Ground tissue :- The tissue of a plant other than the epidermis, periderm, and vascular tissues .

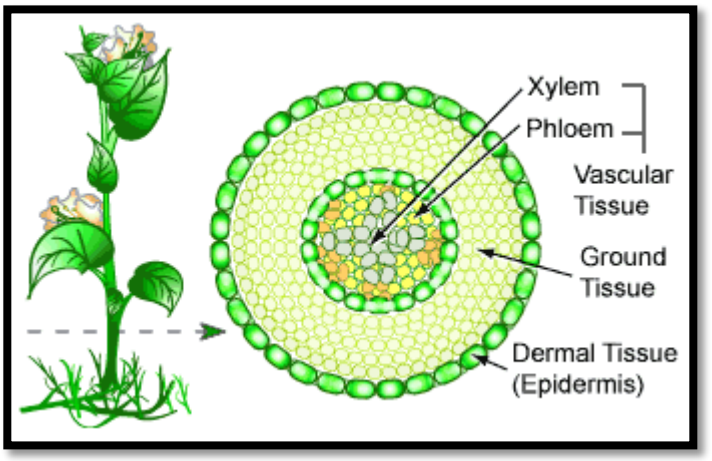

Figure (4-1) ground tissue

It can be divided into three types based on the nature of the cell walls.

1- Parenchyma tissue
2- Collenchyma tissue
3- Sclerenchyma tissue

1- Parenchyma tissue

it is the main part of ground tissue system and is found in plant organs forming continuous tissue as in flesh of fruits floral parts and even in xylem and phloem .

Parenchyma tissue features: -

a- Living cells
b- Capable of growth and division , the protoplast have (meristematic activity) for that reason the phenomena of (**wound healing**) regeneration formation of adventitious root and shoots are made possible .
c- Thin primary cell wall.
d- Cells are arranged with inter cellular spaces as in cortex and pith .
e- Contain dense cytoplasm and normal nucleate .

Types of parenchyma cells according to shape :-

1- Ordinary parenchyma as in → *Zea mays* stem
2- Stellate parenchyma as in → *Cana indica* leaf
3- Columnor parenchyma as in → *Nerium olender* leaf
4- Lobed parenchyma as in → *Nerium olender* leaf
5- Folded parenchyma as in → Mesophyll of *Pinus* leaf

Types of parenchyma cells according to function :-

1- Chlorenchyma contains chloroplast as in → *bougain villaea* stem
2- Food storage parenchyma as in → *Ricinus communis* seeds
3- Water storage parenchyma as in → *Ficus elastica* leaf
4- Air storage parenchyma as in → *Cyperus papyrus* stem

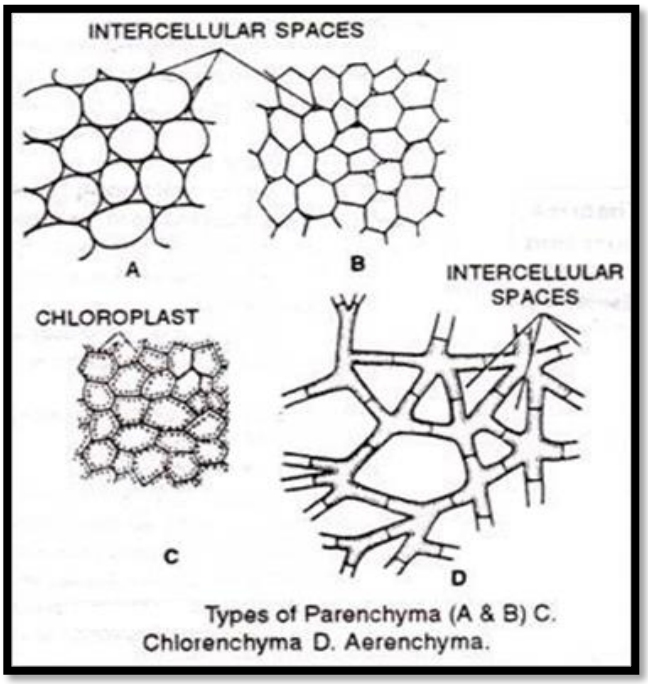

Figure (4-2) parenchyma cells according to function

2- Collenchyma tissue

Living tissue , it is usually regarded as (supporting tissue) , this supporting of collenchymas is used against the mechanical stresses like wind .

Collenchyma tissue features: -

A- Cells are more elongated and narrow than parenchyma .
B- Collenchymas consists of thick cell wall because it contains cellulose , large amount of pectin and hemicelluloses but no lignin .
C- Cells also have meristematic activity .
D- It is found in stems , leaves and floral parts of dicots and it is usually absent in stems a leaves of monocot plants .

The forms of collenchyma are recognized based on the types of thickenings:-

1- Thickening is on the tangential wall it is called lamellar collenchyma .
2- Deposition of pactin is in the corner. where several cells meet it is called angular collenchymas .
3- Thickening are around the inter cellular spaces it is called lacunar collenchymall .

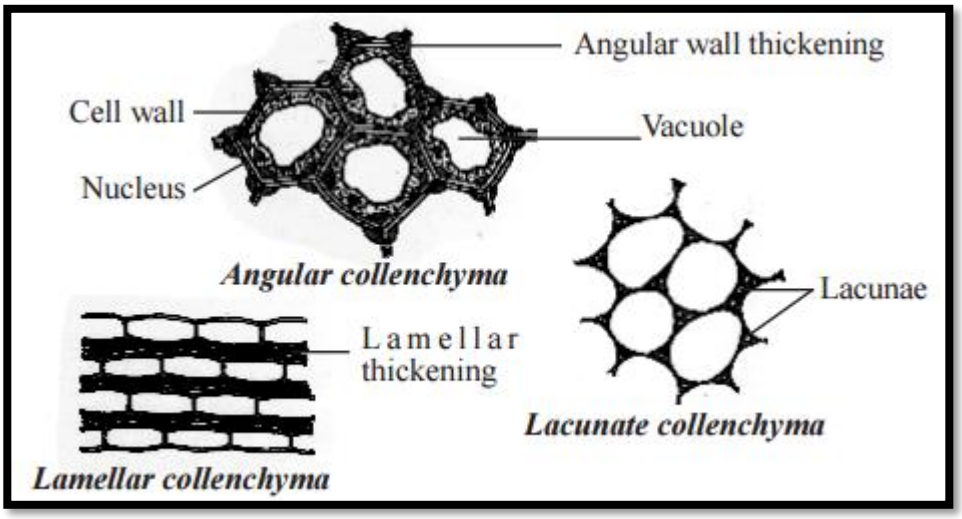

Figure (4-3) forms of collenchyma

3 - Sclerenchyma tissue

a- The cells of sclerenchyma are thick secondary wall and are usually lignified The thickness in sclerenchyma due to formation of lignin.
b- At maturity usually the cells lack protoplast and became (dead cells) .
c- This tissue is found in the stem , roots , leaves , fruits of many plants (in all part of the plant body) .

d- Sclerenchyma cells wall encloses cavity lumen also on the cell wall pits are usually present .

e- The primary function is mechanical support .

Forms of cell in sclerenchyma tissue :

a- Sclerides

Are vary in shape from polyhedral to elongated and may be much branched .

Types of sclerides :-

1- Macrosclereids → in epiderm of *allium sativum* or *allium cepa*
2- Stone cell → in fruit flesh of *pyrus communis* (pear)
3- Osteosclereids → in fruit of *phoenix dactylifera*
4- Tricho sclereids → in the mesophyll of *olea europaea* (olive)
5- Astero sclereids → in *nymphaea* leaf

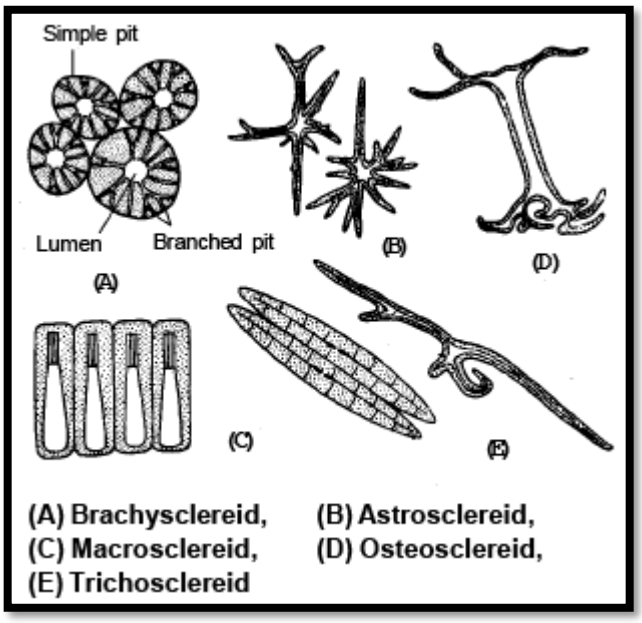

Figure (4-4) Types of sclerides

b- Fibers :-

Generally long and thick cell wall and divided in two types

1- Extra xylary fibers :

Found out of vascular bundle like hypodermal fiber , cortical fiber , perivascular fiber , phloem fibers , bundle cap fiber.

2- Intra xylary fibers :

(Xylem or wood) fiber it is found inside the cambium .

Dermal tissues

Dermal tissues are system makes up the outside covering of plant .

Functions of dermal tissues :-

a- Protection against water loss
b- Regulation of gas exchange
c- Secretion
d- Absorption of water and mineral nutrient .

Dermal tissues consist of : epidermis and periderm

Epidermis :

All surface of the plant consist of a single layer of cells called epidermis or surface tissue . most of the epidermal cells are relatively flat , the outer and the lateral walls are often thicker than thinner wall , it is including **guard cells** and **trichomes** , the cells form a continuous sheet without cellular spaces . Epidermis Play a role in : -

a- protects all parts of the plant b- support c- reduction of water loss .

periderm (Bark) :

when plants increase the girth due to secondary growth, then slough off their epidermal tissue and replace them with priderm it is composed of cork cells (phellem) that hare thick walls with suberin (cutin + lignine) substance which protects the surface of cells , also contains secondary cortex (phelloderm) and cork cambium all them are called periderm .

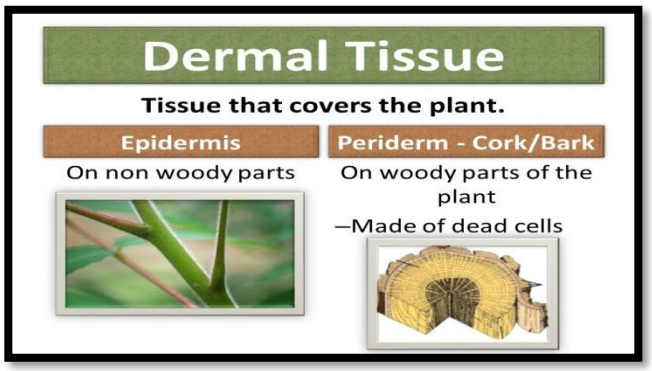

Figure (4-6) Dermal tissue