commercial horticultural centres, and they vary in size depending on the scale of production.

Examples of plants usually raised in nurseries include tomato, pepper, oil palm, mango, guava, orange, and ornamental plants like hibiscus and roses.



Importance of Nursery

1. **Better Germination and Growth:**
   The controlled conditions of a nursery (such as shade, moisture, and temperature) promote healthy seed germination and uniform seedling growth.

2. **Protection from Harsh Conditions:**
   Nurseries protect young plants from wind, heavy rain, pests, and diseases that could destroy them in open fields.

3. **Efficient Use of Land and Inputs:**
   Only healthy seedlings are selected for transplanting, reducing waste of land, seeds, and fertilizers.
4. **Early and Uniform Crop Establishment:**
   Seedlings raised in nurseries are transplanted when conditions are favourable, ensuring uniform maturity and higher yield.
5. **Ease of Management and Monitoring:**
   Small nursery areas make it easy to water, weed, and fertilize the plants efficiently.
6. **Economic Benefits:**
   Nurseries allow farmers to sell seedlings to other growers, providing an additional source of income.
7. **Facilitates Research and Experimentation:**
   Scientists and students use nurseries to study plant varieties, seed viability, and growth performance.

Types of Nursery

Nurseries are classified based on duration and purpose. The main types include:

1. **Temporary Nursery:**
   - Established for a short period (one planting season).
   - Usually close to the main field where seedlings will be transplanted.
   - Example: vegetable nurseries for tomatoes or peppers.
2. **Permanent Nursery:**
   - Established for long-term use and managed continuously.
   - Used for perennial crops such as cocoa, oil palm, citrus, and ornamental trees.
   - Often equipped with irrigation, shading, and pot systems.

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3. **Commercial Nursery:**
    - Managed by private or public enterprises for selling seedlings to farmers, landscapers, or institutions.
    - Requires skilled personnel and quality control.
4. **Educational or Research Nursery:**
    - Found in schools, agricultural colleges, or research institutes.
    - Used for training students and conducting experiments on plant growth.

Site Selection for Nursery

Choosing the right site is critical to ensure healthy and successful nursery production.
The following factors should be considered:

1. **Accessibility:**
   The site should be easy to reach for transportation of inputs (seeds, soil, manure) and seedlings.
2. **Soil Quality:**
   The soil should be fertile, loamy, well-drained, and rich in organic matter to support healthy root growth.
3. **Water Supply:**
   There should be a reliable source of clean water for regular watering and irrigation.
4. **Light and Shade:**
   The area should receive moderate sunlight and partial shade to prevent scorching of tender seedlings.
5. **Topography (Land Shape):**
   The site should be flat or gently sloping to avoid waterlogging or erosion.
6. **Protection from Wind:**
   The site should be sheltered from strong winds that can damage young plants.

7. **Proximity to the Main Field:**
   The nursery should be located close to where seedlings will be transplanted to reduce transport stress.

Tools and Materials Used in Nursery Establishment

- Cutlass or hoe – for clearing and shaping the land.
- Rake – for smoothing the surface.
- Watering can – for gentle watering of seedlings.
- Hand trowel – for transplanting and mixing soil.
- Shovel – for digging and soil mixing.
- Wheelbarrow – for carrying soil and manure.
- Sieves – for soil preparation.
- Polythene bags or seed trays – for raising seedlings.
- Shade nets or palm fronds – for covering the nursery.

Steps in Establishing a Nursery

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1. **Clearing the Site:**

   Remove weeds, debris, and stumps to prepare a clean working area.

2. **Soil Preparation:**

   Loosen the soil with a hoe or shovel and remove stones or hard lumps to ensure proper aeration.

3. **Marking and Layout:**

   Divide the nursery into plots or seedbeds, leaving paths for easy movement and watering.

4. **Addition of Manure:**
   Mix organic manure or compost with topsoil to improve fertility and structure.
5. **Seed Sowing:**
   Sow seeds either by broadcasting or in rows, depending on the crop type.
6. **Mulching and Watering:**
   Apply mulch such as dry grass to conserve moisture, and water regularly with a fine watering can.
7. **Providing Shade:**
   Erect shade using palm fronds, shade nets, or bamboo frames to protect seedlings from excessive sun or rain.
8. **Weeding and Thinning:**
   Remove unwanted weeds and excess seedlings to ensure proper spacing and healthy growth.
9. **Transplanting:**
   When seedlings are mature enough (usually 2–4 weeks), they are carefully uprooted and transferred to the main farm.

Summary

A nursery is a controlled environment where young plants are raised before being transplanted to the main field.
Nurseries can be temporary, permanent, commercial, or educational.
They are essential for good germination, early planting, and efficient management.
Establishing a nursery requires proper site selection, good soil, water supply, shade, and regular care.

Evaluation

1. Define a nursery.

2. State four importance of a nursery.
3. List and explain two main types of nursery.
4. Mention five factors to consider when selecting a nursery site.
5. List four tools used in establishing a nursery.

Assignment

1. Explain five steps involved in establishing a nursery.
2. Differentiate between a temporary and a permanent nursery.
3. State five advantages of raising seedlings in a nursery before transplanting.
4. Draw and label five nursery tools.
5. Mention four crops that are commonly raised in a nursery before transplanting.

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WEEK 3: NURSERY BED PREPARATION

Introduction

A **nursery bed** is a small portion of land or a raised surface where seeds are sown and young plants are nurtured before being transplanted to the main field.
Preparing a good nursery bed is one of the most important steps in successful crop and horticultural production because it ensures uniform germination, healthy seedlings, and proper management of young plants.

In this lesson, we will study the meaning and purpose of a nursery bed, materials and tools used for preparation, soil sterilization, watering, and the practical procedures involved.

Meaning of Nursery Bed

A **nursery bed** is a specially prepared piece of land where seeds are sown for the purpose of raising seedlings.
It is usually small in size, rectangular in shape, and may be **raised**, **flat**, or **sunken**, depending on the type of crop and soil condition.
A well-prepared nursery bed ensures adequate drainage, aeration, and easy management of the seedlings.

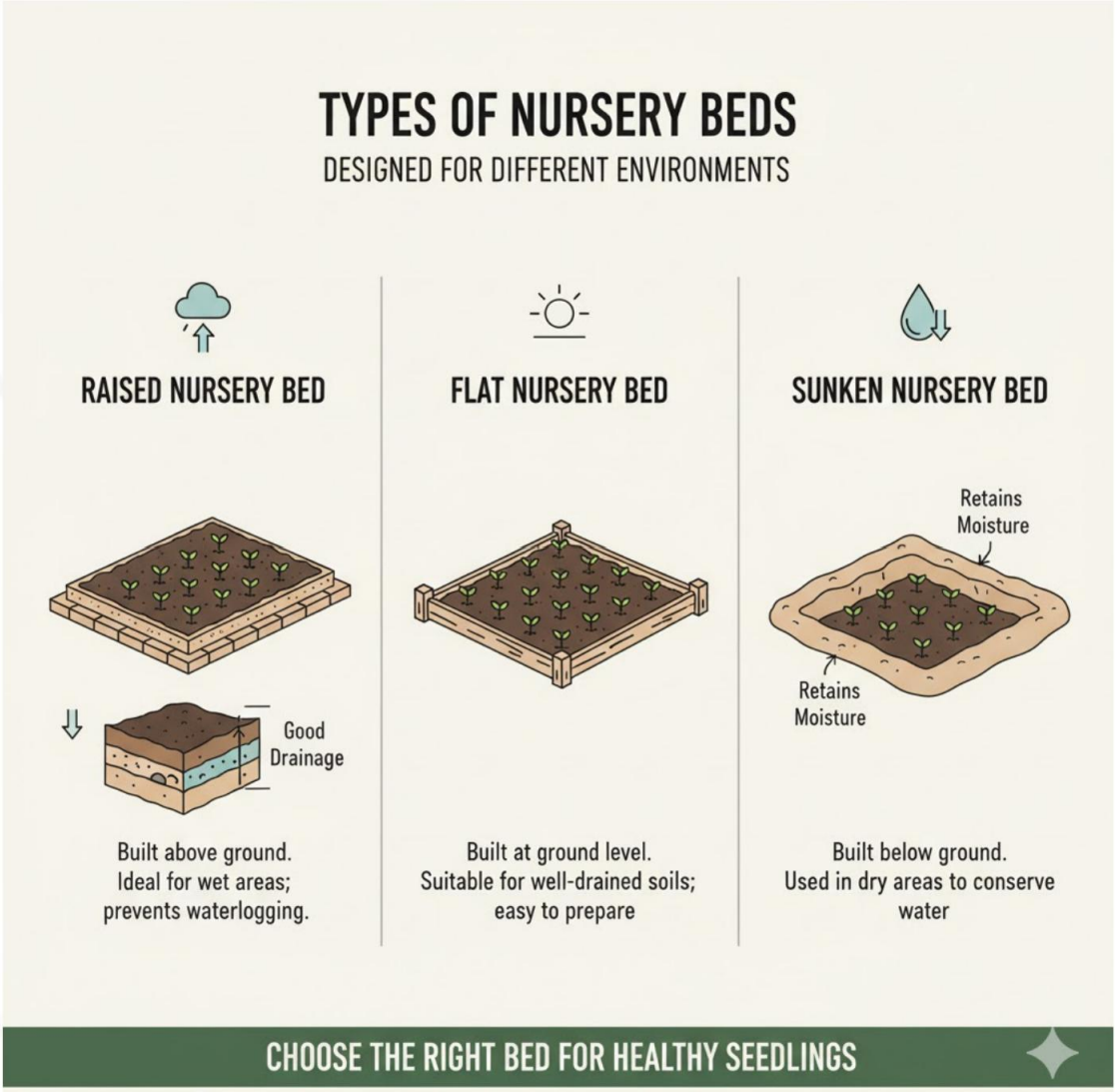
Purpose of Nursery Bed

1. **To Raise Seedlings in a Controlled Environment:**
   It provides favourable conditions such as moisture, temperature, and soil fertility for seed germination and early growth.
2. **To Facilitate Easy Management:**
   Since the area is small, watering, weeding, and pest control become easier and more effective.

3. **To Save Space and Inputs:**
   Only healthy seedlings are selected for transplanting, reducing waste of seeds, fertilizers, and land.
4. **To Ensure Uniform Growth:**
   The even soil and planting conditions in nursery beds promote uniform seedling development.
5. **To Protect Seeds and Seedlings:**
   It helps protect delicate young plants from wind, heavy rain, drought, and pests.

Types of Nursery Beds

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1. **Raised Nursery Bed:**
    - Built slightly above ground level (about 15–20 cm high).
    - Commonly used in areas with heavy rainfall or poor drainage.
    - It prevents waterlogging and ensures good aeration.
2. **Flat Nursery Bed:**
    - Built at the same level as the ground surface.
    - Suitable for well-drained soils and crops that do not tolerate excessive dryness.
    - Easier to prepare but prone to flooding in wet seasons.

3. **Sunken Nursery Bed:**
    - Built below the ground level.
    - Used in dry or arid areas to help conserve water.
    - It retains moisture better than other types.

Materials and Tools Needed for Nursery Bed Preparation

Materials:

- Topsoil (loamy and fertile soil)
- Organic manure or compost
- Mulch materials (dry grasses or palm leaves)
- Shade materials (palm fronds, shade nets, or bamboo structures)
- Water source

Tools:

- Hoe
- Rake
- Spade
- Cutlass
- Shovel
- Hand trowel
- Watering can
- Measuring tape or rope
- Pegs and string for marking out

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Steps in Preparing a Nursery Bed

1. **Site Clearing:**

   Remove all weeds, stones, and debris from the selected nursery site using a hoe or cutlass.

2. **Measurement and Marking Out:**

   Measure the nursery area and mark the boundaries using pegs and strings.

   The ideal size of a nursery bed is usually **3 meters long × 1 meter wide** with paths of about 50 cm between beds.

3. **Loosening the Soil:**

   Use a hoe or spade to loosen the soil to a depth of about 15–20 cm.

   This allows roots to penetrate easily and improves aeration.



4. **Removal of Stones and Lumps:**

   Break soil clods and remove stones or sticks to ensure a fine and smooth surface.

5. **Mixing of Manure:**
   Mix well-rotted organic manure with the topsoil in a 1:3 ratio to improve soil fertility and structure.

6. **Raising the Bed (if necessary):**
   Heap the soil to form a raised bed and level the surface using a rake.

7. **Soil Sterilization:**
   Sterilize the soil to kill pests, weed seeds, and disease organisms.
   Common methods include:

   - **Solarization:** Cover the soil with transparent plastic for 2–3 days under the sun.
   - **Boiling Water Treatment:** Pour hot water over the soil surface to destroy harmful organisms.
   - **Burning Method:** Light dry grass on the bed and allow the ash to mix with the soil.

8. **Mulching:**
   Cover the bed with dry grass or leaves to conserve moisture and prevent erosion after sowing.

9. **Watering:**
   Water the bed gently using a watering can with a fine nozzle to avoid washing away seeds.

10. **Shading:**
    Erect shade over the bed to protect the seedlings from direct sunlight and heavy rain.

11. **Labelling:**
    Attach a tag or label to identify the crop, variety, and date of sowing.

Soil Sterilization

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Meaning:

Soil sterilization is the process of killing harmful microorganisms, pests, and weed seeds in the soil before planting.

Importance of Soil Sterilization:

- Prevents damping-off disease and root rot in seedlings.
- Eliminates weed competition.
- Promotes healthy and uniform growth.
- Reduces pest and disease attacks.

Simple Classroom Activity:

Students can sterilize a small portion of nursery soil using the boiling water or burning method under teacher supervision.

Watering of Nursery Bed

Watering is one of the most important maintenance operations in a nursery.

- Use a **watering can with a fine rose** to sprinkle water evenly.
- Water **daily** in the morning or evening when temperature is low.
- Avoid excessive watering to prevent waterlogging or fungal infection.

Practical Demonstration (Teacher or Group Activity)

Students should:

1. Clear and prepare a small portion of the school garden for a nursery bed.
2. Measure and mark out the bed using pegs and string.
3. Mix soil and organic manure.
4. Raise the bed and sterilize the soil.

5. Mulch and water the bed properly.
6. Erect shades using palm fronds.

Summary

A nursery bed is a small, well-prepared plot for raising seedlings before transplanting.
It can be raised, flat, or sunken depending on soil type and environmental conditions.
Preparation involves clearing, loosening soil, mixing manure, sterilizing, watering, mulching, and shading.
Properly prepared nursery beds promote healthy seedlings and high crop yield.

Evaluation

1. Define a nursery bed.
2. State three types of nursery beds and describe each.
3. List five materials and five tools used in preparing a nursery bed.
4. Mention four steps in preparing a nursery bed.
5. Explain the meaning and importance of soil sterilization.

Assignment

1. Describe the step-by-step process of preparing a raised nursery bed.
2. List and explain three methods of soil sterilization.
3. Draw and label a simple diagram of a well-prepared nursery bed showing its parts (bed, path, shade, mulch, and label).

WEEK 4: FERTILIZER APPLICATION

Introduction

Fertilizer application is one of the most important practices in crop and horticultural production. Fertilizers supply essential nutrients that plants need for healthy growth, flowering, and fruiting. Without adequate nutrients, plants grow weak, produce low yields, and become easily attacked by pests and diseases.

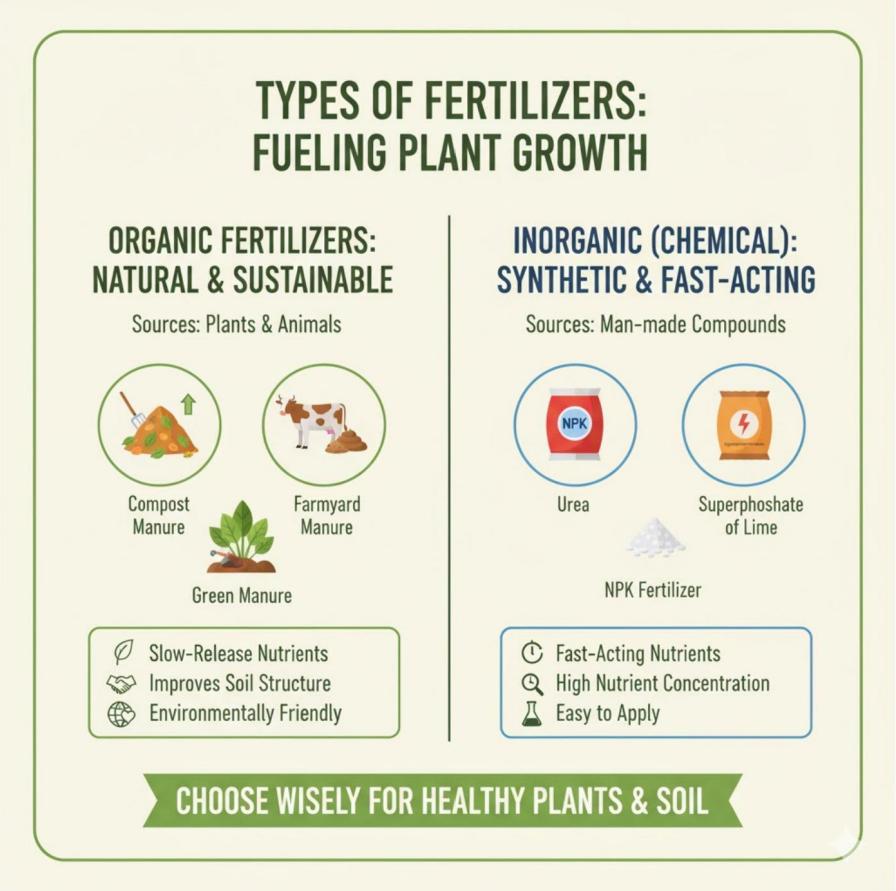
In this lesson, we will learn the meaning and types of fertilizers, various methods of application, importance of balanced fertilization, and the effects of misuse of fertilizers on crops and soil.

Meaning of Fertilizer

A **fertilizer** is any substance—natural or artificial—added to the soil or plant to increase its fertility and supply nutrients necessary for plant growth.
Fertilizers improve the soil's nutrient content and promote healthy development of roots, leaves, flowers, and fruits.

There are two main categories of fertilizers: **organic** and **inorganic**.

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Types of Fertilizers

1. Organic Fertilizers

Organic fertilizers are obtained from natural sources such as plants and animals.

They contain nutrients in complex organic forms that are released slowly into the soil.

Examples:

- Compost manure
- Farmyard manure
- Green manure
- Bone meal
- Blood meal
- Poultry droppings

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Advantages:

1. Improve soil structure and texture.
2. Increase water-holding capacity of soil.
3. Supply micronutrients in addition to major nutrients.
4. Encourage the growth of beneficial soil organisms.
5. Environmentally friendly and non-toxic.

Disadvantages:

1. Nutrients are released slowly.
2. Bulky and difficult to transport.
3. May contain weed seeds if not properly decomposed.

2. Inorganic (Chemical) Fertilizers

Inorganic fertilizers are man-made or synthetic substances produced from chemical compounds. They provide nutrients in a readily available form that plants can absorb immediately.

Examples:

- NPK (Nitrogen, Phosphorus, Potassium) fertilizer
- Urea
- Ammonium sulphate
- Superphosphate of lime (SSP)
- Potassium chloride (Muriate of potash)

Advantages:

1. Supply nutrients quickly to plants.
2. Easy to store, transport, and apply.

3. Require small quantities for large areas.
4. Promote rapid crop growth and high yield.

Disadvantages:

1. Continuous use may reduce soil fertility and destroy microorganisms.
2. Can cause soil acidity or toxicity if misused.
3. Expensive to purchase.
4. May cause environmental pollution if washed into rivers.

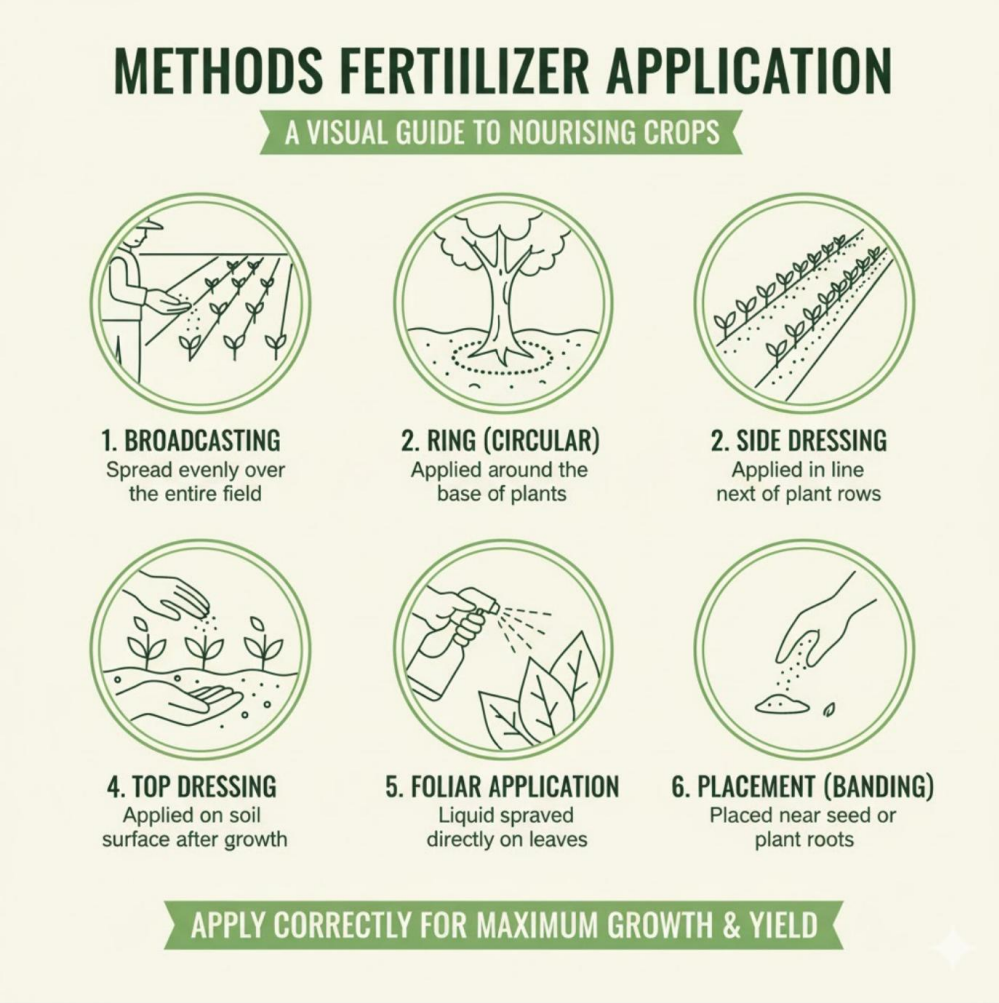
Importance of Balanced Fertilization

Balanced fertilization means applying the right type and amount of nutrients according to the needs of the soil and the crop.
When the correct balance of nutrients is maintained, plants grow well and produce abundant yields.

Importance:

1. Enhances plant growth and yield.
2. Improves quality of fruits, vegetables, and flowers.
3. Strengthens plant resistance to diseases.
4. Prevents wastage of fertilizer and reduces cost.
5. Protects the environment from chemical pollution.
6. Maintains soil fertility for future planting seasons.

Methods of Fertilizer Application



Different crops and soil conditions require different methods of fertilizer application. The major methods include:

1. Broadcasting

Fertilizer is spread evenly over the entire field either before or after planting.

- Suitable for small-seeded crops like rice and pasture.
- Can be done manually or with a spreader.
- May result in nutrient wastage if not well controlled.

2. Ring (Circular) Application

Fertilizer is applied around the base of a plant, about 5–10 cm from the stem, in a circular pattern.

- Common in fruit trees, vegetables, and ornamental plants.
- Ensures nutrients are close to the roots where they are needed.

3. Side Dressing

Fertilizer is applied beside the growing crop, usually in a line parallel to the row of plants.

- Useful for maize, cassava, and vegetables.
- Helps plants access nutrients during their active growth stages.

4. Top Dressing

Fertilizer is applied to the surface of the soil after crops have started growing.

- Often used for nitrogen fertilizers like urea and ammonium sulphate.
- Promotes rapid leaf growth and greenness.

5. Foliar Application

Liquid fertilizer is sprayed directly onto the leaves using a sprayer.

- Plants absorb nutrients through their stomata.
- Suitable for micronutrient deficiency correction.

6. Placement (Banding)

Fertilizer is placed in a hole or furrow close to the seed or plant root during planting.

- Prevents nutrient loss and ensures effective absorption by roots.

Effects of Misuse of Fertilizers

Improper or excessive use of fertilizers can cause serious problems for plants, soil, and the environment.

Effects include:

1. **Soil Acidification:** Excess nitrogen fertilizer reduces soil pH, making it unsuitable for crops.
2. **Nutrient Imbalance:** Too much of one nutrient can prevent others from being absorbed.
3. **Plant Burn:** High concentration of fertilizer salts damages plant roots and leaves.
4. **Water Pollution:** Fertilizer runoff contaminates streams and rivers, harming aquatic life.
5. **Reduced Soil Microorganisms:** Continuous use of chemical fertilizers can kill beneficial soil organisms.

Safety Precautions in Fertilizer Handling and Application

1. Wear protective gloves, boots, and masks.
2. Avoid inhaling fertilizer dust or fumes.
3. Wash hands after handling fertilizer.
4. Do not apply fertilizer during heavy rain to avoid leaching.
5. Store fertilizers in a dry and well-ventilated area away from children and food items.
6. Follow manufacturer's instructions for dosage and application method.

Summary

Fertilizers are substances added to the soil to enhance fertility and promote plant growth.
They can be organic (natural) or inorganic (chemical).
Balanced fertilization ensures that plants receive the right nutrients for healthy growth.
Common methods of application include broadcasting, ring method, side dressing, top dressing, foliar, and placement.
However, misuse of fertilizers can harm plants, reduce soil fertility, and cause pollution.

Evaluation

1. Define fertilizer and state its two main types.
2. List three examples each of organic and inorganic fertilizers.
3. Mention four methods of fertilizer application.
4. Explain the term “balanced fertilization.”
5. State three effects of fertilizer misuse on soil or plants.

Assignment

1. Differentiate between organic and inorganic fertilizers with two examples each.
2. Write short notes on (a) Broadcasting method, (b) Top dressing method, (c) Foliar application.
3. State five safety precautions to observe when applying fertilizers.

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WEEK 6: SEED COLLECTION AND DORMANCY BREAKING

Introduction

Seed collection and dormancy breaking are essential practices in horticulture and crop production.

Good seed quality determines the success of any planting operation. Before seeds can be planted, they must be properly collected, stored, and prepared for germination.

Sometimes, even healthy seeds fail to germinate immediately after planting because they are in a resting state called **dormancy**.

This lesson will explain how to collect viable seeds, understand seed dormancy, and apply various methods to break dormancy before planting.



Meaning of Seed Collection

Seed collection refers to the process of gathering mature and viable seeds from healthy plants for propagation or future planting.
Seeds are collected from crops, fruits, or flowers after they have reached maturity and are ready to reproduce.

Purposes of Seed Collection:

1. To obtain planting materials for the next season.
2. To preserve good plant varieties and desirable traits.
3. To ensure high-quality, disease-free seeds.
4. To reduce the cost of buying seeds.
5. To maintain seed diversity in horticulture.

Qualities of Good Seeds for Collection:

1. Mature and fully developed.
2. Free from pests and diseases.
3. Obtained from healthy and high-yielding plants.
4. Dry and firm to touch.
5. True to type (from the desired variety).

Sources of Seeds

Seeds can be obtained from various places depending on the type of crop.

Common sources include:

1. Research institutions and seed companies.
2. Agricultural extension agencies.
3. Farmers' cooperative societies.

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4. Community seed banks.
5. Direct collection from mature plants or fruits in the garden.

Methods of Seed Collection

The method used depends on the type of crop or fruit being harvested.

1. **Manual Collection:**
    - Seeds are handpicked from ripe fruits or pods.
    - Used for crops like beans, tomatoes, and peppers.
2. **Mechanical Collection:**
    - Machines are used to harvest seeds from large farms.
    - Suitable for grains like maize, rice, and wheat.
3. **Shaking or Beating Method:**
    - Tree branches are gently shaken or beaten with sticks to release dry seeds into collection nets.
4. **Cutting and Threshing:**
    - Plants are cut, dried, and threshed to separate seeds from pods or husks.
    - Used for legumes and cereals.
5. **Winnowing and Cleaning:**
    - After threshing, seeds are cleaned and separated from chaff or debris using wind or sieves.

Storage of Viable Seeds

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After collection, seeds must be stored properly to remain viable (alive and capable of germination).

Storage Methods:

1. **Dry Storage:**
    - Seeds are kept in airtight containers or bags in a cool, dry place.
2. **Refrigerated Storage:**
    - Used for sensitive seeds that lose viability quickly (e.g., vegetable seeds).
3. **Seed Banks:**
    - Institutions that preserve seeds under controlled conditions for long-term use.

Conditions for Proper Storage:

- Seeds must be dry before storage.
- Store in moisture-proof containers.
- Keep away from direct sunlight and pests.
- Label containers with crop name and date of collection.

Meaning of Seed Dormancy

Seed dormancy is the natural condition in which a viable seed fails to germinate even when the environmental conditions (water, oxygen, temperature) are favorable.
Dormancy is a protective mechanism that prevents seeds from germinating before the right season or under unfavorable conditions.

Causes of Seed Dormancy:

1. Hard or impermeable seed coat (e.g., in beans or tamarind).
2. Presence of chemical inhibitors that prevent germination.
3. Immature embryo inside the seed.

4. Lack of light or oxygen.
5. Extremely dry or cold conditions.

Reasons for Breaking Seed Dormancy

1. To encourage uniform germination.
2. To speed up seed sprouting before planting.
3. To ensure higher germination rate.
4. To prepare seeds for planting in the right season.
5. To promote good crop establishment and yield.

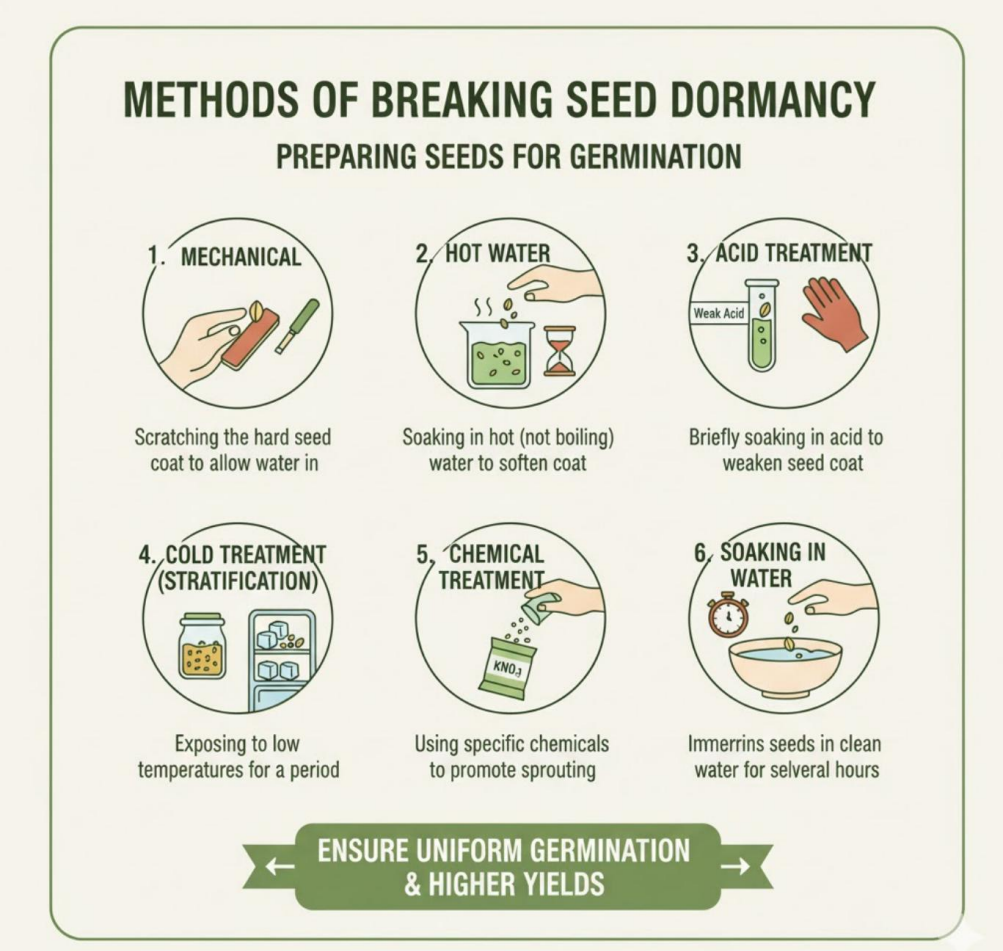
Methods of Breaking Seed Dormancy

1. **Mechanical Scarification:**
    - Scratching or gently rubbing the hard seed coat with sandpaper, knife, or file to allow water entry.
    - Used for seeds with hard coverings like beans and tamarind.
2. **Hot Water Treatment:**
    - Seeds are soaked in hot (not boiling) water for a few minutes, then allowed to cool before planting.
    - Helps soften seed coats and speed up germination.
3. **Acid Treatment:**
    - Seeds are soaked briefly in weak acid solution (e.g., sulfuric acid) to weaken the seed coat.
    - Used in industrial seed preparation under controlled conditions.

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4. **Cold Treatment (Stratification):**
    - Seeds are exposed to low temperatures for a period to break dormancy.
    - Common for temperate crops like apples and strawberries.
5. **Chemical Treatment:**
    - Seeds are treated with chemicals such as potassium nitrate (KNO_3) or gibberellic acid (GA_3) to promote germination.
6. **Dry Heat or Sun Drying:**
    - Seeds are spread under mild sunlight or warm air to remove excess moisture that delays germination.
7. **Soaking in Water:**
    - Seeds are soaked in clean water for several hours to soften the seed coat.
    - Commonly used for cowpea, maize, and groundnut.

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Importance of Proper Seed Preparation

1. Ensures high germination rate and better crop stand.
2. Promotes early maturity and uniform growth.
3. Reduces seed wastage and production costs.
4. Improves yield and quality of produce.
5. Encourages good farm management and planning.

Safety Precautions During Dormancy Breaking

1. Wear gloves and goggles when handling acids or chemicals.
2. Avoid soaking seeds in excessively hot water.

3. Label treated seeds clearly to avoid confusion.
4. Wash hands thoroughly after treatment.
5. Keep chemicals away from food and water sources.

Summary

Seed collection involves gathering mature and healthy seeds for future planting.
Seeds must be properly cleaned, dried, and stored in suitable conditions to maintain viability.
Some seeds do not germinate immediately because they are dormant.
Seed dormancy can be broken using several methods such as soaking, scarification, hot water, or chemical treatment.
Proper seed handling and dormancy breaking ensure uniform germination, high yield, and successful crop production.

Evaluation

1. Define seed collection.
2. List four qualities of good seeds for collection.
3. Explain the term seed dormancy.
4. Mention three causes of seed dormancy.
5. State four methods of breaking seed dormancy.

Assignment

1. List and describe five methods of seed collection.
2. Explain any three reasons for breaking seed dormancy.
3. State five safety precautions to observe during seed dormancy treatment.

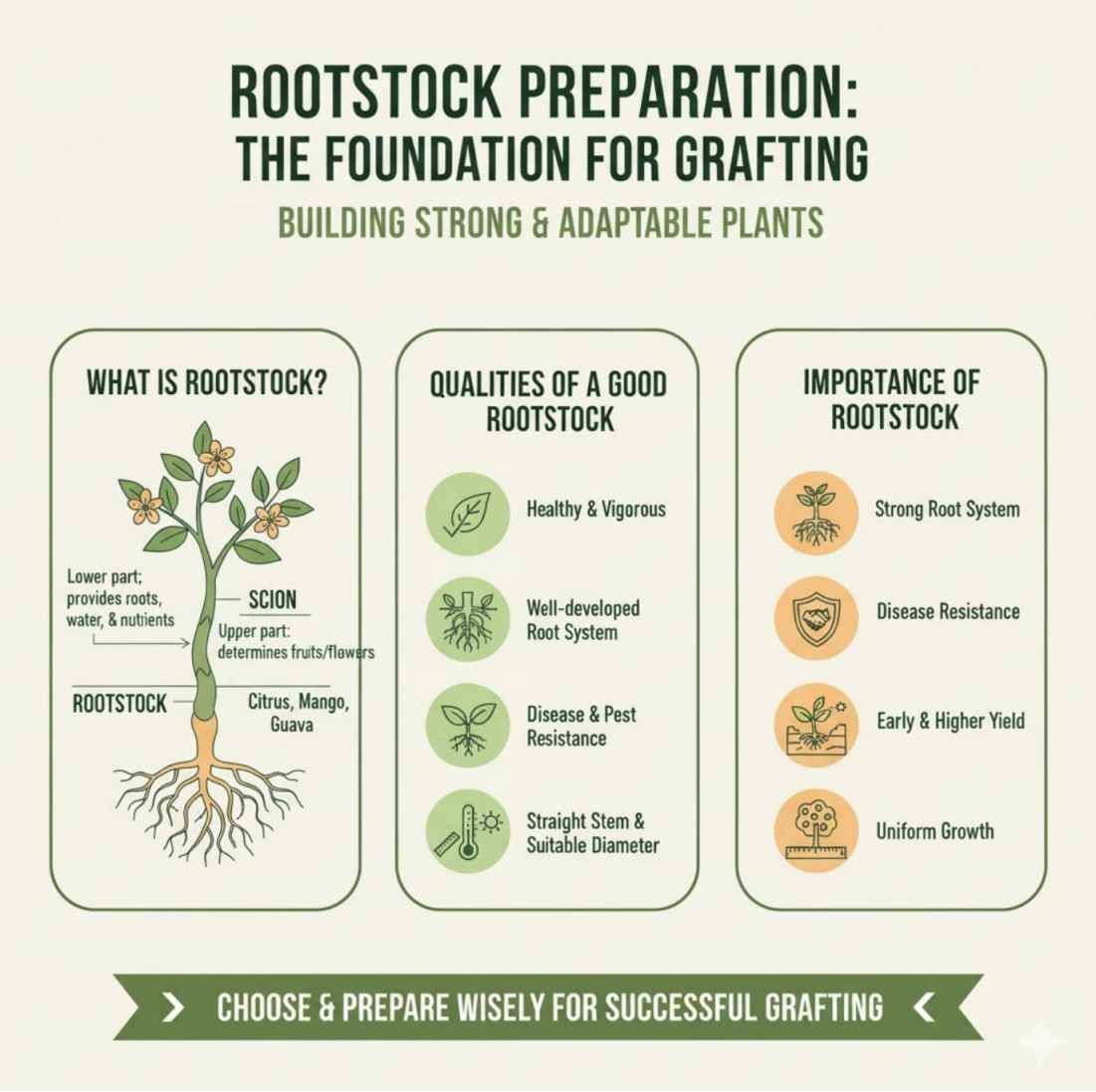
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WEEK 8: ROOTSTOCK PREPARATION

Introduction

In horticulture, one of the most important plant propagation techniques is **grafting**, which involves joining two plant parts so that they grow as one.
The lower part of the plant used for support and nutrient supply is called the **rootstock**, while the upper part that bears flowers or fruits is the **scion**.

Proper preparation of the rootstock is very important because it determines the strength, disease resistance, and survival of the grafted plant.
This lesson explains the meaning, qualities, preparation steps, and care of rootstock used in horticultural practices.



Meaning of Rootstock

A **rootstock** is the lower part of a plant that provides the root system for another plant in grafting or budding operations.
It serves as the base onto which the scion is joined.
The rootstock is responsible for anchoring the plant and supplying water and nutrients from the soil to the scion.

In simple terms, the rootstock provides the foundation, while the scion determines the fruit or flower characteristics.

Examples of common rootstocks:

- Citrus species (used for oranges, lemons, and tangerines)
- Mango seedlings
- Guava seedlings
- Apple or pear seedlings
- Rubber and cocoa seedlings

Importance of Rootstock in Horticulture

1. Provides a strong and healthy root system for grafted plants.
2. Improves the resistance of plants to soil-borne diseases and pests.
3. Increases the adaptability of plants to different soil and climatic conditions.
4. Controls the growth and size of the scion (e.g., dwarfing effect).
5. Promotes early fruiting and higher yield.
6. Ensures uniformity in growth and production.
7. Helps propagate plants that do not grow well from seeds.

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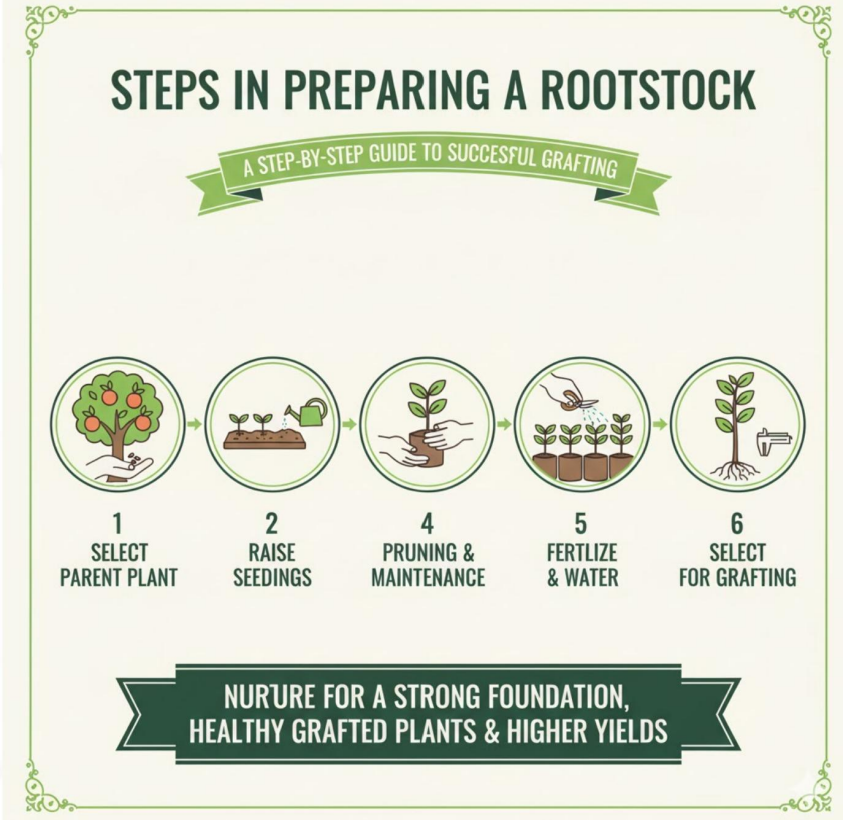
Qualities of a Good Rootstock

A good rootstock must have certain desirable qualities to ensure the success of grafting or budding.

1. **Healthy and Vigorous:**
    - Should be free from diseases, pests, and deformities.
2. **Compatible with the Scion:**
    - The rootstock and scion must belong to the same or closely related species for proper union.
3. **Well-developed Root System:**
    - Should have strong, fibrous roots that can anchor the plant firmly and absorb water effectively.
4. **Good Adaptability:**
    - Must tolerate the local soil, temperature, and moisture conditions.
5. **Resistance to Diseases and Pests:**
    - Especially root rot and nematode attacks.
6. **Straight Stem and Suitable Diameter:**
    - The stem should be smooth, straight, and nearly equal in thickness to the scion.
7. **Age and Maturity:**
    - Usually young, actively growing seedlings are best for use as rootstock.

Preparation of Rootstock

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The process of preparing a rootstock for grafting or budding involves several careful steps to ensure a healthy and successful plant union.

Step 1: Selection of Parent Plant

- Choose a healthy and disease-free plant from which seeds or cuttings will be obtained.
- The plant should have desirable characteristics such as strong roots and good growth rate.

Step 2: Raising the Seedlings

- Sow seeds of the selected plant species in a well-prepared nursery bed or pots.
- Water regularly and protect from pests until seedlings are strong enough to be transplanted.
- The seedlings that grow into sturdy young plants will serve as rootstocks.

Step 3: Transplanting

- Transplant seedlings into polybags or pots when they are about 15–30 cm tall.

- This allows each rootstock to develop independently and become stronger.

Step 4: Pruning and Maintenance

- Remove weak or damaged shoots to encourage healthy growth.
- Apply manure or fertilizer to promote root development.
- Weed regularly and water moderately.

Step 5: Selection for Grafting

- When the rootstock reaches the desired height and thickness (about the size of a pencil), it is ready for grafting or budding.
- The stem should be straight, firm, and free from cracks or wounds.

Care of Rootstock

1. **Regular Watering:**
    - Maintain adequate moisture, especially in dry periods.
2. **Weeding:**
    - Keep the nursery or pots free from weeds that compete for nutrients.
3. **Pest and Disease Control:**
    - Inspect regularly and apply organic or chemical control methods where necessary.
4. **Fertilization:**
    - Apply compost or NPK fertilizer sparingly to promote healthy root growth.
5. **Proper Spacing:**
    - Avoid overcrowding to allow enough air and sunlight for each plant.
6. **Shading and Protection:**
    - Provide shade for young rootstocks to protect from direct sunlight and heavy rain.

Common Mistakes in Rootstock Preparation

1. Using diseased or weak seedlings.
2. Selecting rootstock and scion that are not compatible.
3. Overwatering, which can cause root rot.
4. Using over-aged or too-young seedlings for grafting.
5. Poor handling that injures the rootstock during transplanting.

Demonstration (Practical Activity)

Students can observe or participate in a simple demonstration:

1. Select healthy citrus seedlings as rootstocks.
2. Transplant them into pots or polybags.
3. Label and care for them for a few weeks until they are ready for budding or grafting.

This practical helps students understand how to select, grow, and maintain rootstocks before actual grafting.

Summary

A rootstock is the lower part of a plant that supports the scion in grafting or budding.
It must be healthy, vigorous, and compatible with the scion for a successful union.
Proper preparation and care—such as watering, weeding, and pest control—ensure that the rootstock grows strong and ready for propagation.
Using the right rootstock leads to stronger plants, early fruiting, and better yields in horticulture.

Evaluation

1. Define rootstock.
2. State four qualities of a good rootstock.
3. Mention three importance of rootstock in horticulture.
4. List the major steps in preparing a rootstock.
5. Identify three common mistakes in rootstock preparation.

Assignment

1. Explain five qualities of a good rootstock with examples.
2. Describe the process of preparing a rootstock for grafting.
3. List and explain four care practices for maintaining healthy rootstocks.

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WEEK 9: SCION COLLECTION

Introduction

In horticultural propagation, **grafting** involves joining two living plant parts so that they unite and grow as a single plant.
The **rootstock** forms the lower part, while the **scion** forms the upper part that determines the variety and quality of fruits or flowers.

For grafting to succeed, both the rootstock and scion must be carefully selected and prepared. This lesson focuses on the meaning of a scion, its qualities, techniques of collection, and proper handling to ensure successful grafting.

Meaning of Scion

A **scion** is a detached shoot or bud of a desired plant variety that is grafted onto a rootstock.
It is the upper part of the new plant that will produce the branches, leaves, flowers, and fruits.

The scion carries the **genetic characteristics** of the parent plant, such as fruit size, taste, colour, and yield quality.

In simple terms:
The scion determines *what kind of plant you get*, while the rootstock determines *how strong the plant will grow*.

Examples of Common Scions Used in Horticulture

- Citrus (orange, tangerine, lemon)
- Mango varieties
- Cocoa
- Guava
- Apple and pear

- Rubber

Importance of Scion in Grafting

1. Determines the variety and quality of fruit or flower produced.
2. Preserves desirable traits of a parent plant, such as sweetness, flavour, and size.
3. Enables mass propagation of improved plant species.
4. Reduces the time taken for a plant to start bearing fruits (early maturity).
5. Ensures uniformity in fruit type and production.
6. Helps in combining disease resistance from rootstock with productivity from scion.

Qualities of a Good Scion

To achieve successful grafting, the scion must possess specific desirable qualities:

1. **Healthy and Disease-free:**
    - Should not show signs of infection, pest attack, or physical damage.
2. **Mature but Not Old:**
    - Scion should be taken from a mature branch that has stopped growing rapidly but is still fresh and green.
3. **Proper Size and Thickness:**
    - The diameter of the scion should be almost equal to that of the rootstock (about the size of a pencil).
4. **True-to-type:**
    - Must come from a mother plant known for desirable qualities (good fruit size, taste, or yield).

5. **Vigorous Growth:**
    - Should be taken from a well-nourished and vigorously growing parent plant.
6. **Presence of Viable Buds:**
    - Scion should have at least two or three healthy buds that will sprout after grafting.
7. **Moist and Fresh:**
    - Should not be dry or withered; moisture helps maintain life before grafting.

Techniques of Scion Collection

Proper collection of scions requires care and timing. The following are the main steps:

Step 1: Selection of Parent Plant

- Choose a healthy, high-yielding plant with desirable traits.
- Avoid plants that show symptoms of disease or stress.

Step 2: Choosing the Right Time

- Scions are best collected during the **dormant or early growing season**, when the plant is not under stress from heat or drought.
- Early morning or late evening is preferable to avoid water loss.

Step 3: Selecting Suitable Branches

- Select straight, healthy shoots with well-developed buds.
- Avoid very soft or overly woody branches.

Step 4: Cutting the Scion

- Use a **sharp, sterilized knife or secateurs** to make clean cuts.
- Each scion should be about **10–15 cm long** and have **2–4 buds**.
- Make the cut just below a node to promote new growth.

Step 5: Handling and Labeling

- Immediately wrap the cut scions in **moist tissue paper or banana leaves** to prevent drying.
- Label each scion with the variety name and date of collection.

Step 6: Storage

- If not used immediately, store scions in a **cool, humid place** or refrigerate in sealed plastic bags.
- Scions can remain viable for several days if kept moist and cool.

Handling and Care of Scions Before Grafting

1. Keep the scion moist and shaded to prevent drying.
2. Avoid exposing scions to direct sunlight.
3. Do not crush or bend the scion while handling.
4. Use clean and sharp tools to avoid infection.
5. Graft as soon as possible after collection (preferably within 24–48 hours).

Common Mistakes in Scion Collection

1. Collecting scions from unhealthy or diseased plants.
2. Using dry or immature shoots.
3. Cutting too long or too short scions.
4. Allowing scions to dry out before grafting.
5. Using blunt or unsterilized tools that damage plant tissue.

Demonstration (Practical Activity)

Students can observe or participate in a teacher-led demonstration on scion collection:

1. Select a healthy citrus or mango tree.
2. Identify a suitable branch with visible buds.
3. Use a clean, sharp knife to cut a 10–15 cm scion piece.
4. Wrap the scion in moist paper and label it properly.

This practical helps students learn how to collect, handle, and preserve scions for grafting.

Summary

A **scion** is the shoot or bud from a desirable plant variety used for grafting onto a rootstock.
It determines the type, quality, and yield of the final plant.
For successful grafting, the scion must be healthy, mature, fresh, and compatible with the rootstock.
Proper handling and storage prevent drying and ensure better union during grafting.

Evaluation

1. Define scion.
2. Mention three examples of plants commonly used as scions.
3. State four qualities of a good scion.
4. List and explain three steps involved in scion collection.
5. Identify three mistakes that can lead to poor grafting results.

Assignment

1. Explain the difference between a scion and a rootstock.

2. Describe in detail how to collect and store scions before grafting.

3. List five important qualities of a good scion and explain why each is important.

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WEEK 10: VEGETABLE PRODUCTION

Introduction

Vegetable production is one of the most important branches of horticulture. It deals with the **cultivation of edible plants** whose roots, stems, leaves, or fruits are eaten either raw or cooked. Vegetables are rich in vitamins, minerals, and fibre, making them essential for human health and nutrition.

In this lesson, we will explore common types of vegetables, their importance, cultural practices involved in their production, and the correct ways to harvest, package, and store them.

Meaning of Vegetable Production

Vegetable production refers to the growing of vegetables for food and commercial purposes. It includes all activities involved from **land preparation, planting, maintenance, harvesting, packaging, and marketing** of vegetable crops.

Vegetables can be classified according to the parts of the plant that are eaten.

Classification of Vegetables

1. **Leafy Vegetables:**
    - Examples: Amaranthus (green), spinach, fluted pumpkin (ugu), lettuce, cabbage.
    - Part eaten: Leaves.
2. **Root Vegetables:**
    - Examples: Carrot, beetroot, radish, turnip.
    - Part eaten: Roots.
3. **Fruit Vegetables:**
    - Examples: Tomato, pepper, okra, garden egg, cucumber.
    - Part eaten: Fruits.

4. **Stem Vegetables:**
    - Examples: Asparagus, sugarcane, cocoyam (for edible stem).
    - Part eaten: Stem.
5. **Bulb and Tuber Vegetables:**
    - Examples: Onion, garlic, potato, yam.
    - Part eaten: Bulb or tuber.
6. **Leguminous Vegetables:**
    - Examples: Beans, peas, soybeans.
    - Part eaten: Seeds enclosed in pods.

Importance of Vegetable Production

1. **Nutritional Value:** Vegetables are rich in vitamins (A, B, C, K), minerals, and dietary fibre.
2. **Economic Value:** Vegetable farming provides income and employment for farmers.
3. **Health Benefits:** Regular consumption of vegetables helps prevent diseases and promotes healthy living.
4. **Environmental Benefits:** Vegetables help in soil conservation, improve soil fertility, and beautify the environment.
5. **Industrial Use:** Some vegetables are used in food processing industries to make canned, frozen, or dried products.
6. **Educational Value:** Vegetable gardens serve as learning centres for agricultural students.

Cultural Practices in Vegetable Production

Cultural practices are all the steps and activities involved in growing vegetables successfully. These practices include:

1. Site Selection

- Choose land that has **loamy, fertile, and well-drained soil**.
- The site should have access to **adequate sunlight and water supply**.
- Avoid waterlogged areas or stony ground.

2. Land Preparation

- Clear weeds, grasses, and stumps from the land.
- Plough, harrow, and make **beds or ridges** for planting.
- Apply organic manure (compost or farmyard manure) before planting to enrich the soil.

3. Seed Selection and Nursery Preparation

- Select high-quality, viable seeds of good varieties.
- For vegetables like tomato, pepper, and eggplant, start with a **nursery bed** before transplanting to the field.
- Water the nursery regularly and protect it from pests.

4. Transplanting

- Transplant seedlings when they are 3–4 weeks old and strong enough to survive.
- Transplant in the evening or early morning to reduce heat stress.

5. Spacing

- Proper spacing prevents overcrowding and allows enough sunlight and air circulation.
    - Example: Tomato – 60 cm × 60 cm; Okra – 45 cm × 60 cm.

6. Fertilizer Application

- Apply **organic manure** or **NPK fertilizer** moderately to boost growth and yield.

- Avoid over-fertilization, which may cause excessive leaf growth and poor fruiting.

7. Watering/Irrigation

- Water regularly, especially during dry seasons.
- Avoid overwatering that may cause root rot or fungal diseases.

8. Weed Control

- Weed regularly to reduce competition for nutrients and light.
- Use **hand weeding** or **mulching** to control weeds.

9. Pest and Disease Control

- Common pests: aphids, caterpillars, beetles, grasshoppers.
- Common diseases: leaf spot, damping off, blight, mildew.
- Control methods:
    - Practise crop rotation.
    - Use resistant varieties.
    - Apply safe pesticides when necessary.

10. Harvesting

- Harvest vegetables at the right maturity stage for best quality.
    - Leafy vegetables – harvested young and tender.
    - Fruit vegetables – harvested when fruits are ripe.
    - Root vegetables – harvested when roots are well-developed.
- Use clean tools and handle carefully to avoid bruising.

Harvesting, Packaging, and Storage of Vegetables

1. Harvesting

- Harvest with **sharp knives or scissors** to avoid damaging plants.
- Handle gently to preserve freshness and appearance.

2. Packaging

- Use **baskets, crates, or perforated plastic containers** for packaging.
- Avoid overfilling containers to prevent crushing.
- Label products properly when marketing.

3. Storage

- Store vegetables in a **cool, shaded, or refrigerated place** to maintain freshness.
- Perishable vegetables like tomato, lettuce, and spinach require quick marketing or refrigeration.
- Root vegetables like carrots and potatoes can be stored longer in cool, dry conditions.

Simple Practical Activity

Students can participate in a classroom or school garden activity:

1. Prepare a small vegetable bed.
2. Transplant seedlings (e.g., tomato or pepper).
3. Water regularly and observe growth stages.
4. Record observations of plant height, leaf size, and fruiting period.

Summary

Vegetable production involves the cultivation of edible plants for food and commercial purposes. Vegetables are classified based on the plant part eaten — such as leaves, roots, fruits, and bulbs. They are vital sources of vitamins and income. Successful vegetable farming requires careful

land preparation, regular watering, proper spacing, pest control, and timely harvesting. Proper packaging and storage maintain quality and market value.

Evaluation

1. Define vegetable production.
2. List four classes of vegetables and give two examples of each.
3. State five importance of vegetables.
4. Mention four cultural practices in vegetable production.
5. Explain two methods of preserving vegetables after harvest.

Assignment

1. Describe the steps involved in vegetable production from land preparation to harvesting.
2. Write short notes on three cultural practices that ensure good vegetable yield.
3. Mention five vegetables commonly grown in Nigeria and the part of the plant eaten in each case.

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WEEK 11: REVISION

Introduction

Revision is an important part of the learning process. It helps students recall, understand, and connect all the topics taught during the term. This week's lesson is designed to review the major areas of **horticulture and crop production** covered in the second term.
Students will revisit the definitions, processes, and importance of horticultural practices, focusing on how each topic contributes to effective crop management and food production.

Summary of Topics Covered This Term

1. Introduction to Horticulture

- **Meaning:** Horticulture is the science and art of cultivating fruits, vegetables, flowers, and ornamental plants.
- **Branches:**
    - *Floriculture* – production of flowers and ornamental plants.
    - *Olericulture* – cultivation of vegetables.
    - *Pomology* – cultivation of fruits.
- **Importance:**
    - Improves nutrition and food supply.
    - Generates income and employment.
    - Beautifies the environment.
    - Provides raw materials for industries.
- **Career Opportunities:**
    - Landscape designer, greenhouse manager, nursery operator, fruit farmer.

2. Nursery Establishment (Part 1)

- **Meaning:** A nursery is a place where young plants (seedlings) are raised before being transplanted to the main farm.
- **Importance:**
    - Provides protection and good care for young plants.
    - Saves seeds and space.
    - Allows for easy selection of healthy seedlings.
- **Types of Nursery:**
    - Temporary nursery
    - Permanent nursery
- **Tools Used:** Hoe, rake, watering can, shovel, spade, and hand trowel.
- **Steps in Establishing a Nursery:**

1. Choose a suitable site.
2. Clear and level the land.
3. Prepare nursery beds.
4. Sow the seeds.
5. Water regularly and control pests.

3. Nursery Bed Preparation

- **Meaning:** A nursery bed is a small plot where seeds are sown and raised into seedlings.
- **Materials Needed:** Good topsoil, manure, watering can, hoe, rake.
- **Purpose:** To provide a controlled environment for healthy seedling growth.
- **Steps in Preparation:**

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1. Clear and loosen the soil.
2. Mix with manure.
3. Level and shape the bed (1m width, 5–10 cm height).
4. Water and sow seeds in rows.

- **Practical Tip:** Cover with palm fronds to protect from harsh sunlight or heavy rain.

4. Fertilizer Application

- **Meaning:** Fertilizer is a substance added to the soil to supply nutrients that promote plant growth.
- **Types:**
    1. Organic fertilizers (manure, compost).
    2. Inorganic fertilizers (NPK, urea).
- **Methods of Application:**
    - Broadcasting
    - Ring method
    - Side dressing
    - Foliar application
- **Importance:**
    - Improves soil fertility.
    - Increases crop yield.
    - Enhances plant growth.
- **Effects of Misuse:**
    - May burn crops.

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- Causes soil acidity.
- Pollutes water bodies.

5. Seed Collection and Dormancy Breaking

- **Seed Collection:** Gathering mature and healthy seeds from ripe fruits or crops.
- **Seed Dormancy:** The temporary state that prevents a seed from germinating even when conditions are favourable.
- **Reasons for Dormancy:** Hard seed coat, immature embryo, lack of moisture or air.
- **Methods of Breaking Dormancy:**
    1. Soaking seeds in water.
    2. Removing or scratching the seed coat.
    3. Using chemicals like acid or hormones.
- **Storage:** Store viable seeds in a cool, dry, airtight container.

6. Rootstock Preparation

- **Meaning:** Rootstock is the lower part of a plant (root or stem) onto which another plant (scion) is grafted.
- **Qualities of a Good Rootstock:**
    - Disease-resistant.
    - Strong and healthy root system.
    - Compatible with the scion.
- **Preparation Steps:**

1. Select healthy plant.

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2. Cut to the required height.
3. Treat and water regularly.

- **Care:** Keep free from pests and ensure steady watering before grafting.

7. Scion Collection

- **Meaning:** A scion is a piece of a stem or bud taken from a desired plant and joined to a rootstock to form a new plant.
- **Qualities of a Good Scion:**
    - Taken from a healthy, high-yielding parent plant.
    - Free from disease and pests.
    - Mature and firm.
- **Techniques of Collection:**
    - Cut with a sharp, clean knife.
    - Wrap in moist material to prevent drying before grafting.
- **Purpose:** To multiply plants with desirable qualities such as high yield or good fruit taste.

8. Vegetable Production

- **Meaning:** The cultivation of edible plants such as tomato, okra, spinach, carrot, and pepper.
- **Cultural Practices:**
    - Site selection
    - Land preparation
    - Nursery raising and transplanting
    - Watering and weeding

    - Pest and disease control
    - Harvesting and storage
- **Importance:**
    - Provides vitamins and minerals.
    - Generates income for farmers.
    - Enhances health and nutrition.

General Term Summary

This term focused on the **practical aspects of crop propagation and management** in horticulture. Students learned about nurseries, seed handling, grafting, and vegetable cultivation. These skills are essential for starting small-scale gardens or managing horticultural farms successfully.

Evaluation

1. Define horticulture.
2. Mention three branches of horticulture.
3. List four steps in establishing a nursery.
4. State two methods of applying fertilizer.
5. Explain the meaning of seed dormancy.
6. Mention three qualities of a good rootstock.
7. What is a scion, and what is its function?
8. List five cultural practices in vegetable production.
9. Give three importance of horticulture to national development.

10. Mention two effects of fertilizer misuse.

Assignment

1. Prepare a comprehensive note summarizing all eight main topics taught this term.
2. Draw and label a simple nursery bed showing rows, watering area, and shading.
3. Write short notes on:
   a. Seed dormancy
   b. Grafting
   c. Vegetable harvesting

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JSS 1 HORTICULTURE AND CROP PRODUCTION LESSON NOTE

THIRD TERM

WEEK 1: VEGETATIVE PROPAGATION IN HORTICULTURAL CROPS

Introduction

Vegetative propagation is one of the most important techniques in horticulture and crop production. It enables farmers to produce new plants from existing ones without using seeds. Many horticultural crops such as oranges, roses, cassava, and hibiscus are propagated through this method because it ensures that the new plants retain all the desirable qualities of the parent plant.

In this lesson, students will learn the meaning, methods, advantages, and disadvantages of vegetative propagation.

Meaning of Vegetative Propagation

Vegetative propagation refers to the process of growing new plants from the **vegetative parts** of an existing plant such as stems, roots, or leaves instead of from seeds.

It is a form of **asexual reproduction**, meaning no fusion of male and female gametes occurs.

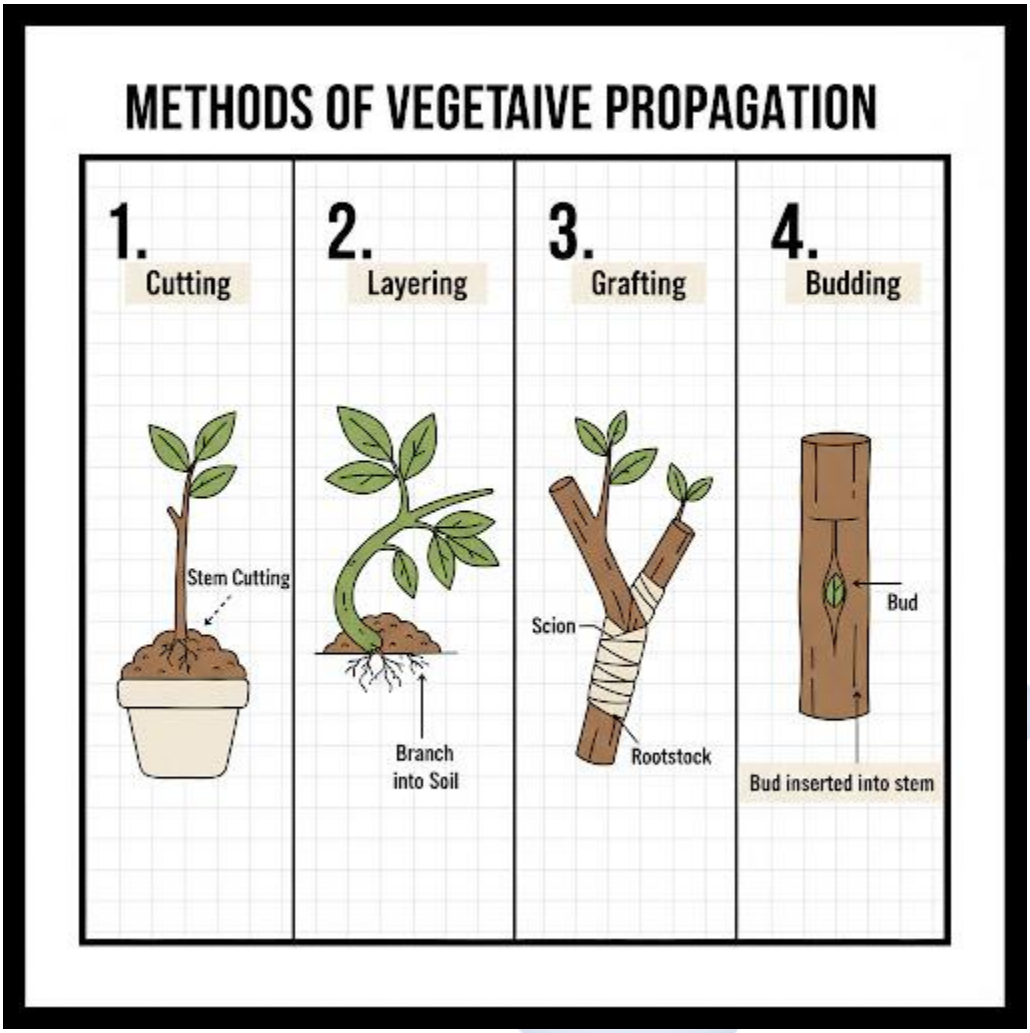
The resulting plants are **clones**, i.e., they are genetically identical to the parent plant.

Examples of plants propagated vegetatively: cassava, yam, sugarcane, banana, pineapple, citrus, rose, and guava.

Importance of Vegetative Propagation

1. It helps to **maintain desirable traits** such as fruit quality, taste, or colour in plants.
2. It allows **faster multiplication** of valuable crops.
3. It helps in the **propagation of seedless plants** such as sugarcane and banana.
4. It ensures **uniform growth and maturity** in plants.

5. It allows **early flowering and fruiting** compared to plants grown from seeds.
6. It helps in **disease resistance improvement** through grafting of resistant rootstocks.



Methods of Vegetative Propagation

1. **Cutting**

- This involves cutting a portion of the plant stem, root, or leaf and placing it in a suitable medium such as soil or water to develop roots and grow into a new plant.
- Example: stem cutting in cassava, rose, and hibiscus.
- **Steps:** select a healthy plant, cut 10–15 cm portion, remove lower leaves, plant in moist soil, and water regularly.

2. **Layering**

- In layering, a branch of the parent plant is bent down and partially buried in the soil while still attached.
- Roots develop at the buried part, and the new plant is later detached and transplanted.
- Example: bougainvillea and yam.
- **Types of layering:** simple layering, air layering (marcotting).

3. **Grafting**

- This is the process of joining two plant parts so that they grow together as one plant.
- The **scion** (upper part with buds) is attached to the **rootstock** (lower part with roots).
- Example: citrus, mango, and apple.
- Grafting helps combine desirable qualities such as good fruit from the scion and disease resistance from the rootstock.

4. **Budding**

- Budding is similar to grafting but uses only a **single bud** instead of a stem piece.
- The bud from one plant (scion) is inserted into another plant (rootstock).
- Example: roses, citrus, and peaches.
- It is used for mass multiplication of ornamental and fruit crops.

5. **Division and Suckering**

- Division involves separating clumps or bulbs of a plant into smaller units that can grow individually.
- Example: pineapple, banana, and ginger.
- Suckers growing from the base of the parent plant can be removed and replanted.

Advantages of Vegetative Propagation

1. New plants are **identical to the parent**, preserving desirable qualities.
2. It allows **faster growth and early maturity**.
3. Useful for **plants that produce few or no seeds**.
4. It enables the **combination of traits** (e.g., disease resistance and fruit quality).
5. It ensures **uniform yield and quality**.
6. It is possible to propagate **seedless varieties** such as banana and pineapple.

Disadvantages of Vegetative Propagation

1. Lack of variation — plants are genetically identical, so they can all be affected by the same disease or pest.
2. Propagation requires **skilled labour** and proper handling.
3. **Transporting cuttings or grafts** is often difficult and costly.
4. It produces **fewer plants** compared to seed propagation.
5. Continuous vegetative propagation may cause **loss of vigour** in plants over time.

Conditions Necessary for Successful Vegetative Propagation

1. Use of healthy and disease-free parent plants.
2. Availability of adequate water and suitable soil.
3. Proper temperature and humidity.
4. Clean and sharp tools to prevent damage.
5. Protection of young propagules from pests and harsh weather.

Summary

Vegetative propagation is the process of producing new plants from parts of an existing plant instead of from seeds.

It is a common method used in horticulture because it ensures faster, uniform, and reliable crop multiplication.

The main methods include cutting, layering, grafting, and budding.

Although it produces identical plants with desirable traits, it requires skill, labour, and proper management to avoid disease spread and low plant vigour.

Evaluation

1. Define vegetative propagation.
2. Mention four methods of vegetative propagation and give one example for each.
3. State three advantages and two disadvantages of vegetative propagation.
4. What is the difference between grafting and budding?
5. List three conditions necessary for successful vegetative propagation.

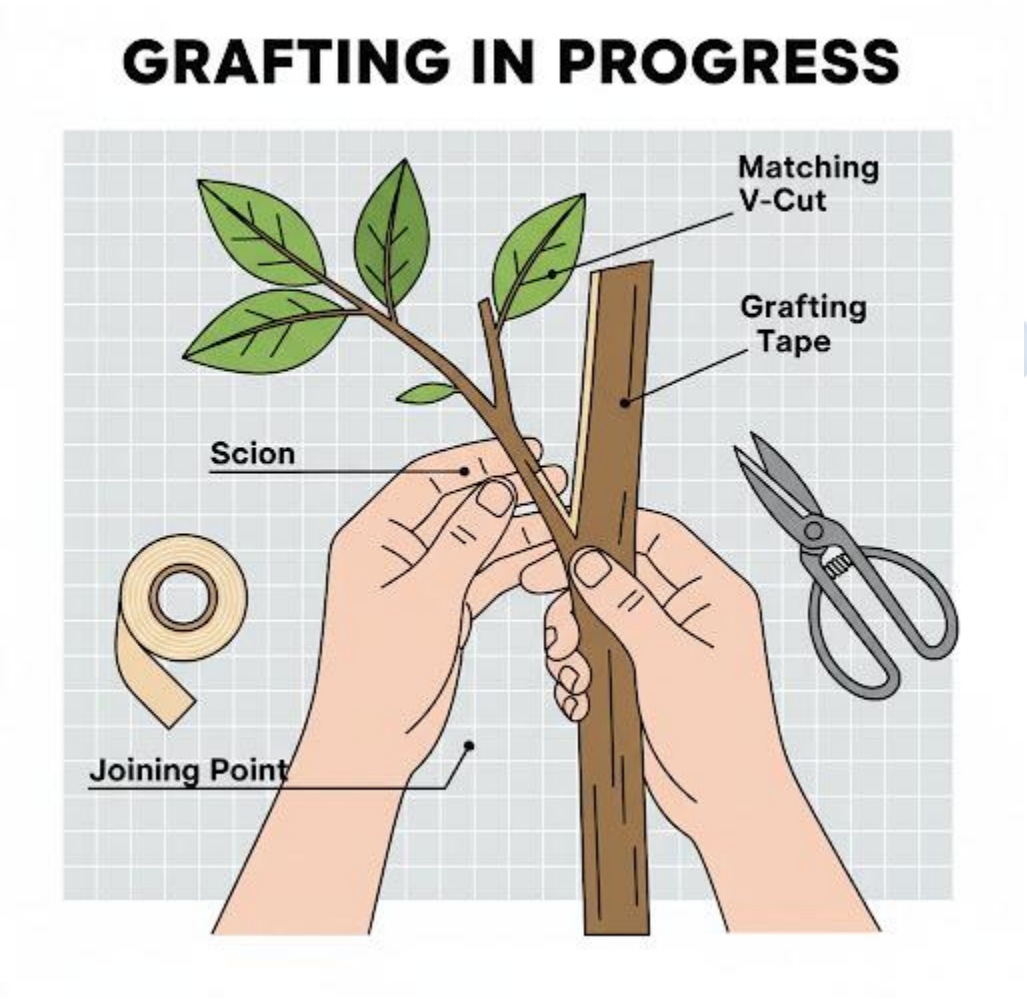
Assignment

1. Explain the steps involved in grafting and state two crops commonly propagated by this method.
2. Discuss three reasons why horticulturists prefer vegetative propagation to seed propagation.
3. Draw and label a simple diagram showing any one method of vegetative propagation.

WEEK 2: PRACTICAL SESSION ON VEGETATIVE PROPAGATION

Introduction

Practical sessions are important in horticulture because they help students to apply theoretical knowledge through hands-on experience. Vegetative propagation is not only a concept to be studied in theory but also a skill to be practiced. In this lesson, students will perform and observe various methods of vegetative propagation such as grafting, budding, and layering.
The lesson will also highlight the tools and materials used during propagation and the maintenance practices required for the success of the propagated plants.



Meaning of Practical Vegetative Propagation

Practical vegetative propagation refers to the **hands-on exercise** of producing new plants from the vegetative parts of an existing plant (stem, bud, or root).
The main objective of this practical is to enable students to learn how to:

1. Handle propagation tools safely.
2. Carry out operations like cutting, layering, grafting, and budding correctly.
3. Maintain and care for the new plants until they are established.

Tools and Materials Used in Vegetative Propagation

The success of any propagation exercise depends largely on the use of proper tools and materials.

Common Tools:

1. Cutlass – for clearing and cutting plant stems.
2. Secateurs – for making neat and precise cuts on branches.
3. Grafting knife – used for making incisions during grafting and budding.
4. Hand trowel – for digging and covering soil.
5. Polythene bags or pots – for planting and raising propagated crops.
6. Watering can – for regular watering.
7. Labels and marker pens – for identifying plant varieties.

Common Materials:

1. Scions (buds or shoots of desired plants).
2. Rootstocks (rooted base plants).
3. Binding tape or grafting film – for holding plant parts together.
4. Moist soil or sand – as rooting medium.
5. Fertilizer and organic manure – for soil enrichment.

Demonstration of Grafting

Steps Involved in Grafting:

1. Select a healthy **rootstock** of the same or closely related species.
2. Choose a **scion** (a young shoot or twig) from a healthy plant with desirable traits.
3. Make a **slanting cut** at the top of the rootstock and a matching cut at the base of the scion.
4. Join both parts firmly so that the **cambium layers** meet.
5. Tie the joint tightly with grafting tape or polythene strip to prevent air entry.
6. Protect the grafted plant from direct sunlight and water moderately.
7. After 2–4 weeks, the scion and rootstock unite, and new growth begins.

Observation:

- Students should observe how the scion develops new leaves.
- Record the time it takes for the union to form and note any changes in leaf colour or growth.

Demonstration of Budding

Steps Involved in Budding:

1. Select a healthy **rootstock** of about the same thickness as a pencil.
2. Cut a **T-shaped incision** on the bark of the rootstock.
3. Carefully remove a **bud shield** from the parent plant (scion source).
4. Insert the bud under the flap of the T-incision.
5. Tie the area firmly with budding tape, leaving the bud exposed.
6. Water the plant regularly and keep it under shade.

Observation:

- The bud begins to sprout after about 2–3 weeks.
- The success of budding depends on proper alignment of the tissues and care after operation.

Demonstration of Layering

Steps in Simple Layering:

1. Select a healthy and flexible branch of a plant.
2. Bend the branch down and bury a part of it in the soil while it is still attached to the parent plant.
3. Secure the buried portion with a peg or small stone.
4. Keep the soil moist until roots develop at the buried section.
5. After rooting, cut the new plant from the parent and transplant it.

Steps in Air Layering (Marcotting):

1. Select a healthy branch on a woody plant (e.g., citrus or guava).
2. Remove a ring of bark (about 2–5 cm wide) from the branch.
3. Apply moist soil or sphagnum moss around the wound.
4. Cover with plastic wrap or polythene and tie both ends.
5. Roots develop within 3–4 weeks; cut and plant the new seedling.

Observation:

- Students should observe root formation in the layered portion.
- Record how long it takes for roots to appear.

Maintenance of Propagated Crops

After propagation, proper maintenance ensures that the new plants survive and grow well.

Maintenance Practices Include:

1. Regular watering to maintain moisture in the soil.
2. Protection from direct sunlight or strong wind.
3. Removal of weeds around propagated plants.
4. Application of organic manure or fertilizer to promote growth.
5. Replacement of failed propagules (re-propagation).
6. Regular inspection for pests and diseases.
7. Proper labeling of propagated plants to identify species and methods used.

Safety Precautions During Practical Work

1. Handle knives and secateurs carefully to avoid cuts.
2. Wear gloves and protective clothing when handling sharp tools.
3. Keep all tools clean and dry after use.
4. Do not taste or chew any plant material.
5. Report any injury or accident to the teacher immediately.
6. Always work under supervision and maintain a tidy work area.

Summary

Vegetative propagation can be carried out practically using several methods such as grafting, budding, and layering.
Each method requires specific tools, materials, and proper care to ensure success.

The practical session allows students to observe, perform, and understand how new plants are produced from existing ones.
Through careful handling and maintenance, propagated crops can establish quickly and produce high-quality yield.

Evaluation

1. Define practical vegetative propagation.
2. Mention three tools and three materials used in vegetative propagation.
3. List the steps involved in grafting.
4. Explain the difference between simple layering and air layering.
5. State four maintenance practices for newly propagated crops.

Assignment

1. Explain the steps involved in budding and name two plants commonly propagated by this method.
2. List and describe three safety precautions to observe during vegetative propagation practical.
3. Draw and label one method of vegetative propagation demonstrated in class.

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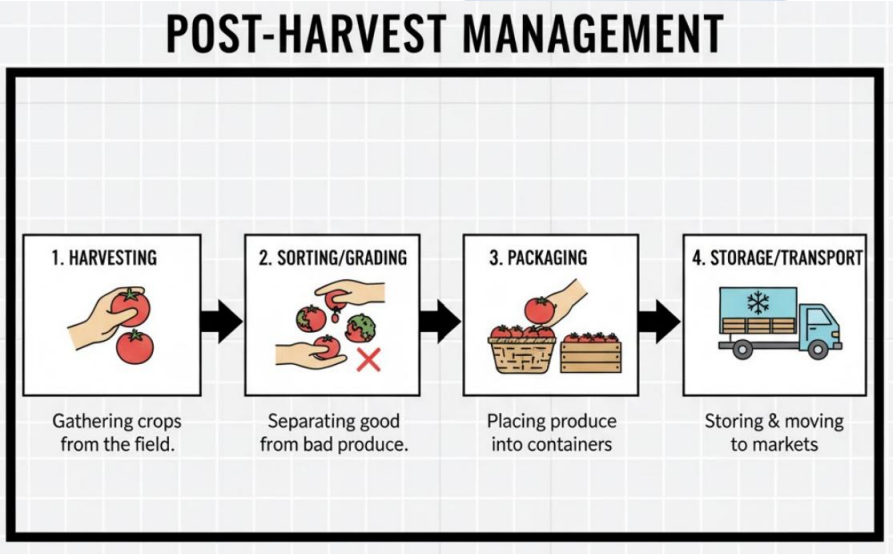
WEEK 3: POST-HARVEST MANAGEMENT OF VEGETABLES

Introduction

Post-harvest management refers to all the activities carried out after vegetables are harvested from the farm until they reach the final consumer. These activities are aimed at maintaining the freshness, quality, and market value of the produce.

Vegetables are highly perishable and can spoil quickly if not handled properly. Therefore, it is important to understand the correct methods of harvesting, sorting, grading, packaging, storage, and transportation.

In this lesson, students will learn the proper handling practices that ensure vegetables remain fresh, attractive, and safe for consumption.



Meaning of Post-Harvest Management

Post-harvest management involves the handling, treatment, and processing of farm produce after harvest to maintain its quality and prolong its shelf life.

It is a crucial stage in crop production because poor handling can result in high losses and low income for farmers.

Proper post-harvest management ensures that vegetables reach the market in good condition, retaining their nutritional and economic value.

Importance of Post-Harvest Management

1. Reduces spoilage and wastage of vegetables.
2. Maintains the freshness, colour, and taste of produce.
3. Improves market value and consumer satisfaction.
4. Ensures food safety and hygiene.
5. Prolongs the storage life of vegetables.
6. Enhances farmer's income by reducing losses.
7. Promotes good reputation and trust in the market.

Harvesting of Vegetables

Meaning:

Harvesting is the process of gathering mature vegetables from the farm for use or sale. It is usually done when the crops reach the right stage of maturity.

Harvesting Methods:

1. **Manual Harvesting:**

- Done by hand using knives, cutlasses, or scissors.
- Suitable for tender vegetables like spinach, pepper, okra, and tomatoes.

2. **Mechanical Harvesting:**

- Uses machines to harvest large quantities quickly.
- Suitable for large-scale farms growing crops like cabbage and lettuce.

Harvesting Tips:

- Harvest in the early morning or late evening to avoid heat damage.
- Handle vegetables gently to prevent bruises and cuts.

- Use clean tools to avoid contamination.
- Avoid overripe or immature vegetables.

Sorting and Grading of Vegetables

Sorting:

This is the process of separating good vegetables from bad or damaged ones after harvest.

- Remove vegetables that are diseased, rotten, or overripe.
- Separate according to colour, size, and quality.

Grading:

Grading involves grouping vegetables according to size, shape, and market standard.

- Large, fresh, and uniformly coloured vegetables are placed in higher grades.
- Smaller or slightly defective ones are placed in lower grades.

Importance of Sorting and Grading:

1. Improves the overall appearance of produce.
2. Facilitates better packaging and marketing.
3. Attracts higher prices in the market.
4. Reduces chances of spoilage during storage.

Packaging and Storage of Vegetables

Packaging:

Packaging means enclosing vegetables in containers for storage or transportation. Proper packaging prevents mechanical damage, moisture loss, and contamination.

Common Packaging Materials:

1. Baskets and crates.

2. Plastic containers or trays.
3. Cardboard boxes.
4. Polythene bags and net sacks.

Qualities of Good Packaging:

- Must be clean and well-ventilated.
- Should protect vegetables from crushing or bruising.
- Should be easy to handle and transport.

Storage:

Storage is keeping vegetables in suitable conditions to maintain their freshness until they are needed.

Types of Storage:

1. **Room Temperature Storage:**

- Used for short-term storage of hardy vegetables like yam or pumpkin.

2. **Cool Storage (Refrigeration):**

- Used for perishable vegetables like tomato, pepper, and lettuce.

3. **Cold Room or Freezer Storage:**

- Maintains temperature between 0–5°C for long-term storage of fresh produce.

4. **Evaporative Cooling Chambers:**

- Uses moist air to keep vegetables cool where electricity is not available.

Conditions for Proper Storage:

- Vegetables must be dry and clean before storage.
- Maintain proper temperature and humidity.
- Store in well-ventilated containers.

- Keep storage areas free from pests.

Transportation and Marketing of Vegetables

Transportation:

Vegetables are transported from farms to markets or consumers using various means such as bicycles, vehicles, or carts.

Guidelines for Transportation:

1. Use well-ventilated vehicles.
2. Stack vegetables carefully to avoid crushing.
3. Transport early in the morning or late evening.
4. Cover produce with nets or cloth to protect from sun and dust.

Marketing:

Marketing involves selling the harvested vegetables to consumers, retailers, or wholesalers.

Importance of Marketing:

- Helps farmers earn income.
- Encourages production and job creation.
- Ensures steady supply of vegetables to the community.
- Promotes agricultural development.

Common Post-Harvest Problems

1. Mechanical injury (cuts, bruises, and crushing).
2. High temperature and humidity causing decay.
3. Poor hygiene leading to contamination.

4. Delay in transportation and sale.
5. Insect and rodent attack during storage.

Measures to Reduce Post-Harvest Losses

1. Harvest vegetables at the right stage of maturity.
2. Handle produce gently to avoid damage.
3. Sort and grade immediately after harvest.
4. Store under cool and dry conditions.
5. Use clean packaging materials.
6. Transport quickly to the market.
7. Keep storage and packaging areas clean and pest-free.

Summary

Post-harvest management involves the handling, sorting, packaging, storage, transportation, and marketing of vegetables after harvest.
Proper post-harvest handling helps maintain the freshness and quality of vegetables, reduces spoilage, and increases the farmer's profit.
Practicing good hygiene, using the right tools, and applying correct handling methods ensure that vegetables reach consumers in the best condition.

Evaluation

1. Define post-harvest management.
2. State three reasons why vegetables spoil after harvest.
3. Mention two methods of harvesting vegetables.

4. Explain the difference between sorting and grading.
5. List three packaging materials used for vegetables.

Assignment

1. List and describe three types of vegetable storage methods.
2. Explain five measures to reduce post-harvest losses.
3. Write short notes on:
   a. Transportation of vegetables
   b. Marketing of vegetables

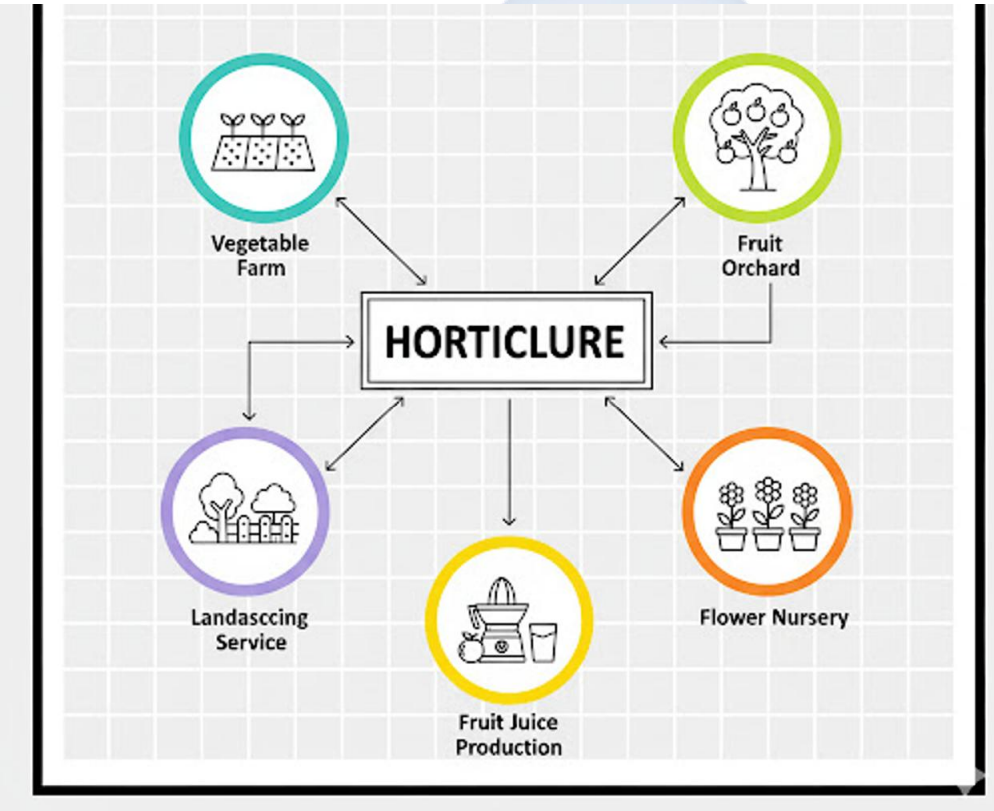
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WEEK 4: CONCEPT OF ENTREPRENEURSHIP IN HORTICULTURE

Introduction

Entrepreneurship is a vital concept in modern agriculture. It involves identifying opportunities in the agricultural sector, developing ideas, and organizing resources to start and manage profitable ventures.

In horticulture and crop production, entrepreneurship helps farmers and students turn their agricultural skills into income-generating activities. This lesson focuses on understanding the meaning, importance, and skills required for entrepreneurship, particularly in the area of horticulture.



Meaning of Entrepreneurship

Entrepreneurship is the process of creating, developing, and managing a business venture in order to make a profit while taking on financial risks.

An **entrepreneur** is a person who starts, organizes, and manages a business enterprise, especially one that involves innovation and risk-taking.

In horticulture, entrepreneurship involves producing, processing, packaging, and marketing horticultural crops such as vegetables, fruits, flowers, and ornamental plants for income generation.

Characteristics of an Entrepreneur

A good entrepreneur possesses certain qualities that enable success in business. These include:

1. **Creativity:** Ability to develop new ideas or improve existing ones.
2. **Initiative:** Taking action without being told what to do.
3. **Determination:** Persistence in achieving business goals despite difficulties.
4. **Risk-taking:** Willingness to face business uncertainties.
5. **Hard work:** Dedication and commitment to business success.
6. **Honesty:** Being truthful and transparent in dealings.
7. **Vision:** Having a clear picture of what to achieve in the future.
8. **Leadership:** Ability to direct and motivate others.
9. **Financial discipline:** Ability to manage money wisely.
10. **Decision-making:** Ability to make sound business judgments quickly.

Importance of Entrepreneurship in Horticulture

Entrepreneurship in horticulture is essential for personal development, community progress, and national growth. It provides opportunities for young people to become self-employed and contribute to food security.

Importance includes:

1. Provides employment and reduces poverty.
2. Encourages self-reliance and independence.
3. Promotes creativity and innovation in agriculture.
4. Improves living standards through income generation.
5. Reduces dependence on government jobs.
6. Boosts agricultural productivity and development.
7. Contributes to national economic growth.
8. Encourages value addition to farm products through processing and packaging.
9. Promotes rural development by creating business opportunities in local areas.

Entrepreneurial Skills in Crop Production

Entrepreneurial skills are the abilities and knowledge required to start, manage, and sustain a profitable agricultural business.
In horticulture, these skills help farmers to operate efficiently and maximize profit.

Major entrepreneurial skills include:

1. **Planning and Organization Skills:** Ability to set business goals and organize resources effectively.
2. **Record-Keeping Skills:** Maintaining accurate records of income, expenses, and production activities.
3. **Financial Management Skills:** Proper budgeting, saving, and investment of profits.
4. **Marketing Skills:** Identifying customers, promoting products, and selling at profitable prices.
5. **Communication Skills:** Ability to interact effectively with customers, suppliers, and workers.

6. **Problem-Solving Skills:** Finding solutions to business challenges like pest attack or market fluctuation.
7. **Risk Management Skills:** Ability to identify and minimize potential business risks.
8. **Time Management Skills:** Using available time wisely to achieve more results.

Areas of Entrepreneurial Opportunities in Horticulture

There are numerous areas where students and farmers can develop profitable ventures in horticulture. These include:

1. Production and sale of vegetables (e.g., tomato, pepper, okra, and spinach).
2. Production and marketing of fruits (e.g., pineapple, watermelon, pawpaw, and citrus).
3. Floriculture – growing and selling flowers and ornamental plants.
4. Seedling production and nursery management.
5. Processing and packaging of horticultural produce (e.g., tomato paste, fruit juice).
6. Landscaping and lawn maintenance services.
7. Greenhouse and hydroponic vegetable farming.
8. Agro-input supply (fertilizers, seedlings, pesticides).
9. Distribution and marketing of fresh produce to restaurants and supermarkets.
10. Training and consultancy services in horticultural production.

Examples of Successful Agripreneurs

Across Nigeria and other countries, several individuals have become successful entrepreneurs in horticulture. Their success stories inspire young people to see agriculture as a profitable career.

Examples include:

1. **John D. Obayomi (Nigeria):** Known for large-scale tomato and pepper production in the north.
2. **Mrs. Toyin Adepoju:** A fruit juice processor and distributor of natural juices.
3. **Florence Ojo:** A horticulturist specializing in the production of ornamental plants for landscaping.
4. **Akin Alabi:** A youth entrepreneur who built a hydroponic vegetable farm supplying urban supermarkets.
5. **Cecilia Umeh:** A flower grower who exports ornamental plants to other African countries.

These examples show that with determination, creativity, and proper management, horticulture can become a highly profitable business.

Challenges Faced by Entrepreneurs in Horticulture

1. Lack of access to credit facilities.
2. High cost of agricultural inputs.
3. Poor storage and marketing facilities.
4. Unstable government policies.
5. Climate change and poor irrigation systems.
6. Inadequate technical knowledge.
7. Pest and disease problems.
8. Lack of modern equipment and machinery.

Ways to Overcome These Challenges

1. Join cooperative societies to access loans and shared resources.

2. Attend agricultural training and extension programs.
3. Adopt improved farming and storage technologies.
4. Form partnerships or groups for joint marketing and resource sharing.
5. Seek government and NGO support for small-scale farmers.
6. Practice good financial planning and savings.

Summary

Entrepreneurship in horticulture helps individuals use agricultural knowledge and creativity to build profitable ventures. It involves identifying opportunities, developing skills, and taking calculated risks.
Through entrepreneurship, young people can become self-employed, contribute to food security, and promote economic growth.

Evaluation

1. Define entrepreneurship.
2. State four characteristics of a successful entrepreneur.
3. List five areas of entrepreneurial opportunities in horticulture.
4. Explain three challenges faced by entrepreneurs in crop production.
5. Why is entrepreneurship important in national development?

Assignment

1. Explain five entrepreneurial skills needed for success in horticulture.
2. Mention four ways government can support young agripreneurs.

3. Write short notes on two successful agripreneurs in Nigeria and their areas of specialization.

WEEK 6: CONCEPT OF MONEY

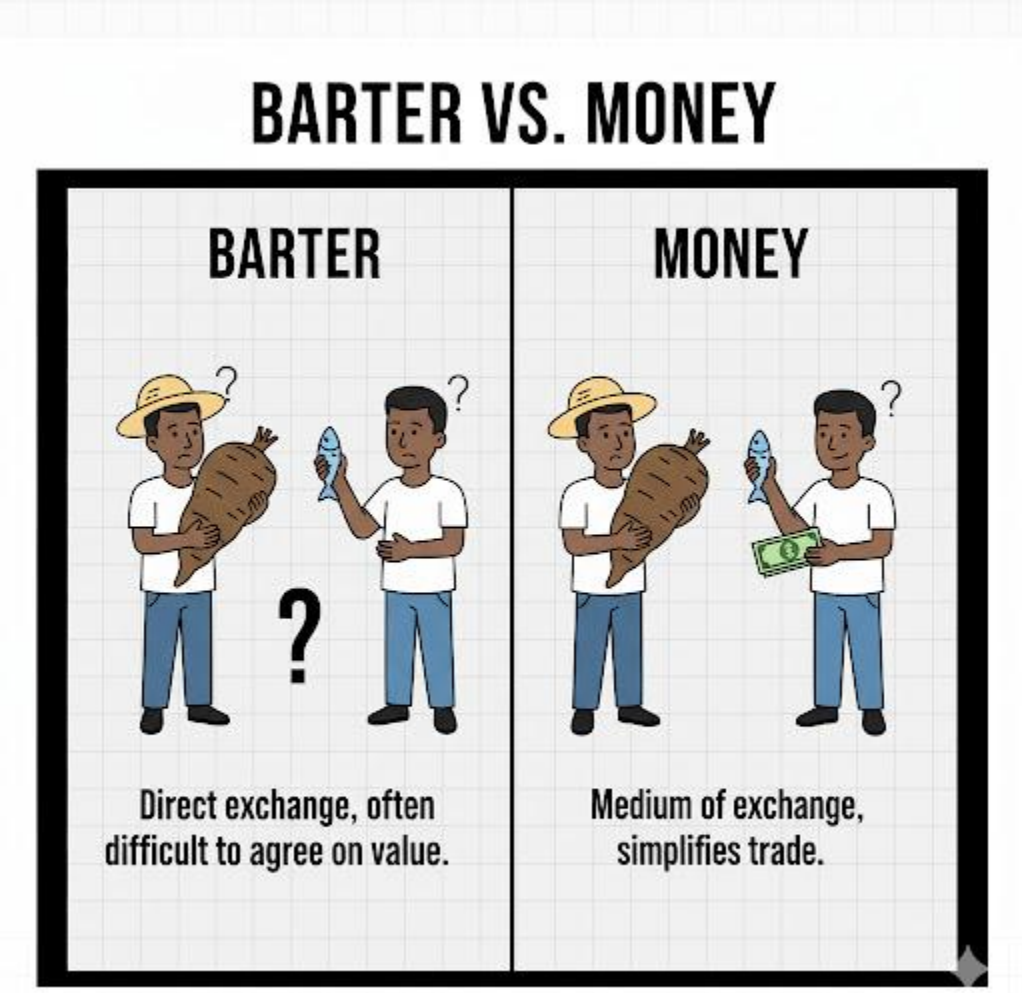
Introduction

Money is one of the most important tools in the business world, including agriculture and horticulture.

Every farmer or horticulturist who wants to sell products, buy tools, or keep business records must understand the use and management of money.

Before the invention of money, people exchanged goods and services directly, a practice known as **barter trade**. However, barter trade had several problems, which led to the introduction of money as a medium of exchange.

This lesson explains the meaning, functions, and types of money, as well as how to manage and save money wisely in horticultural enterprises.



Meaning of Money

Money is anything that is generally accepted as a medium of exchange for goods and services, and for the settlement of debts.
In simple terms, money allows people to buy what they need and sell what they produce without having to exchange goods directly.

Examples of money include: coins, paper notes, cheques, bank transfers, and digital currencies.

Historical Background of Money

Before money was invented, people practiced **barter trade**, which means the direct exchange of goods for goods or services for services.
For example, a farmer could exchange yam for fish or fruits for clothes.
However, barter trade was not convenient because:

1. It required a double coincidence of wants (both parties must need what the other has).
2. It was difficult to determine the exact value of items exchanged.
3. Some goods were not easily divisible (e.g., exchanging a goat for a handful of maize).
4. It was difficult to store wealth in perishable goods.

Because of these problems, societies later developed money to make trade easier, safer, and more efficient.

Functions of Money

Money performs several key functions that make it essential in economic and agricultural activities.

1. **Medium of Exchange:** Money allows people to buy and sell goods and services easily.

2. **Measure of Value:** It provides a common standard for measuring the worth of goods and services.
3. **Store of Value:** Money can be saved and used in the future without losing its value quickly.
4. **Standard of Deferred Payment:** Money allows people to borrow and repay debts conveniently.
5. **Unit of Account:** It helps to keep business records and accounts accurately.

For example, a horticulturist who sells tomatoes for ₦5,000 uses money as a medium of exchange and a measure of value.

Characteristics of Money

For anything to serve as money, it must have certain qualities:

1. **Portability:** Easy to carry around.
2. **Durability:** Must last long without getting spoilt easily.
3. **Divisibility:** Can be divided into smaller units for small or large transactions.
4. **Acceptability:** Widely accepted by people as a means of payment.
5. **Uniformity:** Each unit must be the same in quality and value (e.g., all ₦100 notes are equal).
6. **Stability of Value:** Should maintain its value over time.
7. **Recognizability:** Easy to identify and difficult to counterfeit.

Types of Money

Different forms of money exist in modern society. Each type serves the same purpose but may be used differently depending on the situation.

1. **Commodity Money:** Items like salt, gold, cowries, or livestock that were once used as money.
2. **Coin Money:** Metal coins made of copper, silver, or nickel used for smaller transactions.
3. **Paper Money:** Banknotes issued by the government or central bank.
4. **Bank Deposits/Cheques:** Money kept in the bank and withdrawn or transferred by writing cheques.
5. **Electronic Money (E-Money):** Digital forms of money such as ATM cards, bank transfers, and mobile banking.
6. **Cryptocurrency:** A modern digital currency (e.g., Bitcoin) used mainly for online transactions.

Importance of Money in Horticulture and Crop Production

Money plays a vital role in the success of any horticultural enterprise. It is needed at every stage — from production to marketing.

Importance includes:

1. Used to purchase farm tools, seeds, and fertilizers.
2. Helps in paying for labor and transportation.
3. Facilitates record-keeping and financial planning.
4. Encourages savings and investment in farm expansion.
5. Enables farmers to market and sell produce efficiently.
6. Serves as a reward for hard work and productivity.
7. Helps entrepreneurs measure profit and business growth.

Money Management and Savings

Proper management of money is very important in both personal and business life. Farmers must learn how to use money wisely to avoid waste and ensure business growth.

Ways to Manage Money Wisely:

1. Prepare a **budget** before spending.
2. Separate personal expenses from business funds.
3. Keep proper records of all income and expenses.
4. Save a part of every income earned.
5. Avoid unnecessary borrowing or extravagant spending.
6. Invest profits back into the farm to increase production.

Methods of Saving Money:

1. Through banks or microfinance institutions.
2. With cooperative societies or thrift groups.
3. In personal savings accounts or fixed deposits.
4. By purchasing assets such as farm tools or equipment.
5. Through digital platforms and mobile wallets.

Benefits of Money Management

1. Ensures business stability and growth.
2. Encourages savings and reduces wasteful spending.
3. Helps in decision-making and financial planning.
4. Improves profit and productivity.
5. Allows quick response to emergencies or unexpected expenses.

Summary

Money is a universally accepted medium of exchange used to buy and sell goods and services.
It replaced the barter system, which was inconvenient and inefficient.
Money performs key functions such as being a medium of exchange, a measure of value, and a store of wealth.
Proper management and saving of money are crucial for every horticulturist to maintain a successful business and improve living standards.

Evaluation

1. Define money.
2. List four problems of the barter system.
3. State five functions of money.
4. Mention four characteristics of good money.
5. Explain three reasons why money management is important in horticulture.

Assignment

1. List and explain five types of money.
2. State five ways of managing money wisely in crop production.
3. Describe any four benefits of saving money as a horticultural entrepreneur.

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WEEK 8: BOOK KEEPING IN HORTICULTURE AND CROP PRODUCTION

Introduction

Bookkeeping is an essential part of running a successful horticultural or agricultural business. It involves the systematic recording of all financial transactions that take place on a farm. Through bookkeeping, farmers can monitor how money is earned and spent, know whether they are making profits or losses, and make informed decisions for future operations.

In this lesson, we will explain the meaning of bookkeeping, identify different types of farm records, and show how to prepare a simple profit and loss record.

Meaning of Bookkeeping

Bookkeeping is the process of recording all financial and business transactions in an orderly manner.
It helps the farmer to keep track of income (money received) and expenditure (money spent) in the course of running the farm.

In simple terms, bookkeeping is the act of keeping written records of what goes in and out of a farm business.

Example:
If a horticulturist buys fertilizer for ₦5,000 and sells vegetables for ₦10,000, these two transactions must be recorded to know the financial position of the business.

Importance of Bookkeeping in Horticulture

Bookkeeping is very important for both small and large-scale farmers because it helps in financial control and business growth.

Importance includes:

1. It helps to determine profit or loss made in the business.
2. It enables proper planning and budgeting.

3. It provides information for decision-making.
4. It helps in obtaining loans from banks, as records serve as proof of business activities.
5. It helps track debts and payments.
6. It reduces financial waste and mismanagement.
7. It helps in comparing performance from one season to another.
8. It ensures transparency and accountability.

Types of Farm Records

In horticulture and crop production, different kinds of records are maintained to manage the business efficiently.

Common types include:

1. **Financial Records:**
   These show all money received and spent.
   Examples: Cash book, payment voucher, receipts.
2. **Production Records:**
   They contain information about what was produced, when it was planted, and the yield obtained.
   Examples: Crop yield records, planting records, harvesting logs.
3. **Input Records:**
   These record the quantity and cost of inputs such as seeds, fertilizers, pesticides, and labor.
4. **Sales Records:**
   Used to record items sold, quantity, date, and amount of money earned from sales.
5. **Inventory Records:**
   Contain lists of all farm assets such as tools, equipment, and machinery.

6. **Labour Records:**
   Show details of the number of workers, days worked, and wages paid.
7. **Weather or Farm Diary:**
   Used to record daily farm activities, weather conditions, and observations.
8. **Profit and Loss Records:**
   Show the difference between total income and total expenses to determine profit or loss.

Components of a Simple Farm Record

A good farm record should include the following details:

- Date of transaction
- Description of item
- Quantity bought or sold
- Price per unit
- Total cost or income
- Remarks (for additional notes)

Example Table: Simple Cash Record

Date	Description	Quantity	Amount (₦)	Type (Income/Expense)	Remarks
Jan 10	Bought tomato seeds	2 sachets	2,000	Expense	Planting season
Jan 20	Sold spinach	20 bunches	5,000	Income	Market sale
Jan 22	Paid laborers	–	1,500	Expense	Weeding

Jan 30	Sold pepper	10 baskets	10,000	Income	Local market
Feb 1	Bought fertilizer	1 bag	4,000	Expense	Crop maintenance

Total Income: ₦15,000

Total Expenses: ₦7,500

Profit: ₦15,000 – ₦7,500 = ₦7,500

Meaning of Profit and Loss

Profit is the financial gain made when the total income is greater than total expenses.

Loss occurs when total expenses are more than total income.

Formulas:

- **Profit = Total Income – Total Expenses**
- **Loss = Total Expenses – Total Income**

Example:

If a farmer earns ₦50,000 from selling vegetables and spends ₦30,000 on production,

Profit = ₦50,000 – ₦30,000 = ₦20,000.

If another farmer earns ₦25,000 but spends ₦30,000,

Loss = ₦30,000 – ₦25,000 = ₦5,000.

Importance of Keeping Profit and Loss Records

1. It helps to know if the business is progressing or declining.
2. It aids in making future investment decisions.
3. It enables the farmer to control unnecessary expenses.
4. It encourages savings and financial discipline.

5. It serves as a report for government or financial institutions.

Steps in Keeping Farm Records

1. Record every transaction immediately after it occurs.
2. Use a single notebook or computer for all records.
3. Organize entries in chronological order (by date).
4. Separate income and expenditure clearly.
5. Always total the income and expenses monthly or seasonally.
6. Store the record book safely for future reference.

Qualities of a Good Farm Record

1. Accurate and correct.
2. Clearly written and easy to understand.
3. Up-to-date.
4. Organized and properly arranged.
5. Free from alterations or false entries.

Summary

Bookkeeping in horticulture means recording all financial transactions related to farming activities.
It helps farmers to know whether they are making profits or losses and to plan better for the future.
Various types of records—such as financial, production, and inventory records—are used in horticultural businesses.

Accurate and timely bookkeeping ensures success, accountability, and sustainability in crop production.

Evaluation

1. Define bookkeeping.
2. List five types of farm records.
3. State three importance of bookkeeping in horticulture.
4. Explain the difference between profit and loss.
5. Outline five qualities of a good farm record.

Assignment

1. Draw and fill a sample table of a simple farm record for any three transactions.
2. Explain any four steps in keeping farm records.
3. List and explain five types of farm records used in crop production.

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WEEK 9: BUSINESS START-UP IN HORTICULTURE

Introduction

Starting a horticultural business involves planning, organizing, and managing resources to produce and sell plants, vegetables, or ornamental crops for profit.
Before a horticultural enterprise can be established, the farmer must carefully plan the business, understand the market, and ensure that all necessary materials, equipment, and capital are available.

In this lesson, we will learn the meaning of business start-up, the stages involved in starting a horticultural business, how to prepare a business plan, and the methods of marketing horticultural products.

Meaning of Business Start-Up

A **business start-up** refers to the process of setting up a new business venture.
In horticulture, it means establishing a new farm or enterprise where crops, flowers, fruits, or vegetables are grown and sold for income.

Starting a business involves identifying a good idea, planning, gathering resources, and managing the operation to make profit.

Examples of horticultural start-ups include:

- Vegetable farming (tomato, pepper, cabbage, okra).
- Fruit orchard (mango, orange, pawpaw).
- Flower garden or landscaping service.
- Nursery and seedling business.
- Herbal plant cultivation.

Stages of Business Start-Up in Horticulture

Every successful horticultural enterprise passes through specific stages before it becomes established.

1. Idea Generation

This is the first step in business start-up. It involves thinking of what kind of horticultural business to establish.

The idea could be based on local demand, personal interest, or market opportunity.

Example: A student who loves plants may decide to start a flower garden or vegetable nursery.

2. Feasibility Study

A feasibility study helps to determine if the business idea is realistic and profitable.

It answers questions such as:

- Is there a market for my product?
- What is the cost of production?
- How much profit can I make?
- What are the risks involved?

3. Planning and Budgeting

This stage involves preparing a detailed plan that outlines how the business will be managed.

A budget is made to estimate the cost of materials, labor, equipment, and other expenses.

4. Sourcing for Capital

Capital means the money and resources required to start and run the business.

Sources of capital include:

- Personal savings
- Family and friends
- Bank loans or cooperative societies
- Government grants and agricultural schemes

5. Site Selection and Land Preparation

Choosing a suitable location is important for horticultural success.

The site should have good soil, access to water, sunlight, and transportation.
After selecting the land, the farmer clears and prepares it for planting.

6. Procurement of Inputs and Equipment

Inputs such as seeds, fertilizers, pesticides, and tools must be purchased before production begins.
Basic equipment may include watering cans, hoes, spades, and wheelbarrows.

7. Planting and Crop Management

This stage involves actual planting, weeding, watering, fertilizer application, and pest control to ensure healthy crop growth.

8. Harvesting and Marketing

After crops mature, they are harvested, cleaned, and packaged for sale.
Marketing ensures that products reach consumers and generate income.

9. Record Keeping and Evaluation

Every transaction and activity should be recorded to track progress and assess profit or loss.
Evaluation helps determine if the business is successful and where improvements are needed.

Business Plan Preparation

A **business plan** is a written document that describes the business, its objectives, products, target market, and financial projections.
It serves as a roadmap for running the enterprise successfully.

A good business plan includes:

1. **Business Name and Description:** What type of horticultural business it is.
2. **Objectives:** Goals of the business (e.g., to produce and sell fresh vegetables).
3. **Market Analysis:** Who will buy the products and at what price.
4. **Production Plan:** Details of crops, methods, and required materials.
5. **Financial Plan:** Capital required, expenses, and expected profit.
6. **Marketing Plan:** How and where the products will be sold.

7. **Management Structure:** Who will manage the operations.

A well-written business plan helps in attracting investors, obtaining loans, and guiding daily operations.

Marketing of Horticultural Products

Marketing refers to all the activities involved in moving horticultural produce from the farm to the consumer.
It is an important part of business because it helps farmers sell their goods and make income.

Methods of Marketing Horticultural Products:

1. **Farm Gate Sales:** Selling produce directly to customers at the farm.
2. **Local Market Sales:** Taking products to nearby markets for sale.
3. **Retail Stores or Shops:** Selling in small quantities to consumers.
4. **Wholesale Sales:** Selling in bulk to retailers or distributors.
5. **Online Marketing:** Using social media or websites to sell and advertise products.

Qualities of Good Marketing in Horticulture:

- Fresh and clean produce
- Attractive packaging and labeling
- Fair pricing
- Regular supply
- Good customer relationship

Importance of Business Start-Up in Horticulture

1. Creates employment and self-reliance.

2. Promotes food security and availability of fresh produce.
3. Encourages innovation and creativity among youths.
4. Improves the economy through income generation.
5. Helps in skill development and entrepreneurship training.
6. Enhances community development and rural growth.

Challenges of Business Start-Up

1. Lack of capital or funds.
2. Unstable market prices.
3. Inadequate knowledge or training.
4. Pests and diseases affecting crops.
5. Poor record keeping and planning.

Summary

Business start-up in horticulture involves generating an idea, conducting a feasibility study, planning, sourcing for capital, and implementing the project.
A business plan serves as a guide for the enterprise and assists in obtaining financial support.
Marketing ensures that produce reaches consumers, while proper record keeping helps measure success.
Successful horticultural entrepreneurs contribute greatly to food production, employment, and national development.

Evaluation

1. Define business start-up.

2. List and explain four stages of business start-up in horticulture.
3. What is a business plan? Mention five components of a good business plan.
4. State four methods of marketing horticultural products.
5. Mention three challenges faced by horticultural entrepreneurs.

Assignment

1. Explain in detail the **importance of business start-up** in horticulture.
2. Write a short **business plan** for a small vegetable garden.
3. List and describe **five sources of capital** for starting a horticultural enterprise.

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WEEK 10: ENTERPRISE DEVELOPMENT

Introduction

Enterprise development in horticulture refers to the process of creating, improving, and managing small or medium-scale businesses that deal with the production, processing, and sale of horticultural products.
It involves identifying business opportunities, developing ideas, planning effectively, and ensuring the business grows sustainably.

A horticultural enterprise can be a nursery, flower garden, fruit orchard, vegetable farm, or landscaping business. The main goal of enterprise development is to help individuals become self-reliant, innovative, and productive in agricultural ventures.

Meaning of Enterprise

An **enterprise** is a business organization or venture that is established for the purpose of producing goods or providing services in exchange for profit.
In horticulture, an enterprise may involve growing crops, processing fruits and vegetables, or selling ornamental plants.

Examples of horticultural enterprises include:

- Vegetable farming (tomatoes, peppers, okra, spinach)
- Fruit farming (mango, pineapple, citrus)
- Nursery and seedling production
- Landscaping and flower gardening
- Agro-processing (fruit juice or dried herbs)

Enterprises can be small, medium, or large depending on their capital, labor, and scale of production.

Meaning of Enterprise Development

Enterprise development means the process of building, supporting, and expanding a business to make it successful and sustainable.
It involves training, planning, funding, management, and marketing to ensure steady growth and profitability.

In horticulture, enterprise development helps farmers and entrepreneurs improve their production skills, manage resources efficiently, and explore new markets.

Importance of Enterprise Development in Horticulture

1. **Employment Creation:** Provides job opportunities for youths and rural dwellers.
2. **Income Generation:** Helps farmers and entrepreneurs earn money through sales.
3. **Food Production and Security:** Increases the availability of fruits, vegetables, and flowers.
4. **Skill Acquisition:** Encourages learning of modern agricultural and business techniques.
5. **Rural Development:** Promotes development in local communities through farm-based ventures.
6. **Innovation:** Encourages creativity and use of improved production methods.
7. **Economic Growth:** Contributes to national income and reduces poverty.

Developing Business Ideas

Before starting any enterprise, the first step is to develop a business idea.
A business idea is a concept or plan that describes what product or service the entrepreneur wants to offer.

Steps in Developing a Business Idea:

1. **Observation of Needs:** Identify what people around you need (e.g., fresh vegetables, flowers, fruits).

2. **Brainstorming:** Think creatively about possible ways to meet those needs.
3. **Research and Feasibility Study:** Investigate if the idea is practical and profitable.
4. **Evaluation:** Weigh the pros and cons of the idea.
5. **Selection:** Choose the best idea based on market demand and available resources.

Examples of Business Ideas in Horticulture:

- Selling potted flowers for homes and offices.
- Starting a vegetable farm for local restaurants.
- Setting up a nursery for fruit seedlings.
- Producing herbal teas from dried leaves.

Steps in Developing a Horticultural Enterprise

To build a successful horticultural business, an entrepreneur must follow key stages:

1. Idea Generation

Developing a unique and profitable horticultural idea that meets customer demand.

2. Feasibility Study

Assessing the business environment, costs, and possible risks.

3. Business Planning

Preparing a detailed plan that outlines production, marketing, and financial activities.

4. Resource Mobilization

Gathering capital, equipment, labor, and land needed to start production.

5. Implementation (Starting the Business)

Carrying out planting, production, and marketing activities according to plan.

6. Monitoring and Evaluation

Checking business progress regularly to identify successes or problems.

7. Expansion and Innovation

Improving products or services, adding new ideas, and expanding into new markets.

Managing a Small Horticultural Venture

Good management ensures that the enterprise operates efficiently and profitably.

Principles of Good Enterprise Management:

1. Proper planning and budgeting.
2. Effective record keeping.
3. Regular maintenance of tools and equipment.
4. Timely planting and harvesting.
5. Good marketing and customer service.
6. Reinvestment of profits to grow the business.

Qualities of a Good Entrepreneur:

- Hardworking and determined
- Honest and disciplined
- Innovative and creative
- Good decision-maker
- Willing to take calculated risks
- Keeps accurate records

Sources of Support for Enterprise Development

1. **Government Agencies:** Such as SMEDAN (Small and Medium Enterprises Development Agency of Nigeria) and BOA (Bank of Agriculture).

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2. **Non-Governmental Organizations (NGOs):** Provide training, mentorship, and funding.
3. **Cooperative Societies:** Offer soft loans and farming assistance.
4. **Financial Institutions:** Banks provide credit and savings options.
5. **Agricultural Extension Services:** Offer technical advice and modern farming practices.

Factors Affecting Enterprise Development

1. Inadequate capital or poor financial management.
2. Lack of technical and entrepreneurial skills.
3. Poor marketing system.
4. Unfavorable government policies.
5. Environmental and climatic challenges.
6. High cost of inputs and transportation.

Summary

Enterprise development in horticulture involves creating and growing profitable agricultural businesses.
It helps individuals become self-reliant, encourages innovation, and contributes to food production and economic growth.
Successful enterprise development requires good ideas, planning, financial management, and marketing skills.

Evaluation

1. Define enterprise.
2. What is enterprise development?

3. List and explain four steps in developing a horticultural enterprise.
4. Mention five qualities of a good entrepreneur.
5. State three challenges that can affect enterprise development.

Assignment

1. Explain **five importance** of enterprise development in horticulture.
2. Write **five steps** in developing a horticultural enterprise and explain each briefly.
3. Mention **five government or non-governmental organizations** that support enterprise development in Nigeria and state their roles.

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WEEK 11: REVISION

Introduction

Revision is an important part of learning that helps students review all topics taught during the term.
In horticulture and crop production, revision enables learners to recall key concepts, definitions, and practices that contribute to successful crop growth, post-harvest handling, and agribusiness management.

This week's lesson is a comprehensive review of all the major topics covered in the **third term**, from **vegetative propagation** to **enterprise development**. It aims to reinforce understanding, clarify misconceptions, and prepare students for examinations.

Summary of Key Topics

1. Vegetative Propagation in Horticultural Crops

- **Meaning:** The process of growing new plants from parts of existing plants such as stems, roots, or leaves rather than from seeds.
- **Methods:**
    1. Cutting
    2. Layering
    3. Grafting
    4. Budding
- **Advantages:**
    - Produces identical plants (true-to-type).
    - Faster maturity and early fruiting.
    - Maintains desirable traits.
- **Disadvantages:**

- Limited number of new plants.
- May spread diseases from parent plants.

2. Practical Session on Vegetative Propagation

- **Activities:** Demonstrations of cutting, layering, grafting, and budding.
- **Tools Used:** Knife, budding tape, grafting knife, pruning shears, watering can, and containers.
- **Maintenance:** Regular watering, shading, and pest control ensure survival of propagated plants.

3. Post-Harvest Management of Vegetables

- **Meaning:** The handling of vegetables immediately after harvest to maintain quality and prevent spoilage.
- **Processes:**
  1. Harvesting at the right maturity stage.
  2. Sorting and grading based on size and quality.
  3. Packaging in baskets, crates, or boxes.
  4. Storage under cool and dry conditions.
  5. Transportation to markets or consumers.
- **Importance:** Reduces losses, maintains freshness, and improves market value.

4. Concept of Entrepreneurship in Horticulture

- **Meaning:** Entrepreneurship is the ability to identify opportunities in horticulture and turn them into profitable ventures.

- **Importance:**
    - Encourages self-employment and creativity.
    - Improves income and living standards.
    - Contributes to agricultural development.
- **Examples of Agripreneurs:**
    - Fruit juice producers
    - Flower nursery owners
    - Vegetable distributors

5. Concept of Money

- **Meaning:** Money is a medium of exchange used for buying and selling goods and services.
- **Functions of Money:**
    1. Medium of exchange
    2. Store of value
    3. Unit of account
    4. Standard of deferred payment
- **Types of Money:** Coins, notes, cheques, electronic money, and barter substitutes.
- **Money Management:** Involves budgeting, saving, and spending wisely to ensure business stability.

6. Bookkeeping in Horticulture and Crop Production

- **Meaning:** Bookkeeping is the systematic recording of financial transactions in a business.

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- **Types of Farm Records:**
    1. Input record
    2. Output record
    3. Sales and purchase record
    4. Profit and loss record
    5. Labour record
- **Importance:**
    - Helps track income and expenditure.
    - Guides decision-making.
    - Promotes transparency and accountability.

7. Business Start-Up in Horticulture

- **Meaning:** The process of establishing a new horticultural business from idea to operation.
- **Stages:**
    1. Idea generation
    2. Feasibility study
    3. Business plan development
    4. Sourcing for capital
    5. Implementation and monitoring
- **Marketing:** The process of promoting and selling horticultural products to customers.
- **Importance:** Encourages entrepreneurship and economic self-reliance.

8. Enterprise Development

- **Meaning:** Building and expanding a business to achieve growth and sustainability.
- **Importance:** Provides employment, income, innovation, and food security.
- **Steps:**
    1. Idea generation
    2. Planning and feasibility study
    3. Implementation
    4. Evaluation and improvement
- **Qualities of a Good Entrepreneur:** Hardworking, honest, creative, disciplined, and a good planner.

Summary of Practical Skills Covered

1. Propagation by cutting, grafting, layering, and budding.
2. Sorting, grading, and packaging of vegetables.
3. Simple bookkeeping and profit calculation.
4. Preparation of a small business plan for a horticultural venture.

General Importance of Horticulture and Crop Production

1. Provides food, income, and raw materials.
2. Beautifies the environment with flowers and ornamental plants.
3. Creates employment opportunities.
4. Contributes to national development.
5. Encourages entrepreneurship among youths.

Evaluation

1. Define vegetative propagation.
2. List three methods of vegetative propagation.
3. State four functions of money.
4. Mention three types of farm records and their uses.
5. Explain the term “enterprise development.”
6. State five importance of post-harvest management.
7. Mention any four tools used in vegetative propagation.
8. Describe three steps in developing a horticultural enterprise.

Assignment

1. Summarize the key points of all topics taught during the third term.
2. Explain how bookkeeping supports business start-up and enterprise development.
3. Prepare a simple business idea for a small horticultural enterprise (e.g., flower garden or vegetable farm) and outline how you would manage it.