

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 2: Primary structure of organs.

Module Name: Structure of monocot leaf.

Module No: 13

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Notes

Leaf

Leaf usually denotes foliage leaves. But natural selection has resulted in numerous modifications of leaves, protection (spines), support (tendrils), storage (fleshy leaves of bulbs), and nitrogen procurement (insectivorous). They are important tools in taxonomy.

Parts of leaf

1. Lamina- light harvesting portion
2. Petiole-Stalk that holds the blade into light
 - Prevent self shading.
 - Flutter in wind to bring fresh air
 - Leaf is sessile if it has no petiole and is called petiolated if it has petiole.
 - Many monocots do not have petiole even then flutter due to sheathing leaf base.

INTERNAL STRUCTURE OF MONOCOT LEAF

A) UPPER EPIDERMIS:

The layer consists of two types of flattened rectangle cells. The outer walls of epidermal cells show presence of well developed cuticle. The epidermal cells show absence of chloroplasts. The stomata are present in these epidermal cells. Each stoma is guarded by a pair of dumb-bell shaped guard cells and on the sides of which there are subsidiary cells. Below each stomatal opening the respiratory or sub-stomatal chamber is present.

In upper epidermis, the groups of large cells called bulliform cells are present at regular intervals. The bulliform cells or motor cells are hygroscopic and due to their turgidity and flaccidity they bring about rolling and unrolling of lamina. Their function is to control the rate of transpiration.

B) MESOPHYLL:

This tissue lies between the upper and lower epidermis. It is not differentiated into palisade and spongy tissue (as in dicot leaf). As the maize leaf grows vertically, both the surfaces are equally illuminated. Therefore, mesophyll consists of one type of tissue hence the leaf is known as isobilateral. The mesophyll tissue carries out photosynthesis.

The cells in the mesophyll tissue are round, thin walled isodiametric with chloroplasts. They are arranged with small intercellular spaces. The substomatal cavities or chambers are also smaller than those of dicot or sunflower leaf.

C) VASCULAR BUNDLES:

Each vascular bundle consists of xylem and phloem, the cambium is absent. Thus, vascular bundles are conjoint, collateral closed. They are cut in one plane due to parallel venation.

The vascular bundles vary in size. The larger vascular bundles contain both xylem and phloem but the smaller bundles contain only few vessels of xylem. The large vascular bundles alternate with three to four smaller vascular bundles. On both the sides of vascular bundles there is a small patch of sclerenchyma cells. These patches are close to the upper and lower epidermis. Each vascular bundle is surrounded by a sheath, called bundle sheath, which is composed of thin walled parenchyma cells. The parenchyma bundle sheaths also contains chloroplastid and carry out photosynthesis. The larger vascular bundle resembles the vascular bundles in stem.

Xylem: The xylem is 'V' or 'Y' shaped. The protoxylem shows annular and spiral vessels. It is towards upper epidermis and metaxylem facing lower epidermis. Lysigenous cavity is present just near the protoxylem. Xylem elements conduct water and supply it to living mesophyll cells.

Phloem: It is placed towards lower epidermis. It consists of sieve tubes and companion cells. The phloem carries organic substances from mesophyll cells to other regions.

D) LOWER EPIDERMIS:

It consists of single layer of cells which are thin walled and flattened. The outer walls are cutinised. It shows presence of stomata. Stomatal openings are guarded by guard cells. The subsidiary cells are also present. It shows more stomata than upper epidermis. The bulliform cells are absent. Both the epidermal layers check the transpiration and allow gaseous exchange during photosynthesis and respiration.