

FIG: T.S. OF ROOT OF Zea mays. (MONOCOT ROOT)

Rt - 29/12/2020

AIM OF THE EXPERIMENT: To study the Anatomical structure and details of supplied specimen (Root).

PROCEDURE: The supplied specimen was cut (T.S.) in a thin and uniform section and stain it with safranin solution for 2 minutes. Washed with water and mount in dilute glycerin. The following details are observed.

OBSERVATION:

A. EPIDERMIS: Uniseriate like dicot roots; Composed of a row of closely-set, thin-walled tubular cells without cuticle; unicellular root hairs may be present.

B. CORTEX: It is massive and composed of parenchyma cells with conspicuous intercellular spaces which may be large lacunae (air spaces) originating by separation of cell walls along the middle lamella (schizogenously). Beneath the epidermis, i.e. towards the periphery of the cortex, several layers of cells undergo suberisation and produce a zone of tissue called exodermis. The innermost layer of cortex is differentiated as an endodermis which is composed of a row of barrel-shaped, closely-packed cells with casperian strips; endodermal cells often develop thick secondary walls; sometimes due to delay in such thickening, cells opposite the protoxylem groups remain thin-walled and form passage cells.

C. STELE: stele is composed of following tissues -

(a) PERICYCLE: It is the outermost uniseriate layer of the stele. Pericycle is made of both parenchyma and sclerenchyma cells.

(b) VASCULAR BUNDLES: Polyarch (i.e. many in numbers) and radial, i.e. phloem strands alternate with xylem strands; parenchyma cells near about the xylem groups undergo sclerosis and thus become thick-walled. Proto-phloem of the phloem lies towards the periphery while metaphloem occurs

Further inwards. xylem is exarch.

(C) PITH: Pith is large, central in position and surrounded by a circle of metaxylem vessels. It is composed of loosely-arranged parenchymatous cells containing abundant starch grains.

CLASSIFICATION AND IDENTIFICATION

1. Cortex is massive and composed of parenchyma cells with conspicuous intercellular spaces, endodermis often develops thick secondary walls Root
2. Pericycle is made of both parenchyma and sclerenchyma cells, vascular bundles are polyarch and radial Monocotyledonous Root.

CONCLUSION: Hence, the supplied specimen is identified as monocotyledonous Root of Zea ~~Zae~~ mays (maize).

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(D) Stem of *Zea* sp. (Fig. 6.4)

The stem is circular in cross-section. Tissue arrangement is :

Epidermis : It is single-layered, composed of small tightly set cells. The outer walls are cuticularised and hairs are absent.

Cortex : There is no direct zonation in the cortical region. Vascular bundles are scattered all over the parenchymatous *ground tissue*. There is a thin band of hypodermal sclerenchyma layer just beneath the epidermis.

Stele : It is an atactostele. The bundles occurring towards the periphery are smaller in size and more crowded, whereas those at the central region are larger in size and more spaced.

Vascular Bundles : The vascular bundles are conjoint and closed. Xylem occurs in the form of the letter 'Y' — the two metaxylem vessels with wider cavities occur along the two arms, and protoxylem vessels — usually one or two — with narrow cavities are at the base. In mature bundles, xylem elements

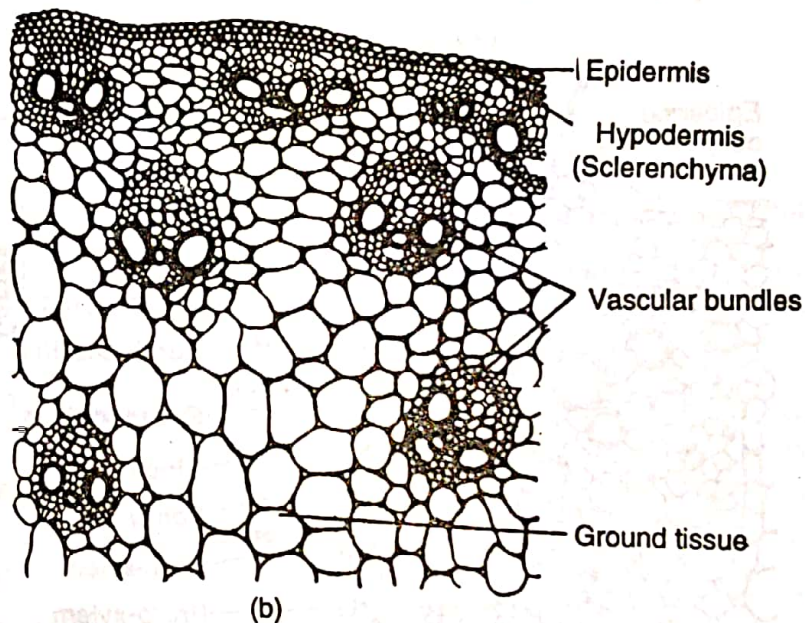
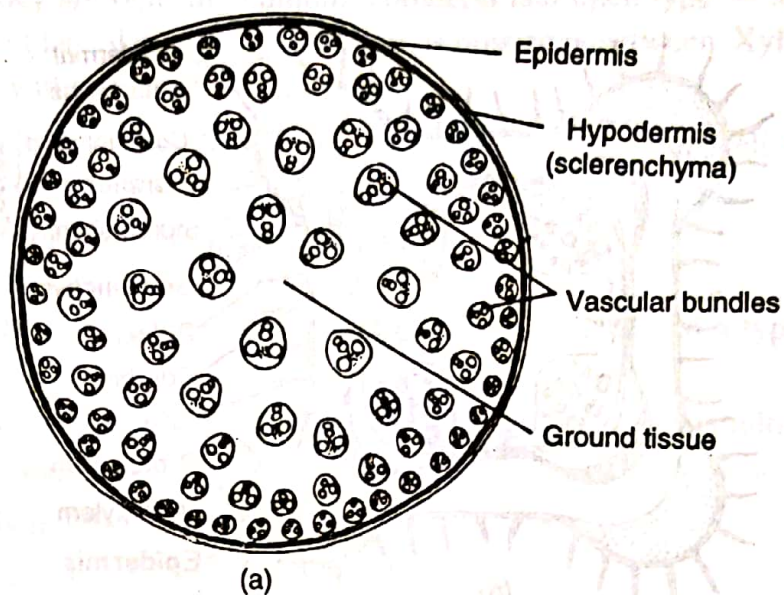


Fig. 6.4 : T.S. of Maize stem. (a) Diagrammatic; (b) A portion of T.S. under magnification

undergo more and more lignification and the lowest protoxylem elements disintegrate forming a lacuna or cavity known as protoxylem cavity. Each bundle is surrounded by sclerenchyma cells as a bundle sheath.

Pith : It is not distinguishable from the ground tissue.

Comments on Anatomical Features

The specimen shows the features of a typical monocotyledonous stem. The reasons are :

- There is a cuticularised epidermis which is devoid of hairs.
- There is no demarcation of cortex and stelar zone. Vascular bundles are scattered all over the ground tissue.
- Each vascular bundle is conjoint, collateral and closed. Xylem is arranged in the form of the letter Y. There is protoxylem cavity in mature bundles.
- Each bundle is covered by a distinct bundle sheath.
- Pith is not differentiated.