

## STUDY NO.: 14

### NAME OF THE STUDY: STUDY ON ANATOMY OF ISOBILATERAL (MONOCOTYLEDONOUS) LEAF

#### 1. LEAF OF MAIZE (*Zea mays*)

The internal structure of isobilateral leaf of maize shows distinct layers of epidermis, mesophylls cells and vascular bundles with following features:

##### I. Epidermis

Epidermis is single layered, present on both surfaces and has cuticles (cuticularized) and stomata on both surfaces (amphistomatic). It is composed of compactly arranged oval or barrel shaped thin walled parenchymatous cells. A few cells in the Upper epidermis may become larger, less cuticularised; lens shaped and found on groups called motor cells or bulliform cells. These cells become empty and large and regulate the curling and uncurling (rolling up) of the leaves during dry conditions.

##### II. Mesophyll

Mesophyll is the ground tissue that is present between the two epidermal layers. It is not differentiated into palisade and spongy parenchyma and contains chloroplasts. It is composed of cells that are almost spherical, oval or angular with irregular intercellular spaces. Mesophyll tissues are not found in the mid-vein region. In mid vein region, sclerenchymatous cells extend from the vascular bundle to the lower and upper epidermis. This extension of sclerenchyma is called bundle sheath extension.

##### III. Vascular bundles

Vascular bundles are of two types- small bundles are abundant and larger bundles are found in between them. The bundles are conjoint, collateral, closed and each covered by parenchymatous bundle sheath cells containing starch grains. Sclerenchymatous cells may be present on both sides of the large bundles. The larger bundles have distinct phloem towards the lower epidermis and xylem toward upper surface.

**Xylem** consists of two pitted oval metaxylem; in between them, tracheids are also found. Xylem parenchyma are less numerous. Protoxylem is represented by a lysigenous cavity.

**Phloem** has sieve tubes and companion cells. The small bundles are surrounded by individual sheaths and contain not distinct and less developed phloem and xylem.

##### Identification:

1. It is a **leaf** because
  - i) Vascular bundles are conjoint, collateral and closed.
2. It is a **monocot leaf** because
  - i) Amphistomatic - stomata on both layers of epidermis.
  - ii) Undifferentiated mesophyll - tissue not differentiated into palisade and spongy parenchyma.
  - iii) Sclerenchyma - present on both sides of vascular bundle.

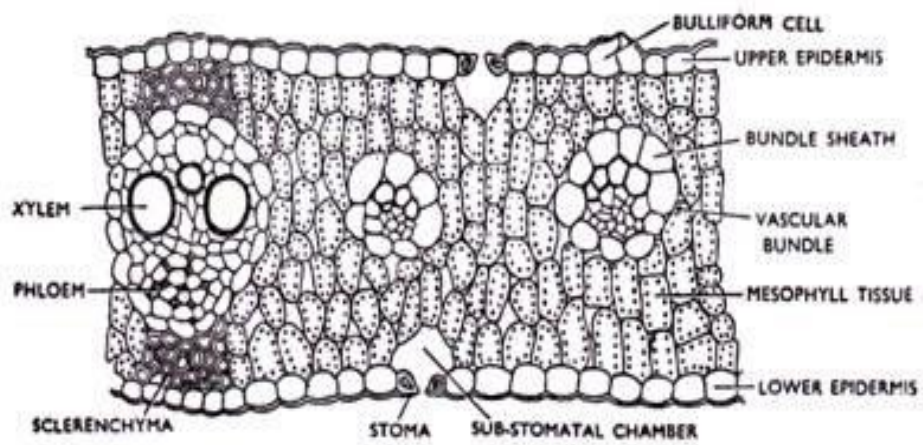


Fig.: T.S. of monocot/isobilateral leaf (maize leaf)