

Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (second Year)

Subject: Botany

Paper Code: BOC-103

Paper Title: Plant anatomy and embryology

Unit: Primary structure of organs

Module Name: Structure of dicot stem

Module No: 10

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Notes:

Structure of young dicot stem (Example: Sunflower)

- A. **Tissue system of dicot stem** consists of 3 types of tissue system:
- Epidermal tissue system consists of epidermis.
 - Ground tissue system consists of distinct cortex, pericycle, pith and medullary rays.
 - Vascular tissue system consists of vascular bundles arranged in ring form around periphery of the pith.
- B. **Transverse Section of young dicot stem** shows following structures:
- Epidermis:** It is the outermost layer of dicot stem. It consists of single layer of compactly arranged parenchymatous cells. Outer surface of epidermis shows deposition of waxy layer called **cuticle**. It prevents the loss of water from inner tissues of the dicot stem. Also it gives protection against mechanical injury, high light intensity, pathogen attack etc. Outer surface also shows presence of multicellular **trichomes**.
 - Cortex:** shows 3 distinct zones i.e. hypodermis, general cortex and endodermis.
 - Hypodermis:** It is the outermost layer of cortex & present just beneath the epidermis. It consists of few layers of collenchymatous cells with angular thickening. Cell wall consists of

cellulose, hemicellulose and pectic materials. It provides mechanical support to growing stem.

- b. **General cortex:** It is the middle layer of cortex. It consists of multilayers of loosely arranged parenchymatous cells. Cells are round or oval with distinct protoplast. Few cells are chlorenchymatous in nature. Few mucilaginous canals are also present. Cortical cells plays important role of food storage.
 - c. **Endodermis:** It is the innermost layer of cortex. It consists of single layer of barrel shaped parenchymatous cells. These cells are rich in starch therefore also referred as **starch sheath**. Radial and inner cell walls shows presence of strip/band called as **casperian strip**.
3. **Stele:** It forms the center region of the stem. It consists of pericycle, vascular bundles, pith and medullary rays. Stele is **eustele** type.
- a. **Pericycle:** It is the outermost layer of stele. It consists of partly sclerenchymatous tissue and partly parenchymatous tissue. Sclerenchymatous tissue forms crescent shaped patches above each vascular bundle called as **bundle sheath**. It provides mechanical support to the stem.
 - b. **Vascular bundle:** Each vascular bundle is **conjoint, collateral and open**.
Xylem consists of tracheids, vessals, fibers and xylem parenchyma. It is **endarch** in nature. The vessals of protoxylem shows annular or spiral thickening. Sometimes reticulate thickening is also seen. The vessals of metaxylem shows reticulate and pitted thickening. Xylem fibers are randomly present in the xylem. Xylem parenchyma is found around the protoxylem.
Phloem consists of sieve elements, companion cells and phloem parenchyma. Sieve elements show larger cavities and dispersed randomly in phloem tissue. Companion cells are comparatively smaller in size and are associated with sieve tubes. Phloem parenchyma is present.
Cambium consists of multilayers of meristematic cells. It is also called as **intra-fascicular cambium**.
 - c. **Pith** is present in the center of the stem. It consists of thin walled, parenchymatous cells with several inter-cellular spaces. They store food material.

- d. **Medullary rays** (Pith rays): consists of thin walled, radially elongated parenchymatous cells. These rays extend between vascular bundles. They play important role in lateral translocation of food, water and other substances. Sometimes they store food material.

