General biology botany

Lecture (6)

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Plant tissue : Root

The root is an important part of the plant that grows into the soil explore its surroundings. It helps the plant stay stable and prevents from falling in win rain.

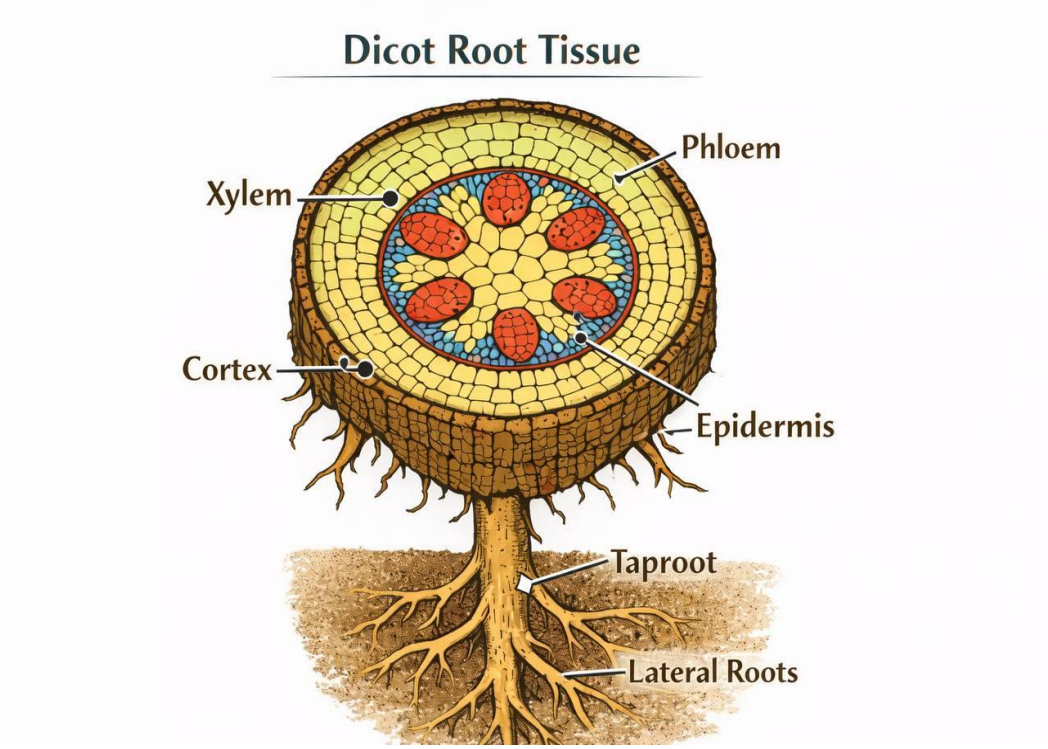
Roots have tiny tips that can sense changes in the soil and moisture. They can also interact with helpful microbes in the soil to support plant health. Roots send chemical signals to the plant to regulate growth development.

Functions:

- Absorption: Water and minerals from soil
- Anchorage: Keeps the plant firmly in the ground
- Storage: Stores food like starch for the plant
- Conduction: Transports water and nutrients to the stem and leaves

Root Tissues:

Roots are made of different tissues, each with a special role that helps the root grow, absorb water and nutrients, and support the plant. The main tissues in a root are: **Epidermis – Cortex – Endodermis – Pericycle – Vascular tissue (Xylem & Phloem) – Cambium – Root Cap**

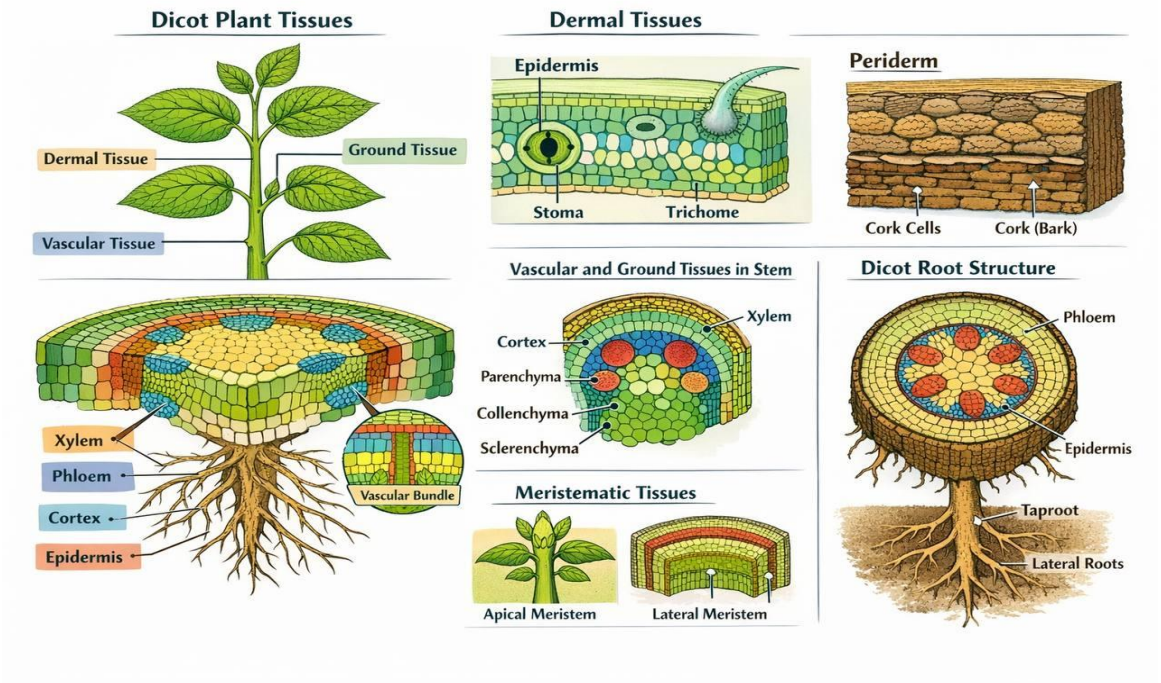


- **Epidermis**: outer layer, often has root hairs; absorbs water and minerals.
- **Cortex**: under epidermis, made of parenchyma cells; stores food and helps move water/minerals to vascular tissue.
- **Endodermis**: innermost cortex layer with tightly packed cells; regulates water and nutrient flow with Casparian strip.

- **Pericycle**: layer inside endodermis; forms lateral roots and helps in root thickening.
- **Vascular tissue:**
- **Xylem**: carries water/minerals up; gives strength to root.
- **Phloem**: transports food from leaves to other parts.
- **Cambium**: meristem layer between xylem and phloem; makes new vascular cells, thickens root.
- **Root Cap**: protects root tip; secretes mucilage to ease movement soil.

Dicot Plant Tissues (Simplified)

In dicot plants, tissues are well organized to help the plant grow and function properly. These tissues are divided into three main systems: dermal, ground, and vascular tissues.



1. Dermal Tissue

The dermal tissue forms the outer covering of the plant.

- **Epidermis**: The outermost layer that protects the plant. It contains stomata for gas exchange and trichomes for protection.
- **Periderm**: Found in woody dicots and replaces the epidermis as the plant grows older. It provides extra protection.

2. Ground Tissue

Ground tissue is responsible for storage, support, and photosynthesis. It includes:

- **Parenchyma**: Thin-walled cells involved in photosynthesis and food storage.
- **Collenchyma**: Provides flexible support in young parts of the plant.
- **Sclerenchyma**: Thick-walled cells that give strength and support to mature parts.

3. Vascular Tissue

Vascular tissue helps in transport inside the plant.

- **Xylem**: Transports water and minerals from roots to the rest of the plant.
- **Phloem**: Transports food from leaves to other parts of the plant.In dicot stems, vascular bundles are arranged in a ring.

4. Meristematic Tissue

Meristematic tissues are responsible for growth.

- **Apical meristem**: Causes increase in length.
- **Lateral meristem**: Causes increase in thickness (secondary growth).

Characteristics of Dicot Plants

- Have two cotyledons.
- Leaves show reticulate venation.
- Vascular bundles are arranged in a ring.
- Roots are usually tap roots.
- Flower parts occur in multiples of four or five.
- Most dicots show secondary growth.