



9. Name the three basic tissue systems in the flowering plants. Give the tissue names under each system.

Solution: The three basic tissue systems in flowering plants are epidermal tissue system, ground tissue system and vascular tissue system.

- Epidermal tissue system comprises epidermal cells, stomata, trichomes and hairs.
- Ground tissue system consists of cortex, endodermis, pericycle, pith and medullary rays, in the primary roots and stems. In-leaves, the ground tissue consists of thin walled chloroplast containing cells and is called mesophyll.
- The vascular tissue system consists of complex tissues, the phloem and the xylem.

10. How is the study of plant anatomy useful to us?

Solution: Study of internal structures of plants is called plant anatomy. Study of plant anatomy is useful:

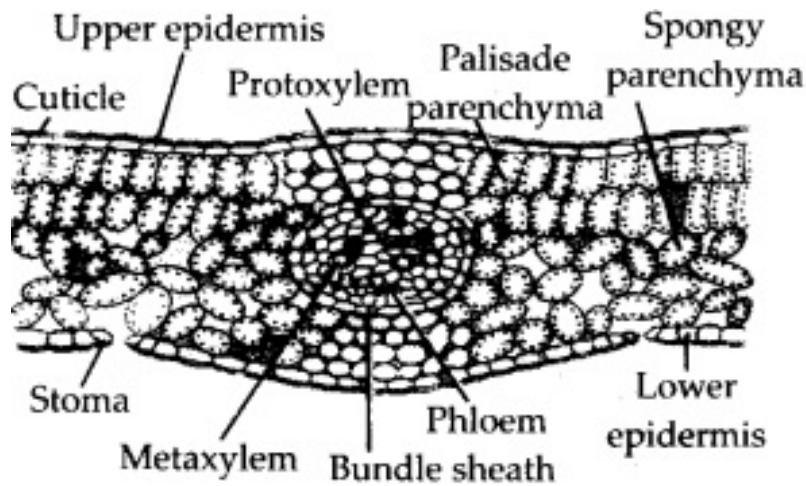
- for solving taxonomic problems.
- For knowing homology and analogy of various plant groups.
- to differentiate the superior and inferior, standard and substandard or specified and unspecified woods.
- In establishing purity and correct identity of plant parts in pharmacognosy (science connected with sources, characteristics and possible medicinal uses).
- In knowing the structural peculiarities of different groups of plants.

11. What is periderm? How does periderm formation take place in the dicot stems?

Solution: Phelloderm, phellogen and phellem together constitute the periderm. Periderm is protective in function. Dicot stems produce cork cambium or phellogen in the outer cortical cells. Phellogen cells divide on both the outer side as well as the inner side to form secondary tissues. The secondary tissue produced on the inner side of the phellogen is called secondary cortex or phelloderm. On the outer side phellogen produces cork or phellem.

12. Describe the internal structure of a dorsiventral leaf with the help of labelled diagram.

Solution:



**Fig.: T.S. of a dorsiventral leaf**

Dorsiventral leaves are found in dicots. The important anatomical features of dorsiventral leaves are discussed below:

- (a) Upper epidermis: This is generally outermost single layer made of parenchymatous cells. The epidermal cells have sometimes outgrowths called papillae, e.g., in *Gladiolus*. The epidermal cells are devoid of chloroplast and stomata are absent on upper epidermis.
- (b) Lower epidermis: It is just like upper epidermis but here stomata are present. Chloroplasts are absent in lower epidermis also, except the guard cells of stomata.
- (c) Mesophyll: In between upper and lower epidermis mesophyll tissue is present which can be divided into two regions:

- Palisade parenchyma: These are elongated columnar cells without intercellular spaces. These have chloroplast in them and are generally arranged in two layers.
- Spongy parenchyma: It is found below palisade parenchyma and are spherical or oval with intercellular spaces. They also have chloroplasts but number of chloroplasts is more in palisade parenchyma than spongy parenchyma.

- (d) Vascular bundles: Vascular bundles are generally found at the boundary between the palisade and the spongy regions. The vascular bundle in midrib region is largest. Vascular bundles are conjoint, collateral and closed. Each vascular bundle is surrounded by a bundle sheath of parenchymatous cells. In the vascular bundle, xylem is present towards upper epidermis and phloem towards lower epidermis. Further in xylem, protoxylem is towards upper epidermis.

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