

Morphology of Flowering Plants

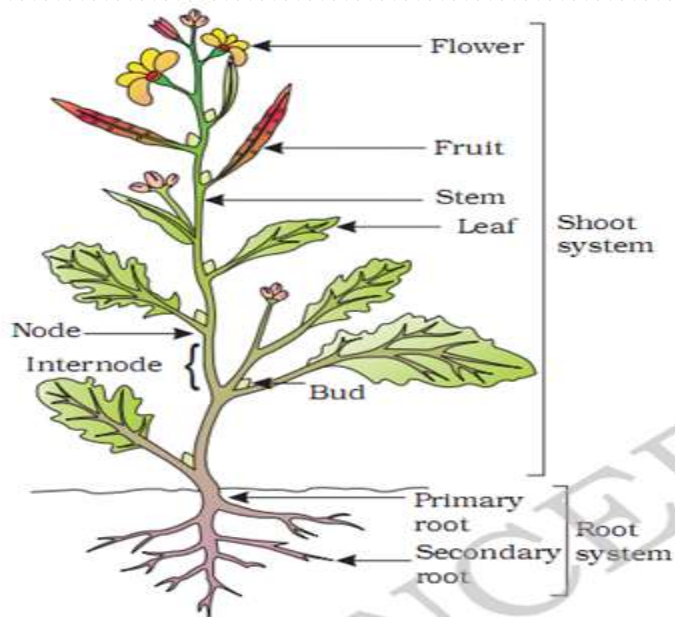


Figure 5.1 Parts of a flowering plant.

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THE ROOT

- Seed – Plumule – stem
- Radical – root
- Types of roots
- Taproot, Fibrous root, Adventitious root.
- Regions of root –
- Region of maturation
- Region of elongation
- Region of meristematic tissues.
- Root cap

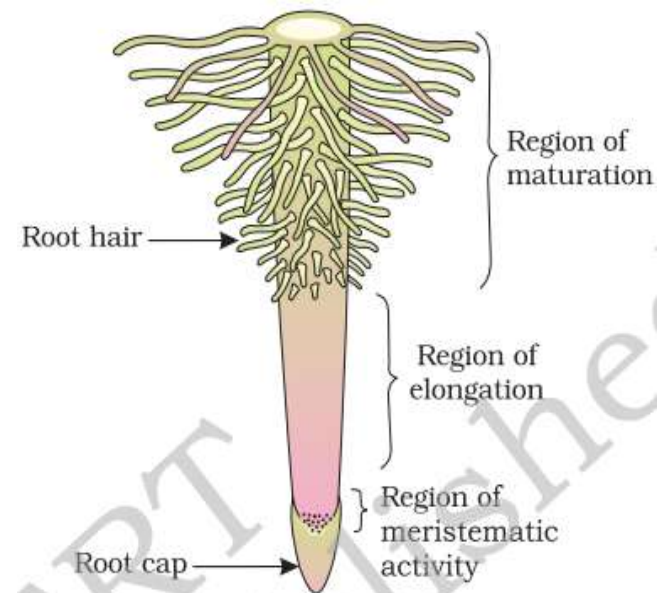


Figure 5.3 The regions of the root-tip

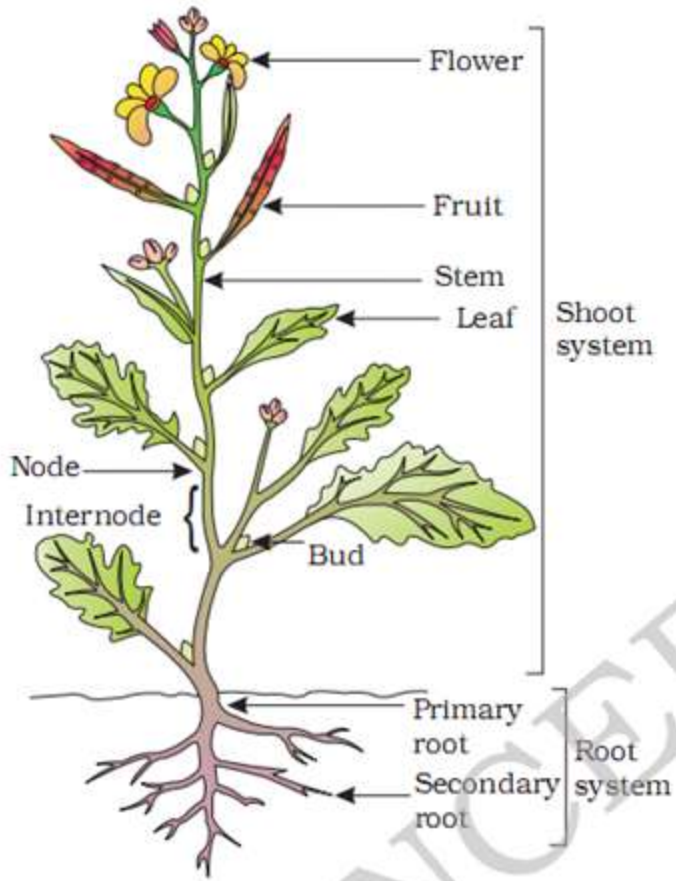


Figure 5.1 Parts of a flowering plant.



Different types of roots : (a) Tap (b) Fibrous (c) Adventitious

MODIFICATIONS OF ROOT

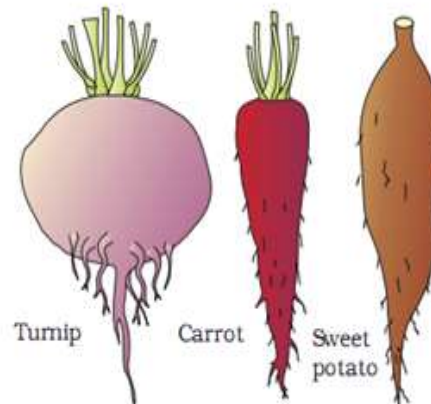
- Roots in some plants change their shape and structure and become modified to perform functions other than absorption and conduction of water and minerals
- Storage- carrot, turnip
- Prop root- banyan tree (support)
- Stilt root – maize, sugarcane
- Pneumatophores- rhizophora (mangroves)



Modification of root for support: Banyan tree



Asparagus



Turnip

Carrot

Sweet potato



(b)

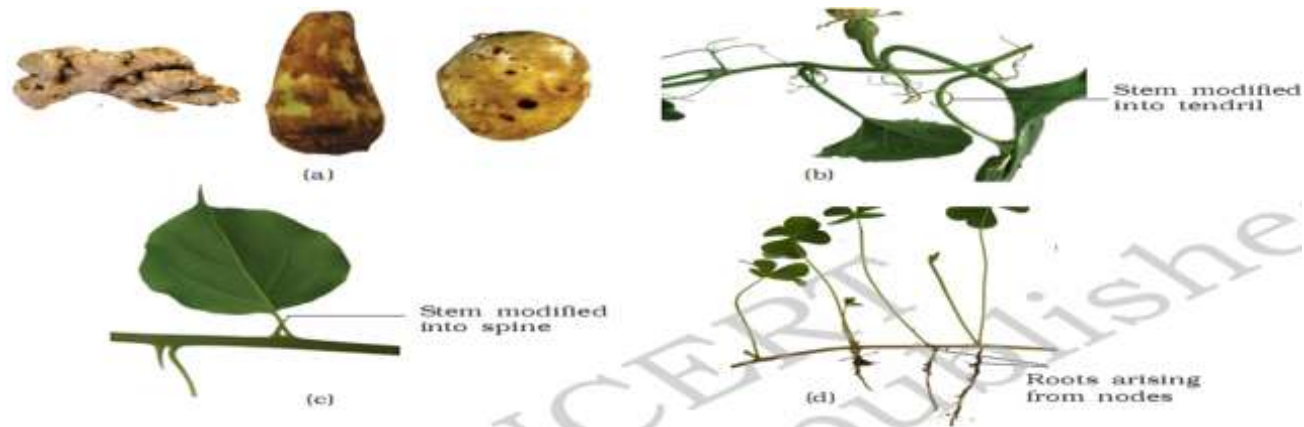
Modification of root for (a) storage (b) respiration:
pneumatophore in Rhizophora

THE STEM

- It develops from the plumule of the embryo of a germinating seed. The stem bears nodes and internodes.
- The region of the stem where leaves are born are called nodes while internodes are the portions between two nodes
- The main function of the stem is spreading out branches bearing leaves, flowers and fruits.
- It conducts water, minerals and photosynthates.
- Some stems perform the function of storage of food, support, protection and of vegetative propagation.

MODIFICATIONS OF STEM

- Underground stems of Sucker, rhizome, corn, tuber and bulb, (potato, ginger, turmeric, zaminkand, Colocasia are modified to store food in them)
- Sucker- Chrysanthemum, Mint, Banana, Pineapple
- Rhizome- ginger, turmeric
- Corn-

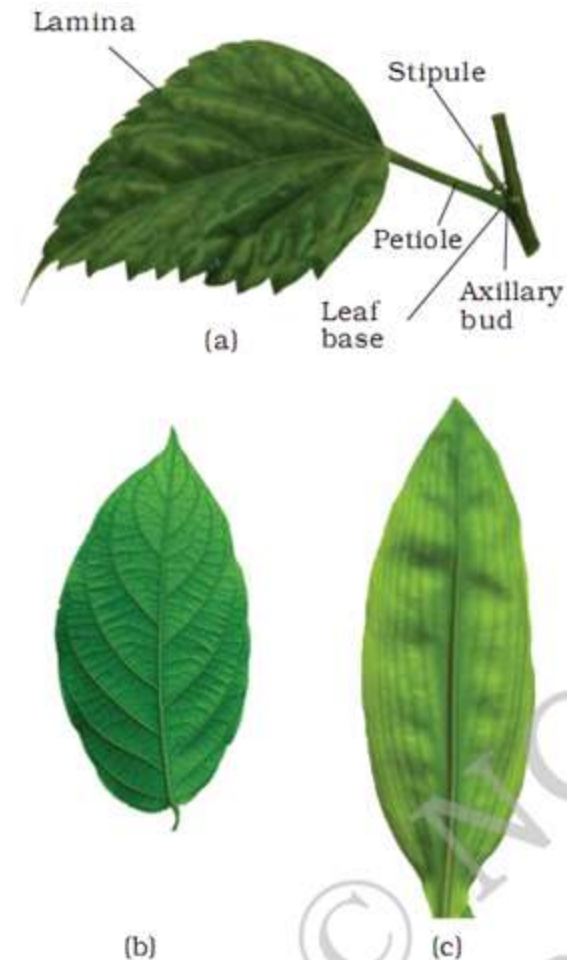


Modifications of stem for : (a) storage (b) support (c) protection (d) spread and vegetative propagation

- **Storage** - potato, ginger, turmeric (perennation)
- **Tendrils** – axillary buds – coils - support (watermelon)
- **Thorns** - axillary buds – citrus (protection)
- **Flattened stem** – opuntia (do photosynthesis)
- **Vegetative propagation** (grass, jasmine, banana)

The leaf

- Short apical meristem gives rise to leaves arranged in acropetal order
- Do photosynthesis
- Three main parts are leaf base, petiole and lamina (leaf blade)
- Have stipules
- Leguminous petioles have pulvinus. (midrib)
- Venation - arrangement of veins and veinlets on a leaf.
- **Types of venation**
- Parallel- monocot leaves
- Reticulate – dicot leaves

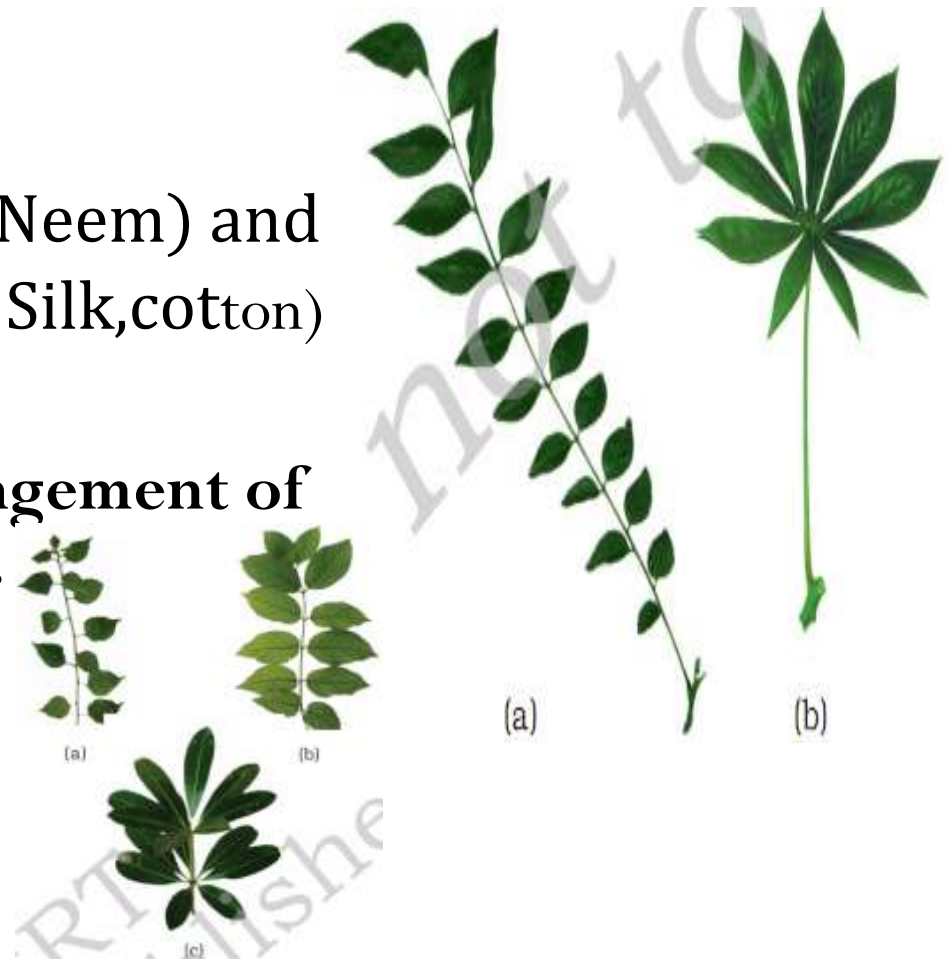


Structure of a leaf : (a) Parts of a leaf
(b) Reticulate venation (c) Parallel venation

Types of leaves:

- Simple leaves
- Compound leaves –
 - Pinnately compound (eg. Neem) and
 - Palmately compound (eg. Silk, cotton)
- **Phyllotaxy: Pattern of arrangement of leaves on the stem / branch.**
 - Alternate- china rose
 - Opposite- guava
 - Whorled- alstonia

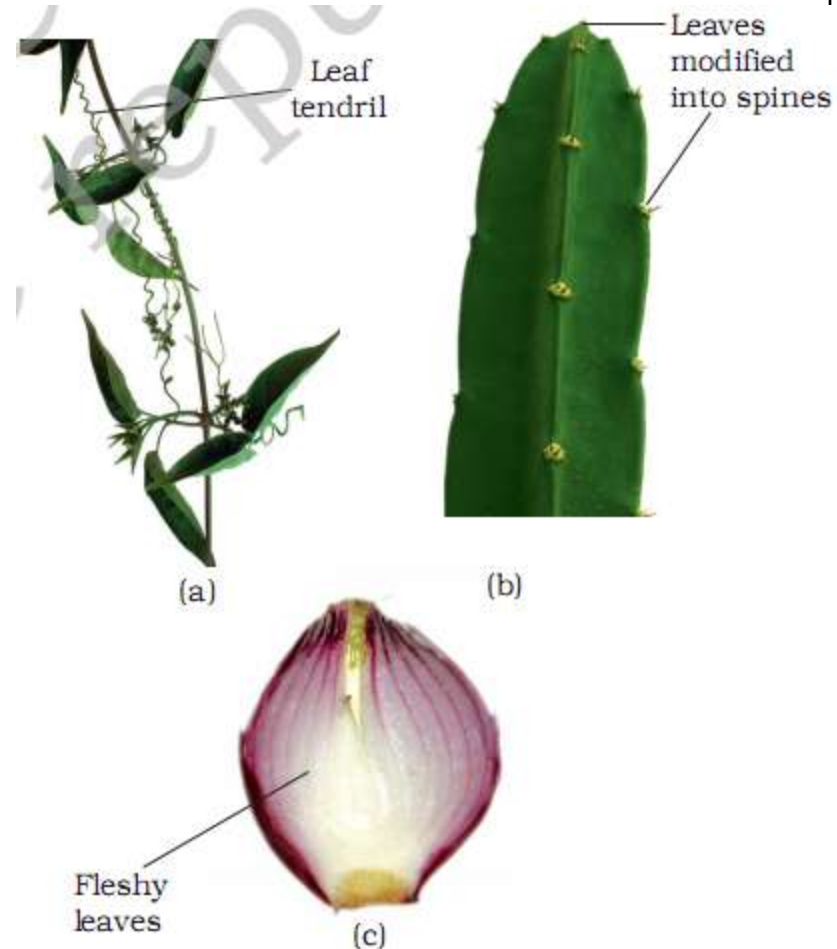
Compound leaves : (a) pinnately compound leaf (b) palmately compound leaf



Different types of phyllotaxy : (a) Alternate (b) Opposite (c) Whorled

Modification of leaves

- Tendrils - pea (support)
- Spines - cacti (protection, water loss)
- Storage - onion/ garlic
- Petiole leaves – acacia
- Pitcher leaves – insectivorous plant (venus fly trap)

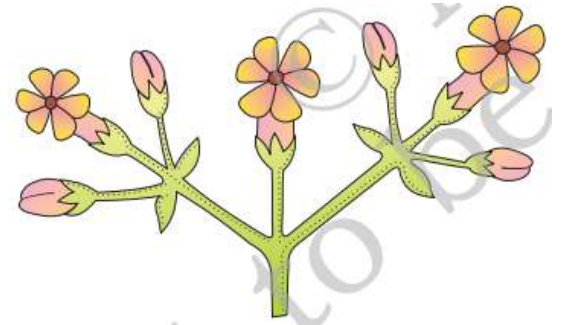


The inflorescence

- Arrangement of flowers on the floral axis
- **Types of inflorescence: Depending on whether the apex gets converted in to a flower/continues to grow**
- there are two major types;
- Racemose. Main axis continues to grow laterally (in an acropetal succession)
- Cymose. Main axis terminates in a flower so limited growth (basipetal order)



Racemose inflorescence



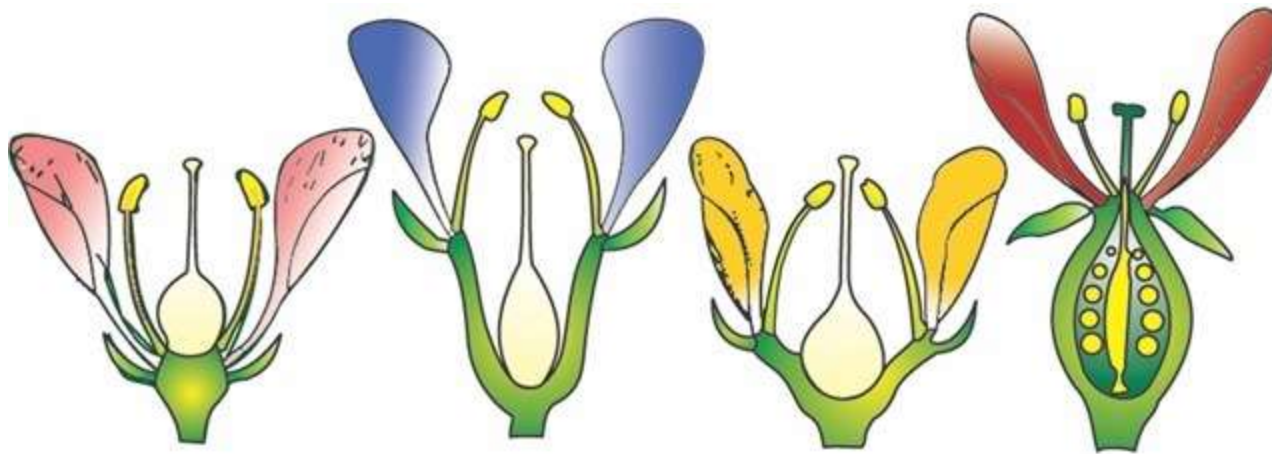
Cymose inflorescence

The flower

- Four whorls. Sepal, petal, gynoecium, and androecium
- Thalamus/receptacle
- Trimerous/tetramerous/pentamerous/polymerous
- Bracteates/ebracteate/bract. (Protective sheet around the flower)
- Bisexual/unisexual
- Actinomorphic(radial symmetry) (mustard)
zygomorphicbilateral symmetry) (pea)
asymmetric (canna)

Based on the position of ovary

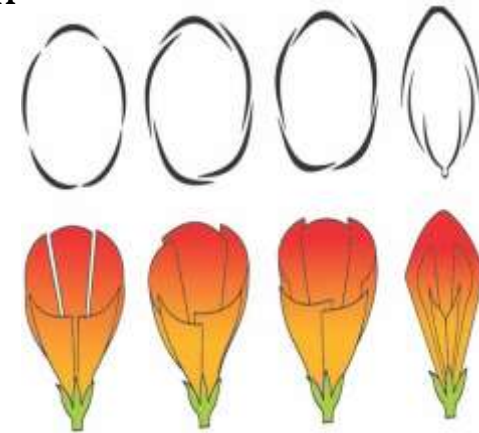
- Hypogynous ovary (mustard) superior
- Perigynous ovary (rose) half inferior
- Epigynous ovary (guava, cucumber) inferior



Position of floral parts on thalamus : (a) Hypogynous (b) and (c) Perigynous (d) Epigynous

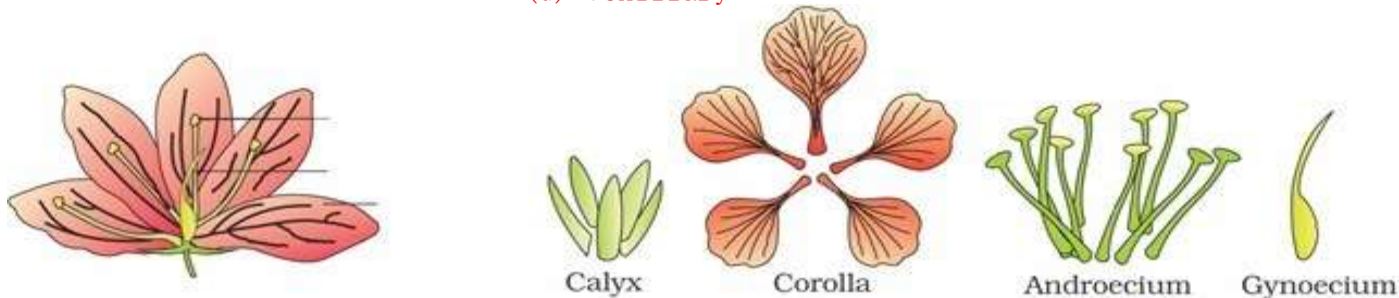
Parts of flower

- **Calyx.** Made of sepals. Can be gamosepalous/polysepalous
- **Corolla.** Made of petals. Gamopetalous/ polypetalous
- **Aestivation:** Arrangement of sepals/ petals in floral bud
- Main types are valvate (petunia alba , calotropis)
- twisted(china rose), imbricate(gulmohur) vexillary (pea, bean)
- **Androecium.**
- Staminode- sterile stamen
- Epipetalous. Attached to the petal
- Epiphyllous- attached to the perianth
- Polyadelphous- Free stamens
- Monoadelphous- united as one bunch (china rose)
- Diadelphous – united two bundles (pea)
- Polyadelphous – many bundles (citrus)



Parts of a flower

Types of aestivation in corolla : (a) Valvate (b) Twisted (c) Imbricate (d) Vexillary



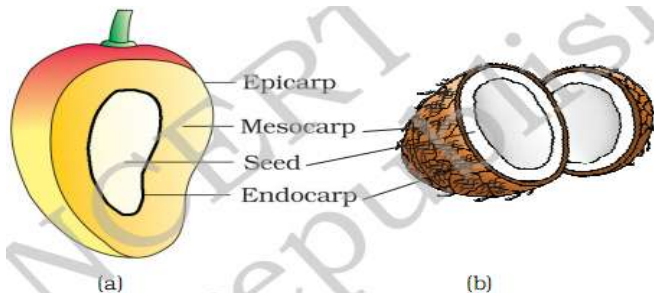
- **Gynoecium**- one / more carpels
- Ovules attached on the wall of ovary called placenta.
- Apocarpous - Free carpels (lotus, rose)
- Syncarpous - Carpels are fused (mustard, tomato)
- After fertilization ovules develop into seed.
- Ovary develops into fruit
- **Placentation:**
- **Arrangement of ovules within the ovary.**
- Different types are marginal (pea), axile (china rose, lemon, tomato),
- Parietal (mustard), freecentral (primrose) and basal (sunflower)



Types of placentation : (a) Marginal (b) Axile (c) Parietal (d) Free central (e) Basal

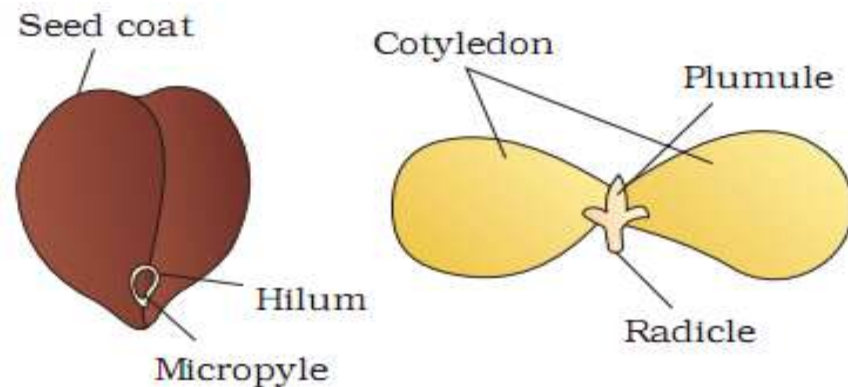
The fruit

- *Parthenocarpic fruit: Formation of fruits without fertilization of ovary. Ex. Seedless grapes,*
- seedless orange.
- Two parts of a fruit are pericarp and seeds.
- Pericarp has epicarp, mesocarp and endocarp
- Both mango and coconut are known as drupe fruits (fruits formed from single ovary / carpel)
- *Perianth: Fused petals and sepals*



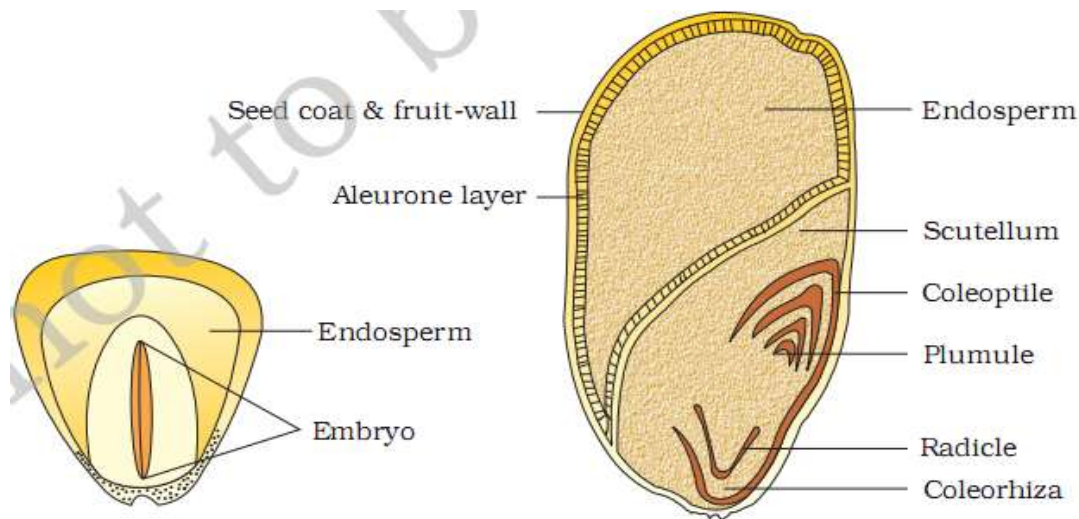
The seed:

- Fertilized ovules.
- Made up of seed coat and an embryo
- Embryo with radical and plumule with one cotyledon or two cotyledon
- **Structure of a dicot seed:**
- Seed coat, Testa and tegmen
- Hilum - small pore (place where it is attached to fruit)
- Micropyle. (water enters)
- Endosperm, cotyledons, embryonal axis (plumule and radicle)
- Mature seeds in dicot do not have endosperm called non-endospermic seeds. (stored food is utilized by embryo)



Structure of monocotyledonous seed:

- Mostly endosperm except orchids
- Endosperm is bulky and store food
- Aleurone layer (produce enzymes to hydrolise proteins for embryo)
- Cotyledon is scutellum
- Protective coats- coleoptiles (piumule), coleorhizae (radical)



Semi – technical description of a typical flowering plant

- Floral formula by symbols:
- **Br** - Bracteate _
- **K** - Calyx G - Inferior ovary
- **C** - Corolla
- **P** - Perianth
- **A** - Androecium
- **G** - Gynoecium
- **G** - Superior Ovary
- **G** - Inferior ovary

