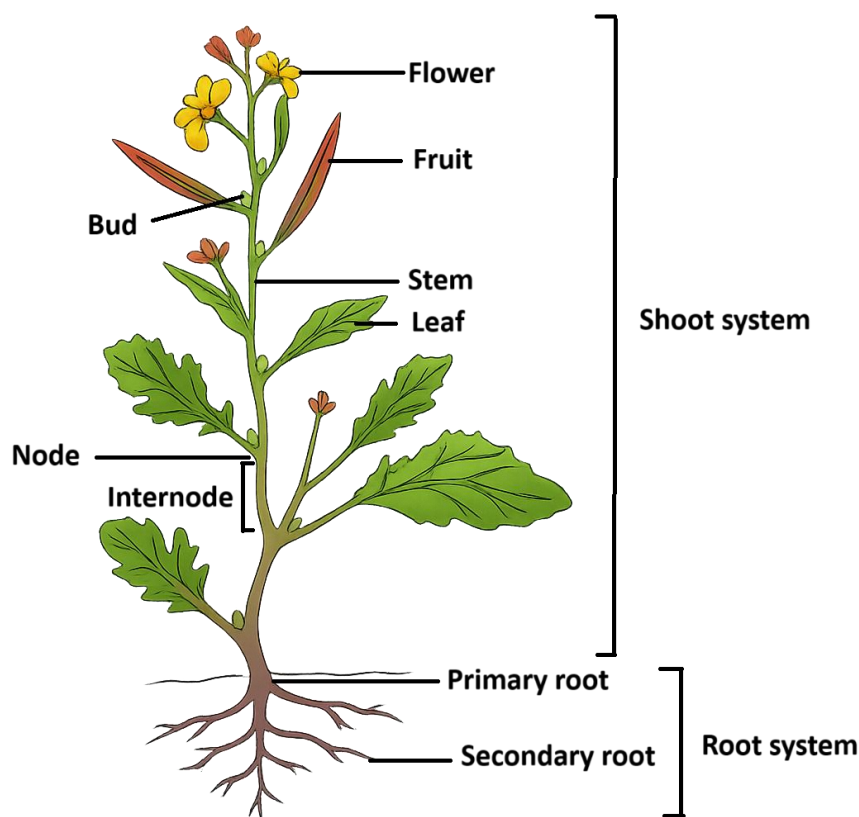


Morphology of Flowering Plants

Introduction to the Morphology of Flowering Plants

Introduction

- Flowering plants (**angiosperms**) exhibit a wide diversity in their external structure (**morphology**).
- Despite this variability, all angiosperms share a basic structural plan that includes:
 - Roots
 - Stems
 - Leaves
 - Flowers
 - Fruits



Parts of a flowering plant

Significance of Morphology in Classification

- To successfully classify and understand higher plants, it is important to:
 - Use standard technical **terms** and **definitions**
 - Understand morphological variations that serve as **adaptations** to different environmental conditions

- e.g., protection, support, climbing, or storage

Observation

- When you examine any common **weed**, you typically observe:
 - Presence of roots, stems, and leaves
 - It may also bear flowers and fruits

Plant Body Division

- The body of a flowering plant is broadly divided into two main systems:
 - **Root System** – the underground part of the plant
 - **Shoot System** – the above-ground part, including stem, branches, leaves, flowers, and fruits

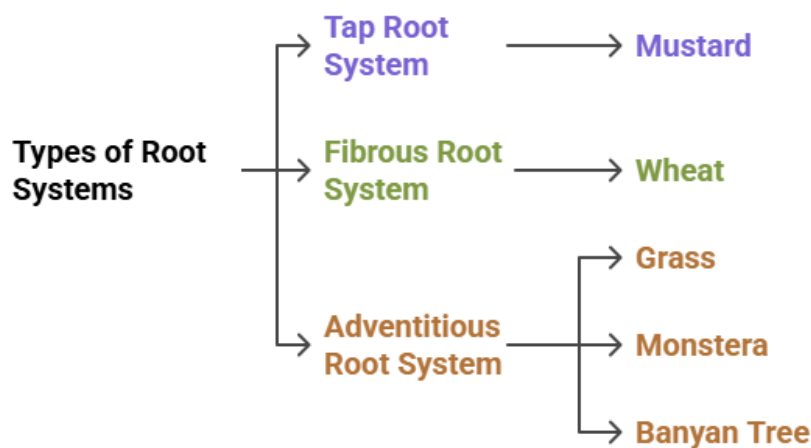
The Root

- The root is the descending, underground part of the plant.
- It is **non-green**, typically does not bear leaves, and **grows toward gravity** (positive geotropism).
- Roots are not segmented and lack nodes and internodes.

Main Characteristics of Roots

- Usually develop from the **radicle** of the embryo
- Grow into the soil to anchor the plant
- Do **not bear buds** (in most cases)

Types of Root Systems



A. Tap Root System

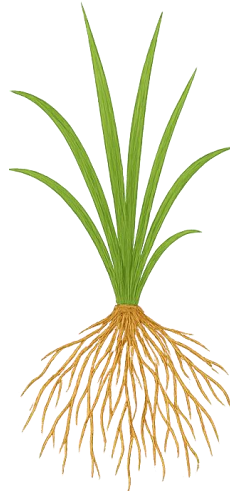
- Found in **dicotyledonous plants** (e.g., *mustard*)
- The radicle grows directly to form the **primary root**
- This primary root continues to grow and produces lateral roots (secondary, tertiary, etc.)
- Together, they form the tap root system
- **Example:** *Mustard (Brassica)*



Tap Root

B. Fibrous Root System

- Typical of monocotyledonous plants (e.g., *wheat, rice*)
- The primary root is short-lived
- Replaced by a cluster of similarly sized roots that emerge from the **base of the stem**
- These roots spread out like fibers, providing a strong anchorage in the upper layers of soil
- **Example:** *Wheat (Triticum)*



Fibrous Root

C. Adventitious Root System

- Roots that arise from parts other than the **radicle**, such as stems or leaves
- May function in support, storage, or additional absorption
- Common in:
 - **Grass** – for quick soil anchorage
 - **Monstera** – for absorption and aerial support
 - **Banyan tree** – for prop or pillar-like support from aerial roots



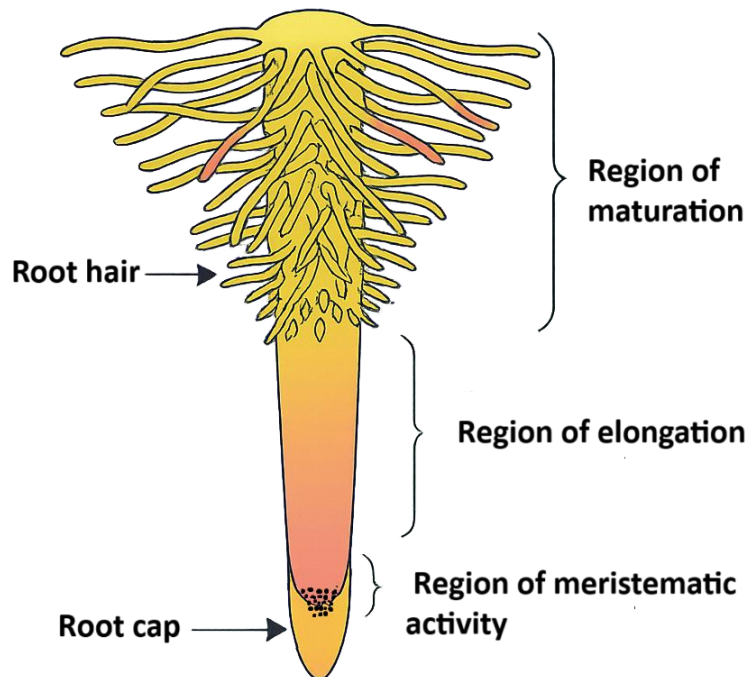
Adventitious Root

Functions of the Root System

- **Absorption:** Takes up water and dissolved minerals from the soil
- **Anchorage:** Fixes the plant firmly in the soil
- **Storage:** Some roots (e.g., carrot, beet) store food
- **Hormone synthesis:** Produces plant growth regulators like cytokinins and abscisic acid

Regions of the Root

The **root** is divided into distinct regions based on function:



The regions of the root-tip

A. Root Cap

- A thimble-like protective structure at the root apex
- **Protects** the tender growing tip as it penetrates the soil

B. Region of Meristematic Activity

- Located just above the root cap
- Composed of small, thin-walled cells with dense protoplasm
- Cells **actively divide** to produce new cells

C. Region of Elongation

- Located just above the meristematic region
- Cells undergo rapid elongation and enlargement
- Responsible for the increase in root length

D. Region of Maturation

- Located above the elongation region
- Cells undergo differentiation and maturation



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