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Subject: Botany
Class: Deg.-II (Hons. & Sub.)
Paper: IVth
Topic: Morphological and Anatomical Adaptations of
Xerophytes (continued)
Lecture no. 11

Morphological and Anatomical Adaptations of Xerophytes (continued):

Anatomical adaptations of xerophytes can be conveniently discussed under the headings: epidermis, hypodermis, ground tissue and vascular tissue.

Epidermis:

- Some xerophytes have multiple epidermises (Nerium).
- Epidermis is with thick cuticle and deposition of waxes, resins etc.
- There are epidermal hairs especially in grooves (furrows) that protect the sunken stomata.
- Mostly stomata are sunken and are in pits.
- Number of Stomata is less than normal.

- Leaves that have the capacity to roll have specialized cells called bulliform cells that help in rolling.

Hypodermis:

Hypodermal layers of xerophytes are thick and well developed.

Ground tissue:

- In stems there is abundant mechanical tissue in the form of sclerenchyma as in Casuarina stem.
- Since leaves are reduced, the stems usually have chlorenchyma.
- In succulent plants, cortex is filled with water, mucilage, latex etc.
- In plants that have leaves, palisade parenchyma is well developed.
- In Pinus mesophyll cells are modified.
- Intercellular spaces are greatly reduced.

Conducting tissue or Vascular Tissues:

Vascular tissue (xylem and phloem) is very well developed in xerophytes.

Physiological adaptations of Xerophytes:

Xerophytes show a number of physiological features:

- Transpiration is well regulated.
- Osmotic concentration of the cell sap is high.

- Succulents have high pentosans (derived from polysaccharides) resulting in accumulation of water.

T.S. of Nerium Leaf showing anatomical adaptations of Xerophytes:

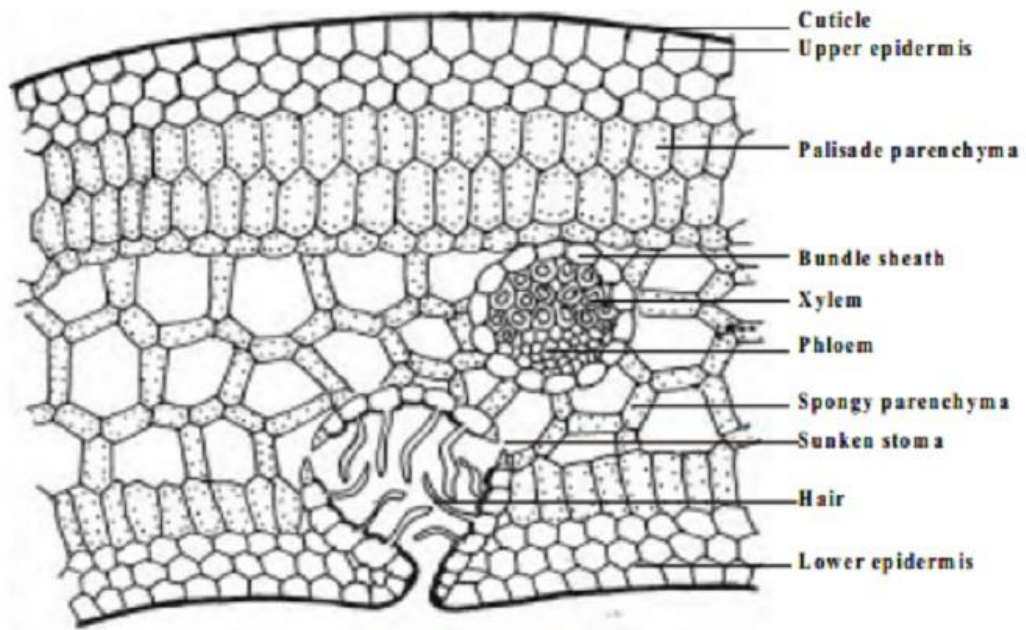


Fig : T.S. of Nerium leaf

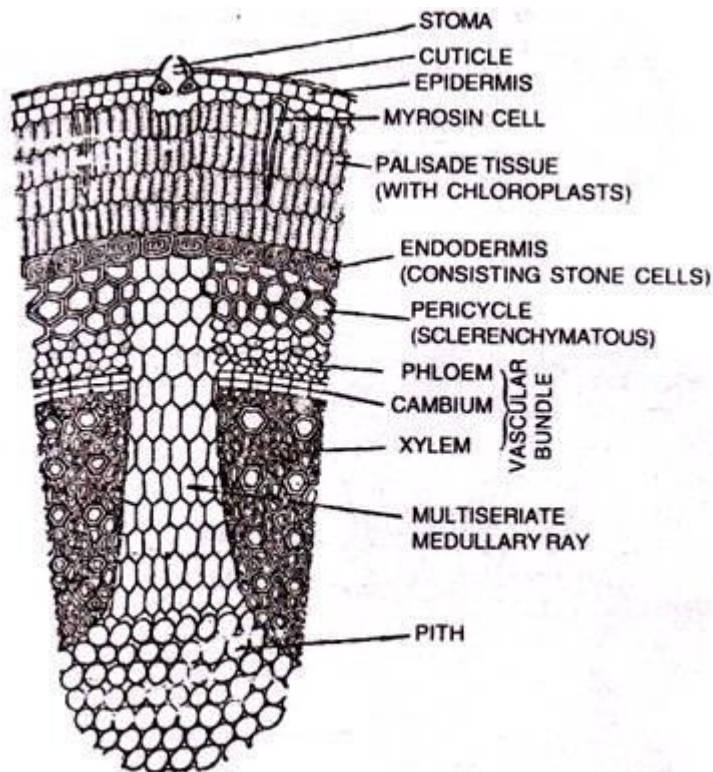


Fig. 2.23. A part of the T.S., stem of *Capparis aphylla* magnified.

Xerophyte adaptations summary:

Adaptation	How it works	Example
<u>thick</u> cuticle	stops uncontrolled evaporation through leaf cells	
small leaf surface area	less surface area for evaporation	conifer needles, cactus spines
low stomata density	smaller surface area for diffusion	
sunken stomata	maintains humid air around stomata	marram grass, cacti
stomatal hairs (trichores)	maintains humid air around stomata	marram grass, couch grass
rolled leaves	maintains humid air around stomata	marram grass,
extensive roots	maximise water uptake	cacti
