TOPIC: PLANT TISSUE SYSTEM-I

LECTURE NO:21
CLASS:XI
DATE: 14TH MAY 2020
AUTHOR: DR.NIRMAL KUMARI

THETISSUESYSTEM

On the basis of their structure and location, there are three types of tissue systems.

These are the epidermal tissue system, the ground or fundamental tissue system and the vascular or conducting tissue system.

Epidermal Tissue System

- The epidermal tissue system forms the outer-most covering of the whole plant body and comprises epidermal cells, stomata and the epidermal appendages – the trichomes and hairs.
- **Epidermis –**
  - It is the outer most layer of the primary plant body.
  - It is made up of elongated, compactly arranged cells, which form a continuous layer.

- Epidermis is usually single layered.
- Epidermal cells are parenchymatous with a small amount of cytoplasm lining the cell wall and a large vacuole.

Cuticle –

- It covers the outside of the epidermis.
- It is a waxy thick layer.
- It prevents the loss of water.
- Cuticle is absent in roots.

Stomata –

- They are present in the epidermis of leaves.
- Stomata regulate the process of transpiration and gaseous exchange.
- Each stoma is composed of two bean shaped cells known as **guard cells.**
- In grasses, the guard cells are dumbbell shaped.
- The outer walls of guard cells (away from the stomatal pore) are thin and the inner walls (towards the stomatal pore) are highly thickened.
- The guard cells possess chloroplasts and regulate the opening and closing of stomata.
- Sometimes, a few epidermal cells, in the vicinity of the guard cells become specialised in their shape and size and are known as **subsidiary cells**.

- The stomatal aperture, guard cells and the surrounding subsidiary cells are together called **stomatal apparatus.**

- **Epidermal appendages –**
  - **Roothairs –** these areunicellular elongations of the epidermal cells and help absorb water andminerals from the soil.
  - **Trichomes –**these are present on stem. The trichomes in the shoot system are usually multicellular.They may be branched or unbranched and soft or stiff. They may evenbe secretory. The trichomes help in preventing water loss due totranspiration.

Ground Tissue System

- All tissues except epidermis and vascular bundles constitute the **ground tissue**.
- It consists of simple tissues such as parenchyma, collenchyma and sclerenchyma.
- Parenchymatous cells are usually present in cortex,pericycle, pith and medullary rays, in the primary stems and roots.
- Inleaves, the ground tissue consists of thin-walled chloroplast containingcells and is called **mesophyll**.

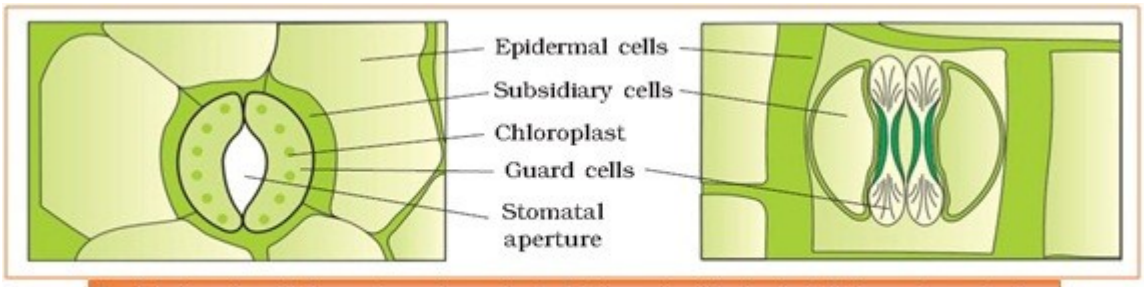

Fig: (a) stomata with bean-shaped guard cells(b) stomata with dumb-bell shaped guard cell

Vascular Tissue System

- The vascular system consists of complex tissues,the phloem and the xylem.
- The xylem and phloem together constitute vascular bundles.
- In dicotyledonous stems, **cambium** is present between phloem and xylem. Such vascular bundles because of the presence of cambium possess the ability to form secondary xylem and phloem tissues, and hence are called **open vascular bundles**.
- In the monocotyledons,the vascular bundles have no cambium present in them. Hence, since they do not form secondary tissues they are referred to as **closed**.
- When xylem and phloem within a vascular bundle are arranged in an alternate manner on different radii, the arrangement is called **radial** such as in roots.
- In **conjoint** type of vascular bundles,the xylem and phloem are situated at the same radius of vascular bundles. Such vascular

bundles are common in stems and leaves. The conjoint vascular bundles usually have the phloem located only on the outer side of xylem.

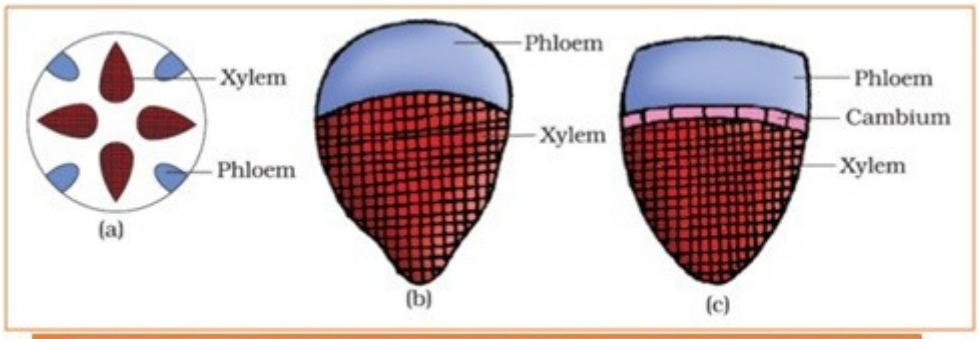

Fig: Various types of vascular bundles :(a) radial (b) conjoint closed (c) conjoint open

ANATOMY OFDICOTYLEDONOUS ANDMONOCOTYLEDONOUSPLANTS

Dicotyledonous Root (Sunflower Root)

- **Epidermis –** outermost layer,many cells protrude in the form of unicellular root hairs.
- **Cortex –** consists of several layers of thin-walled parenchyma cells with intercellular spaces.
- **Endodermis –** innermost layer of the cortex. It comprises a single layer of barrel- shaped cells without any intercellular spaces. The tangential as well as radial walls of the endodermal cells have a deposition of water

impermeable,waxy material-**suberin** in the form of **casparian strips.**

- **Pericycle –** few layers of thick-walled parenchyomatous cells, Next to endodermis. Initiation of lateral roots and vascular cambium during the secondary growth takes place in these cells.
- **Pith –** The pith is small or inconspicuous.
- **Conjuctive tissue –** The parenchymatous cells which lie between the xylem and the phloem are called conjuctive tissue.
- **Vascular bundles – Radial/alternate** type. **Exarch** xylem. There are usually two to four xylem and phloem patches. Later, a cambium ring develops betweeen the xylem and phloem.
- **Stele –**All tissues on the innerside of the endodermis such as pericycle, vascular bundles and pithconstitute the stele.