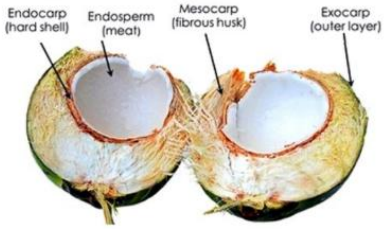
Fruit

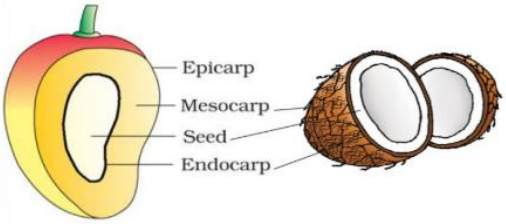
- **Definition**: A fruit is a mature or ripened ovary developed after fertilisation.
- **Development**: Ovules → Seeds, Ovary wall → Pericarp (fruit wall)
- **Types of Fruits**:

1. **True Fruit** – Develops only from fertilised ovary. (Ex: Mango)
2. **False Fruit** – Develops from ovary + other floral parts (e.g., thalamus). Ex: Apple, Cashew, Strawberry.
3. **Parthenocarpic Fruit** – Develops without fertilisation, seedless. Ex: Banana, Grapes, Pineapple.

Types of True Fruits

1. **Simple Fruits** (from single ovary)
    - **Dry**
    - **Fleshy/Drupe** – Pericarp differentiated into:
        - Epicarp (outer skin)
        - Mesocarp (fleshy/edible in mango, fibrous in coconut)
        - Endocarp (stony/hard in mango & coconut)
        - Ex: Mango, Coconut (drupe, single seed).
2. **Aggregate Fruits** – From a single flower with multiple apocarpous ovaries.
    - Ex: Custard apple, Raspberry.
3. **Composite (Multiple) Fruits** – From entire inflorescence.
    - Ex: Pineapple, Jackfruit, Mulberry, Fig.



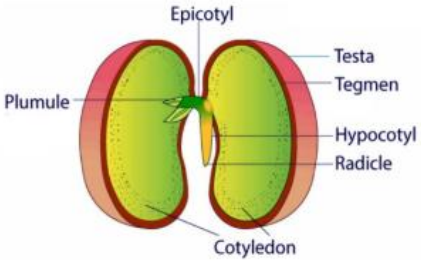


Importance of Fruits

- Source of vitamins, minerals, sugars, pectin.
- Staple food: cereals (one-seeded dry fruits).
- Eaten by birds & animals (dispersal).
- Medicinal: Amla, Datura, Poppy.
- Protect immature seeds.
- Unripe fruits are bitter (tannins/alkaloids) → protect from animals.

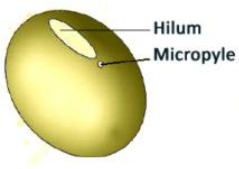
Seed: A seed is a ripened ovule containing an embryo with stored food.

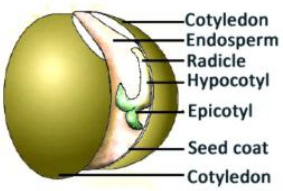
- **Parts**: Seed coat (testa + tegmen) + Embryo (radicle, plumule, cotyledon).

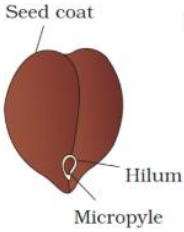


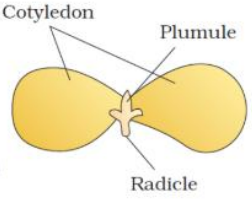
Types of Seeds

1. **Dicot Seed (e.g., Gram, Pea)**
    - Seed coat → Testa (hard) + Tegmen (thin).
    - Hilum (scar of attachment), micropyle (small pore), raphae (ridge).
    - Embryo:
        - Radicle → Root
        - Plumule → Shoot
        - 2 cotyledons (store food).
    - Endosperm absent (non-endospermous).

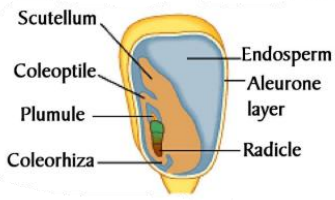


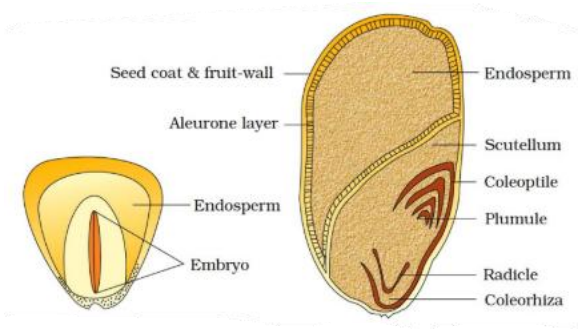






2. **Monocot Seed (e.g., Maize)**
    - Endospermic (bulk food storage).
        - Aleurone layer surrounds endosperm.
        - Embryo:
        - One cotyledon (scutellum).
        - Plumule inside coleoptile, radicle inside coleorhiza.
        - Seed coat fused with pericarp.





Semi-Technical Description of Flowering Plant

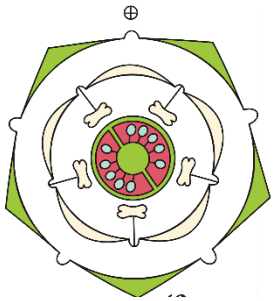
- **Floral Formula**: Symbolic representation of flower characters.
- **Floral Diagram**: Diagrammatic representation showing arrangement of floral parts.

Br (bracteates)	G (gynoecium)	♂ (bisexual)
K (calyx)	G (superior ovary)	⊕ (actinomorphic)
C (corolla)	Ḡ (inferior ovary)	% (zygomorphic)
P (perianth)	♂ (male)	() (fusion)
A (androecium)	♀ (female)	⌒ (adhesion)

1. Family: Solanaceae (Potato Family)

Systematic Position

- Kingdom: Plantae
- Division: Angiosperms
- Class: Dicotyledonae
- Order: Solanales
- Family: Solanaceae



$$\oplus\ \male\ K_{(5)}\ \overset{\frown}{C_{(5)}}\ A_5\ \underline{G}_{(2)}$$

Distribution

- 90 genera, ~2800 species.
- Found in tropics, subtropics & temperate regions.

Habit

- Annual/perennial herbs, shrubs, rarely trees.

Vegetative Characters

- **Root**: Tap root system.
- **Stem**: Herbaceous/woody, may bear hairs/prickles, underground tubers (potato).
- **Leaf**: Alternate, simple, exstipulate, rarely compound (tomato).

Floral Characters

- **Inflorescence**: Solitary, axillary, cymose.
- **Flower**: Bisexual, actinomorphic, pentamerous, hypogynous. Actinomorphic (radially symmetrical), bisexual.
- **Calyx:** 5 sepals, free or slightly fused (gamosepalous), valvate aestivation, persistent.
- **Corolla:** 5 petals, fused (sympetalous), twisted aestivation
- **Androecium:** 5 stamens, epipetalous (attached to corolla tube), alternate with petals.
- **Gynoecium:** Bicarpellary, syncarpous (2 fused carpels), superior ovary, bilocular with many ovules.
- **Receptacle:** Slightly concave; floral formula:

Fruit: Berry or capsule.

- **Seeds**: Endospermic, embryo straight.
- **Special feature in diagram:** Ovary with axile placentation; stamens often enclosed in corolla tube.

Economic Importance

1. **Food plants**: Potato, tomato, brinjal, chilli.
2. **Tobacco**: *Nicotiana tabacum* (nicotine).
3. **Medicinal**:
    - *Atropa belladonna* → Atropine, Belladonna.
    - *Datura stramonium* → Asthma treatment.
    - *Withania somnifera* (Ashwagandha), *Hyoscyamus niger*.
4. **Ornamentals**: *Cestrum nocturnum* (Night queen), *Petunia*.

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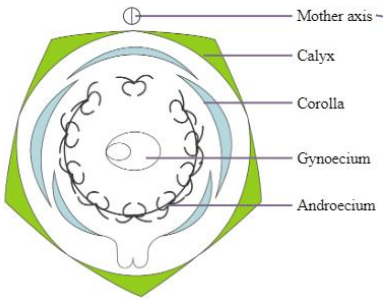
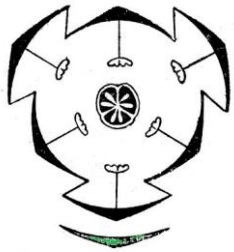
2. Family Fabaceae



% ♂ $K_{(5)}\ C_{1+2+(2)}\ A_{(9)+1}\ \underline{G}_1$

- **Type of flower:** Zygomorphic (bilaterally symmetrical), bisexual.
- **Calyx:** 5 sepals, gamosepalous, valvate aestivation.
- **Corolla:** Papilionaceous: 5 petals – 1 banner/standard (outermost), 2 wings (lateral), 2 keel petals (fused) Vexillary Aestivation.
- **Androecium:** 10 stamens, diadelphous (9 fused + 1 free).
- **Gynoecium:** Monocarpellary, superior ovary, one locule, marginal placentation.
- **Receptacle:** Slightly concave. Floral formula:
- **Special feature in diagram:** Show zygomorphic symmetry with unequal petals and diadelphous stamens.

3. Family Liliaceae



⊕ ♂ $P_{3+3}\ A_{3+3}\ \underline{G}_{(3)}$

- **Type of flower:** Actinomorphic, bisexual.
- **Calyx:** 3 sepals (often petaloid), free.
- **Corolla:** 3 petals, free or resembling sepals; perianth parts similar (tepals).
- **Androecium:** 6 stamens, free, arranged in two whorls of 3 each.
- **Gynoecium:** 3 carpels, syncarpous, superior ovary, trilocular with axile placentation.
- **Receptacle:** Flat; floral formula:
- **Special feature in diagram:** Perianth of 6 tepals in 2 whorls; show trimerous arrangement.

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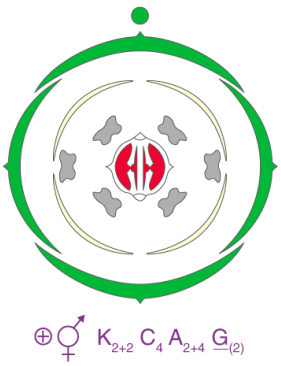
4. Family Brassicaceae (Cruciferae / Mustard family)



⊕ ♂ $K_{2+2}\ C_4\ A_{2+4}\ \underline{G}_{(2)}$

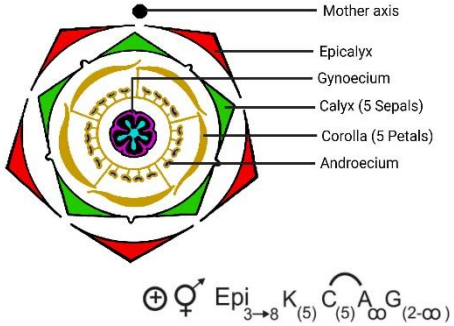
- **Type of flower:** Actinomorphic, bisexual.
- **Calyx:** 4 sepals, free, Imbricate arrangement.
- **Corolla:** 4 petals, free, cruciform (cross-shaped), alternate with sepals, Velvet Aestivation.
- **Androecium:** 6 stamens, tetradynamous (4 long + 2 short).
- **Gynoecium:** 2 carpels, syncarpous, superior ovary, 2-locular with a false septum (replum), marginal placentation.
- **Receptacle:** Slightly elongated; floral formula:

    Floral Formula: ⊕ ♂ $K_{2+2}\ C_4\ A_{2+4}\ G(2)$

Special feature in diagram: Show tetradynamous stamens; ovary with replum.

5. Family Malvaceae (Hibiscus/Okra family)

• **Type of flower:** Actinomorphic (radial symmetry), bisexual.
• **Calyx:** 5 sepals, gamosepalous (fused), valvate aestivation, often with an epicalyx (whorl of bracteoles resembling sepals).
• **Corolla:** 5 petals, polypetalous (free), twisted (contorted) aestivation, often showy.
• **Androecium:** Numerous stamens (monadelphous) – staminal filaments fused into a staminal tube around the style; anthers are monothecous (one-lobed, one-celled).
• **Gynoecium:** Multicarpellary (usually 5–10), syncarpous, superior ovary, multilocular with axile placentation.



• **Receptacle:** Slightly elongated.
• **Floral formula:** ⚥ ⚲ K(5) C5 A∞ G(5–10)
• **Special feature in diagram:** Show **epicalyx**, **twisted corolla aestivation**, **monadelphous staminal tube** with monothecous anthers, and **axile placentation**.