SCLERENCHYMA

The name Sclerenhyma is derived from Greek word *sclerous* means hard and *chyma* means infusion. It is a type of simple tissue meant specially for mechanical support. The cells are thck walled, lignified with simple pits in their cell wall and are characterised by the absence of living protoplast at maturity and are hence, dead. The cells show variation in form, structure, origin and development and are placed in two categories – fibres and sclereids.

A. Fibres

These are originating from procambium of fusiform cambial initials.
The cells are elongated with pointed (tapering) ends. The walls are lignified with very much reduced lumen. Pits occurring on the walls may be few or numerous.

Based on the position and development, fibres are divided into two main groups :

1. Xylary fibres

The xylem fibres develop from the same meristematic tissue as the other xylem cells and constitute an integral part of xylem. These are also called wood fibres.
It varies in size, shape, thickness of wall and in number of pittings.
Pits may be small, round or slit like.
On the basis of relative thickness of their cell wall and type of pits, xylem fibres are of two types:

i. Libriform fibres – characterised by very thick secondary wall and simple pit
ii. Fibre tracheid – characterised by relatively thin walls and bordered pit.

In certain dicotyledonous plants, gelatinous or mucilaginous fibres are also found which are simply xylary fibres having specially a great capacity of water absorption.

2. Extra xylary fibres

These are related to the phloem and present outside the xylem as in cortex, pericycle and phloem, which are collectively called as bast fibres.
Esau (1953), a famous anatomist, recognised three categories of such fibres :

a. Cortical fibres (found in cortex)
b. Peri vascular fibres (found on the periphery of vascular cylinder)
c. Phloic fibre or phloem fibre (found in phloem)

Extra xylary fibres are long, spindle like with acute, acuminate or blunt ends. Their cell wall is quite thick with simple or slightly bordered pit.

Functions

Provides mechanical strength, maintaining their flexibility.
Xylary fibres participate in conduction of water.

Economic use of fibres

44 families of plants are the source of commercial fibres. These fibres can be of two types – hard and soft fibres. Hard fibres are monocot leaf fibres with heavily lignifies walls, eg. *Musa textilis*, *Yucca*, *Agave*, *Sansiviera* etc. The soft fibres are bast fibres obtained from phloem as in *Linum usitatissimum* (flax), *Cannabis sativa* (hemp), *Corchorus capsularis* (jute) etc.

B. Sclereids (Sclerotic cells or Stone cells)

These are broad non prosenchymatous (non pointed ends) cells occurring singly or in groups.

Sclereids occur in leaves and are commonly present in fruits and seeds. The hardness and strength of the seed coat is due to the presence of these stone cells.

Types

On the basis of their shapes, sclereids are subdivided as :

a. Brachysclereids (stone cells) : short roughly isodiametric sclereids found in cortex, pith and phloem of stems and flesh of fruits. (eg. *Pyrus*)
b. Macrosclereids : are elongated columnar sclereids which commonly form palisade like epidermal layer in seed coats of leguminous seeds.
c. Osteosclereids : are bone or barrel shaped with dilated ends, as commonly found in leaves and seed coats of several monocotyledons.
d. Asterosclereids : are star shaped or stellate cells found in the leaves of hydrophytes like *Nymphea*.
e. Trichosclereids : are hair like branched or unbranched sclereids found in intercellular spaces of leaves and stems of some hydrophytes, aerial roots of *Monstera*. These are also called trichoblasts or internal hair.

Functions

1. Provides firmness, stiffness and mechanical strength to the part of the plant.
2. Sclereids found in seed coats and endocarp of fruits produce a hard texture and thus protect the internal parts.