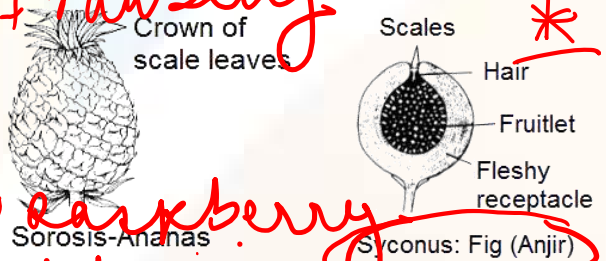
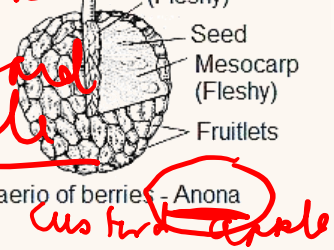
Types of Fruits

Types of Fruits

- **Simple**
  - Fruit develop from the ovary of the single flower with or without accessory parts.
  - **Dry**
    - Etaerio of achenes
    - Etaerio of drupes
    - Etaerio of follicle
    - Etaerio of berries
    - Etaerio of Samara
  - **Succulent**
- **Aggregate**
  - Develops from a flower having apocarpous multicarpellary gynoecium Each carpel develops into a fruit.
- **Composite or multiple fruits**
  - Develop from entire inflorescence. Therefore, they are technically false fruits
  - **Sorosis**
    - Develop from spike. (Ex: Pine apple, Jack fruit) or catkin
  - **Syconus**
    - Develop from those inflorescences in which thalamus is fleshy Ex: Fig, Banyan





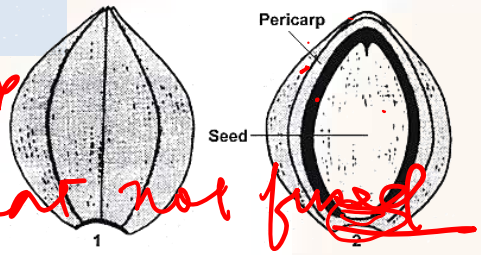
Categories of dry fruits - Achenial fruits

Achenial fruits

- It is simple, dry, indehiscent and single seeded fruit.

Typical Achene

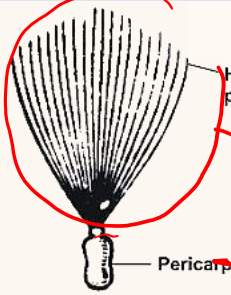
Develops from unilocular, superior ovary fruit wall or pericarp is not fused with seed coat.
Ex: Mirabilis, Boerhaavia.



Typical Achene : Mirabilis jalapa (Four O' clock) 1- external view of achene 2, L.S. of Fruit.

Cypsela

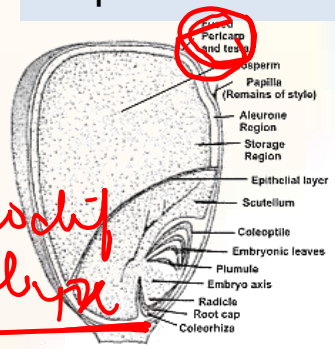
Develops from bicarpellary, syncarpous, Inferior ovary, Fruit wall and seed coat are separate.
Ex: Sunflower.



Cypsela :sunflower

Caryopsis

Develops from monocarpellary, unilocular ovary, Fruit wall or pericarp fused with seed coat.
Ex: Wheat, Maize.



Structure of Maize grain. L.S. or V.S of grain.

Samara

Develops from superior bicarpellary ovary
Ex: Shorea robusta and Hopea

Nut

Developed from superior ovary. Pericarp is hard and woody at maturity.
Ex: Cashewnut, walnuts, Litchi.

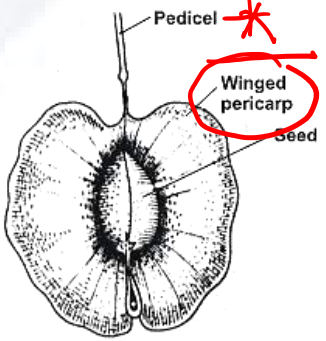


Fig :- Samara - Holoptelea

Categories of dry fruits- Capsular fruits

Capsular fruits

- It is simple, dry, dehiscent & many seeded fruit pericarp splits to expose the seeds.

Legume

It is a dry unilocular fruit developing from superior and monocarpellary ovary.
Ex: Pea, Abrus.

Siliqua

Bilocular dry fruit developed from bicarpellary,superior ovary dehiscence of fruits occurs by both the halves from base.Ex: Mustard

Silicula

A short broad flat siliqua. Ex: Capsella, Iberis amara.

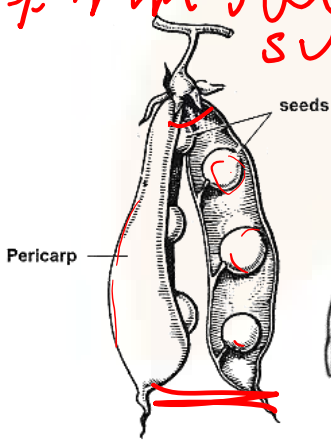
Follicle

It develops from bicarpellary
Ex: Larkspur

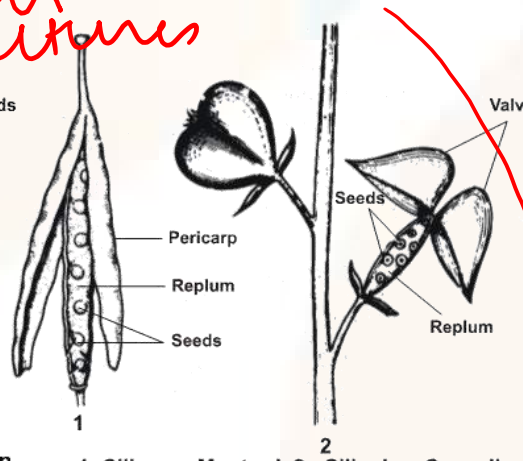
Capsule

develops from syncarpous multicarpellary ovary

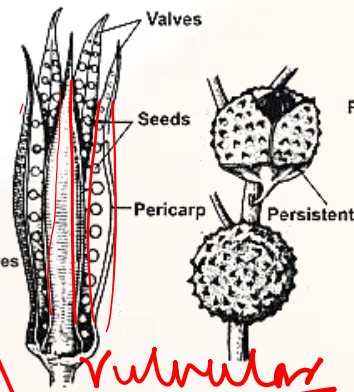
- (i) Poricidal
- (ii) Loculicidal
- (iii) Septicidal
- (iv) Septifragal
- (v) Denticidal
- (vi) Pyxidium

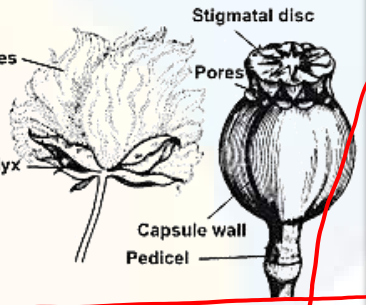


Legume of Bean



1- Siliqua – Mustard, 2 - Silicula – Capsella





Capsular fruits :- 1- Okra, 2-Datura, 3- Gossypium, 4- Poppy

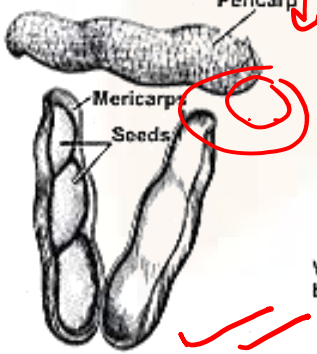
Categories of dry fruits - Schizocarpic fruit

Schizocarpic fruit

- It is intermediate between capsular fruit. It breaks into a number of indehiscent pieces at maturation

Lomentum

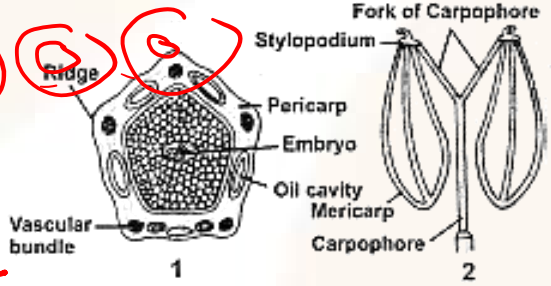
Fruit is constricted in between the seeds
(i) Lomentaceous
(ii) Lomentaceous Siliqua



Lomentum : Groundnut

Cremocarp

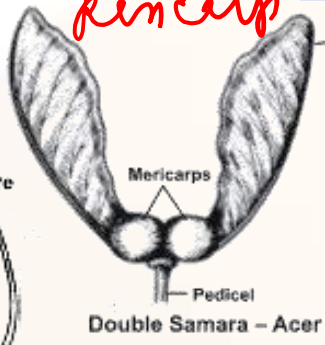
develops from bicarpellary and inferior ovary.
Ex: Coriander



Cremocarp of Coriandrum :1-T.S. of Fruit, 2- Fruit showing two mericarps after dehiscence

Compound Samara

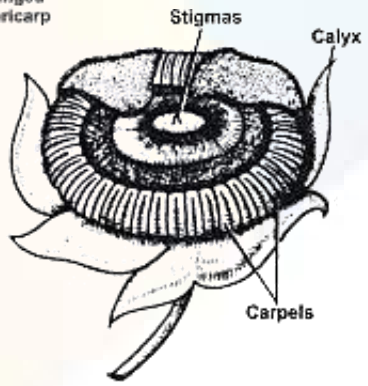
look like samara but at maturity splits into two samara. Ex: Acer,Dodonoea.



Double Samara – Acer

Carcerulus

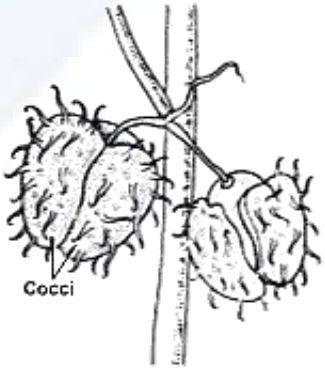
develops from bi or multicarpellary superior ovary.
Ex: Ocimum, Abutilon, Salvia.



Carcerulus : Hollyhock

Regma

Dry schizocarpic fruit developed from Tricarpellary, Syncarpous, Superior ovary.
Ex: Ricinus.



Regma – Castor

Succulent fruits- Berry

1. Berry

Superior Berries

All three pericarps and placenta are edible.

Ex: Brinjal, Grape, Tomato, Date, Palm

Inferior Berries

pericarp is fused with thalamus

Ex: Guava

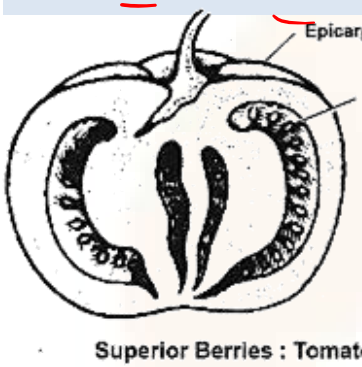
Parthenocarpic Berries

Seeds are absent in the berries

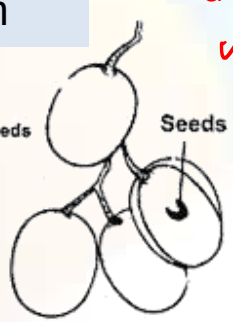
Ex: Banana

Special Berries

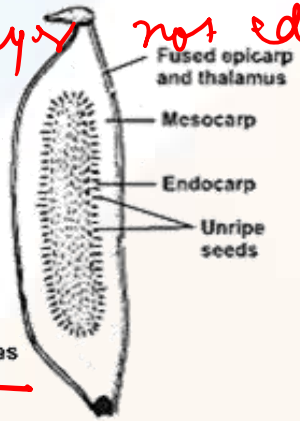
- Pepo
- Hesperidium
- Balausta
- Amphisarca
- Fibrous Berry



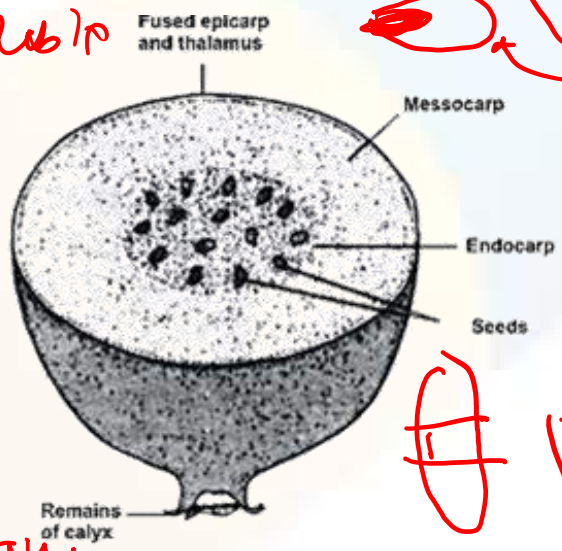
Superior Berries : Tomato



Superior Berries : Grapes



Parthenocarpic Berries : Banana



Inferior berry – T.S. of Guava (Amrood)

Succulent – Drupes and Pomes

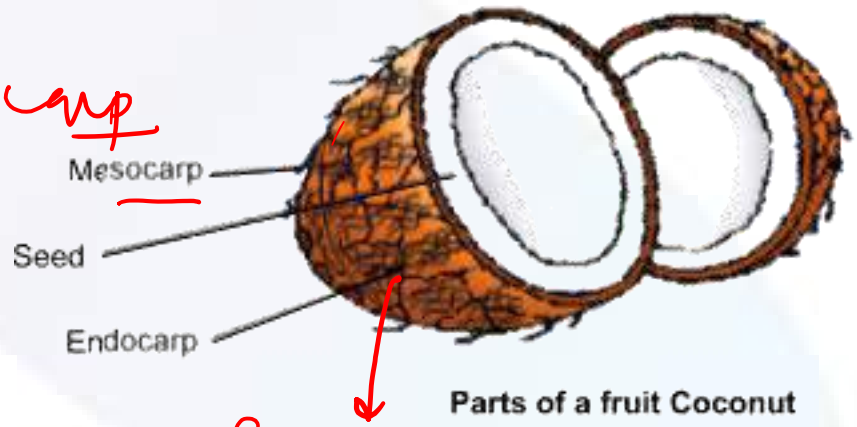
2. Drupes

(Stone fruits)
Hard & Stony endocarp

Mesocarp fleshy Juicy and edible and endocarp hard and stony.

Ex: Mango

epicarp - skin
Mesocarp - fleshy
endocarp - Hard



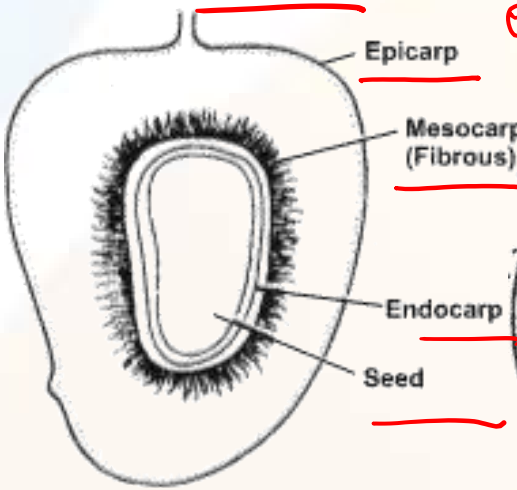
Parts of a fruit Coconut

Green - epicarp - skin
Meso - fibrous
endocarp : Hard & Stony

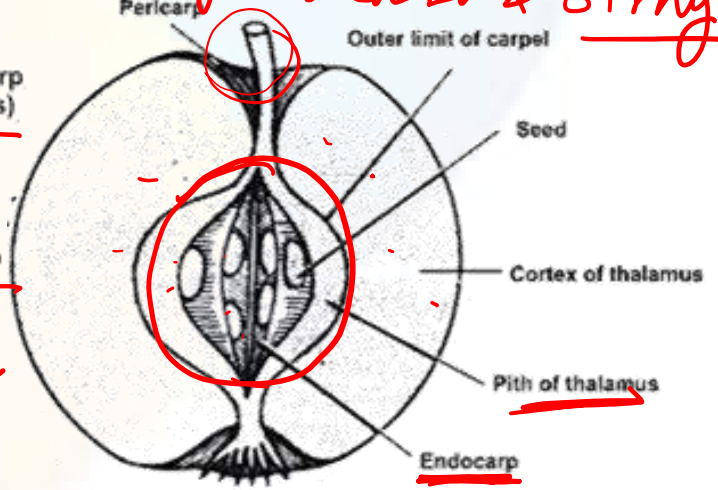
3. Pomes

developed by multicarpellary syncarpous, inferior ovary in which edible part is fleshy thalamus. Ex: Apple, Pear

↳ false



Drupe : Mango



Pome – Apple (L.S. of pome)

Comparison between Dry and Fleshy fruits

S.No.	Dry fruit	Fleshy fruit
1.	Comparison between Dry and Fleshy fruits	Pericarp is distinguish into three layers, epicarp, mesocarp and endocarp.
2.	Fruits may be dehiscent or indehiscent.	Fruits are always indehiscent.
3.	These fruits are not fleshy, as the pericarp is dry seeds get separated. Ex: pea, Calotropis, mustard, etc.	In this type, mesocarp is fleshy or fibrous. Pericarp and seeds are separated after decay of the fruits. Ex: mango, cobnut, apple, etc.

Dehiscent, Indehiscent and Schizocarpic fruits

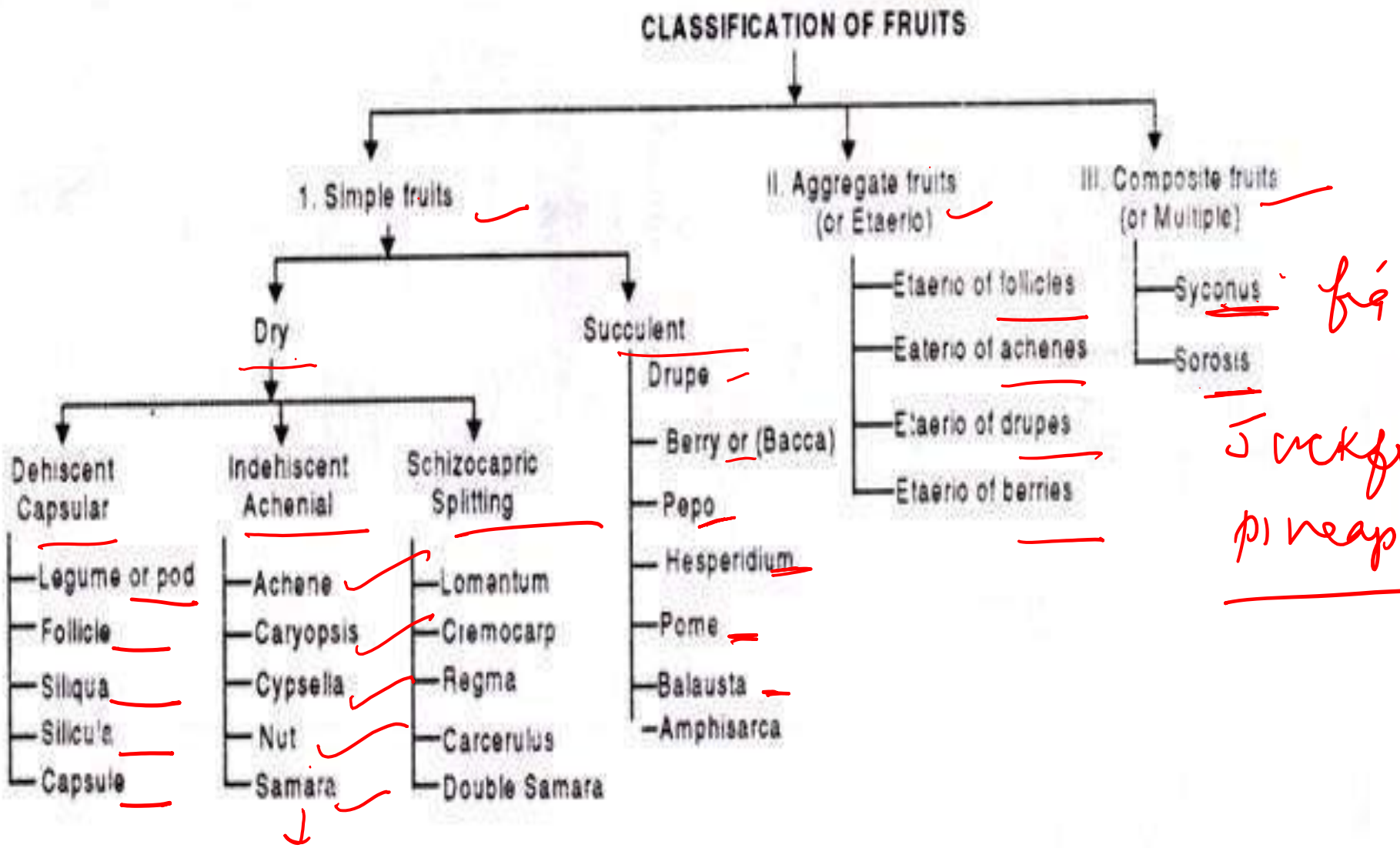
S.No.	Dehiscent (capsular)	Indehiscent (Achenial)	Schizocarpic (splitting)
1.	Many seeded fruits	One seeded fruits	Many seeded fruits. Schizocarpic fruits are intermediate between dehiscent and indehiscent fruit.
2.	The pericarp is ruptured after ripening and seeds are dispersed. Ex: pea, bean, madar, candytuft, cotton, etc.	Fruits do not dehisces & after ripening and seeds remain inside the pericarp. Ex: wheat maize, mirabilis, sunflower, etc.	Fruits after ripening are divided into one seeded segments or mericarps. Ex: coriander, double samara, acacia, etc.

Comparison between Syconus and Sorosis fruits

S.No.	Syconus	Sorosis
1.	It is developed by hypanthodium inflorescence.	It is developed from spike, spadix or catkin inflorescence.
2.	Receptacle becomes fleshy and many achenes develop from the pistillate flowers.	Pericarp is differentiated into epicarp, mesocarp and endocarp, endocarp is sometimes absent.
3.	Fleshy receptacle (rachis) of fruits is the edible part. Ex: fig, peepal, etc.	Bracts, perianth and seeds are edible Ex: jack fruit (katahal), pineapple, mulberry, etc.

Edible parts of some fruits

S.No.	Name	Scientific name	Type	Edible parts
1.	Banana	*Musa paradisiaca*	inferior	Mesocarp and endocarp
2.	Date palm	*Phoenix dactylifera*	Berry	Pericarp and placentae
3.	Apple	*Pyrus malus*	Pome	Fleshy thalamus
4.	Jack fruit	Artocarpus heterophyllus	Sorosis	Bracts, perianth, seeds
5.	Rice	*Oryza sativa*	Caryopsis	Endosperm and embryo
6.	Litchi	*Litchi (nephalium)*	Nut	Aril
7.	Cashewnut	*Anacardium occidentale*	Nut	Seed (cotyledons) and thalamus (peduncle)
8.	Tomato	*Lycopersicum esculentum*	Berry	Pericarp and placentae
9.	Guava	*Triticum aestivum*	Caryopsis	Endosperm and embryo
10.	Wheat	*Ficus carrica*	Syconus	Fleshy receptacle


CLASSIFICATION OF FRUITS
1. Simple fruits
II. Aggregate fruits (or Etaerio)
III. Composite fruits (or Multiple)
Dry
Succulent
Dehiscent Capsular
Indehiscent Achenial
Schizocapric Splitting
Legume or pod
Follicle
Siliqua
Silicula
Capsule
Achene
Caryopsis
Cypsella
Nut
Samara
Lomantum
Cremocarp
Regma
Carcerulus
Double Samara
Drupe
Berry or (Bacca)
Pepo
Hesperidium
Pome
Balausta
Amphisarca
Etaerio of follicles
Eaterio of achenes
Etaerio of drupes
Etaerio of berries
Syconus
Sorosis

Name	Type	Edible part
Wheat Rice Maize	Caryopsis	Endosperm Embryo
* Litchi	Nut	Aril (Add integum[ent]
* Cashewnut	Nut → Seed & funicle)	Thalamus
Orange	Hesperidium	Hairs placent[a]
Coconut	Drupe	Endosperm Embryo
* Pineapple →	Sorosis →	outer part of
Custard apple →	Etaerio of Berry →	Pericarp – Thalamus

Floral formula – I

Position, number, structures, cohesion, adhesion of different parts of flower are represented as a formula through specific signs. It is called floral formula

Bracts (Br)

Br	Bracteate
Ebr	Ebracteate

Bracteoles (Brl)

Brl	Bracteolate
Ebrl	Ebracteolate

Symmetry of the flower

⊕	Actinomorphic
⊖ or %	Zygomorphic

Sex

	Staminate (male)
	Pistillate (female)
	Hermaphrodite

Calyx (K)

K_5	5 sepals, polysepalous
$K_{(5)}$	5 sepals, Gamosepalous
K_{2+2}	4 sepals in 2 whorls of 2 each

Corolla (C)

C_5	5 petals, polypetalous
$C_{(5)}$	5 petals, gamopetalous
C_{2+2}	4 petals in 2 whorls or 2 each

Perianth (P)

P6	6 tepals, polytepalous
P(3+3)	6 tepals, gamopetalous
P3+3	6 tepals, in 2 whorls or 3, 3 each

Floral formula – II

Androecium (A)

A_6	6 stamens, polyandrous
A_{2+4}	6 stamens in 2 whorls of 2and 4 each
A_0	stamens absent
A_{α}	stamens indefinite
$A_{(\alpha)}$	monoadelphous
$A_{1+(9)}$	diadelphous
$A_{(5)}$	5 stamens, syngenesious
$A_{(5)}$	5 stamens, synandrous
$\overset{\frown}{C\,A}$	epipetalous
$\overset{\frown}{P\,A}$	epiphyllous

Gynoecium

G_0	Gynoecium absent
G_2	2 carpels, apocarpous
$G_{(2)}$	2 carpels, syncarpous
$\underline{G}_{(2)}$	bicarpellary, syncarpous, superior
$\underline{G}_{(2)}$	bicarpellary, syncarpous, semi-inferior
$G_{(2)}$	bicarpellary, syncarpous, inferior

Solanaceae

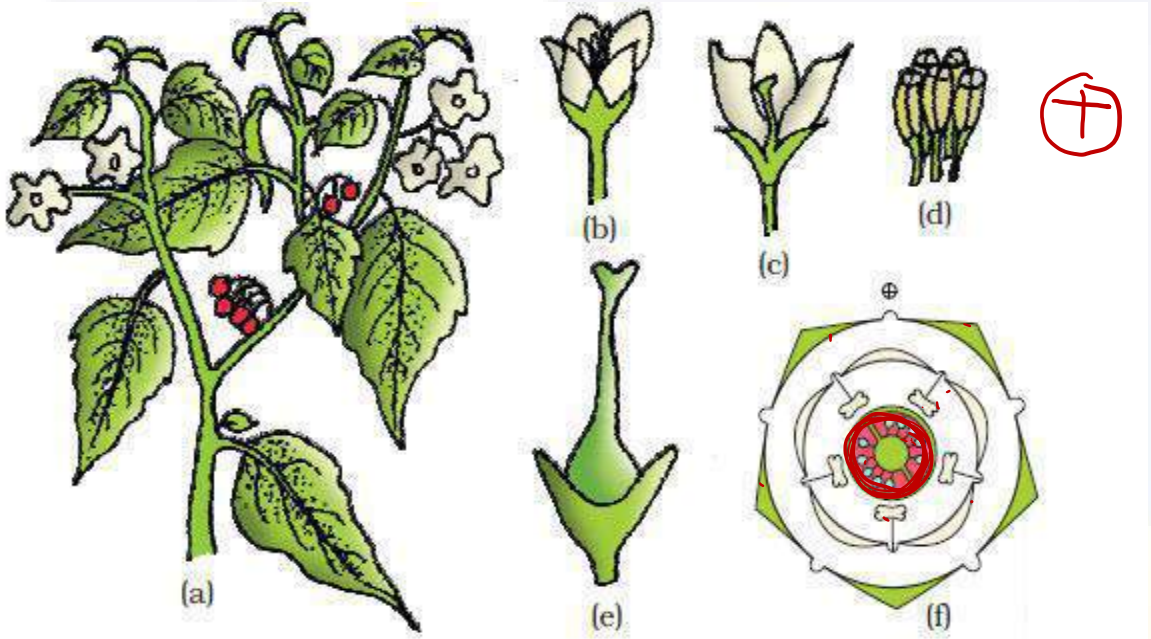


Figure 5.22 *Solanum nigrum* (makoi) plant : (a) Flowering twig (b) Flower (c) L.S. of flower (d) Stamens (e) Carpel (f) Floral diagram

Fabaceae family

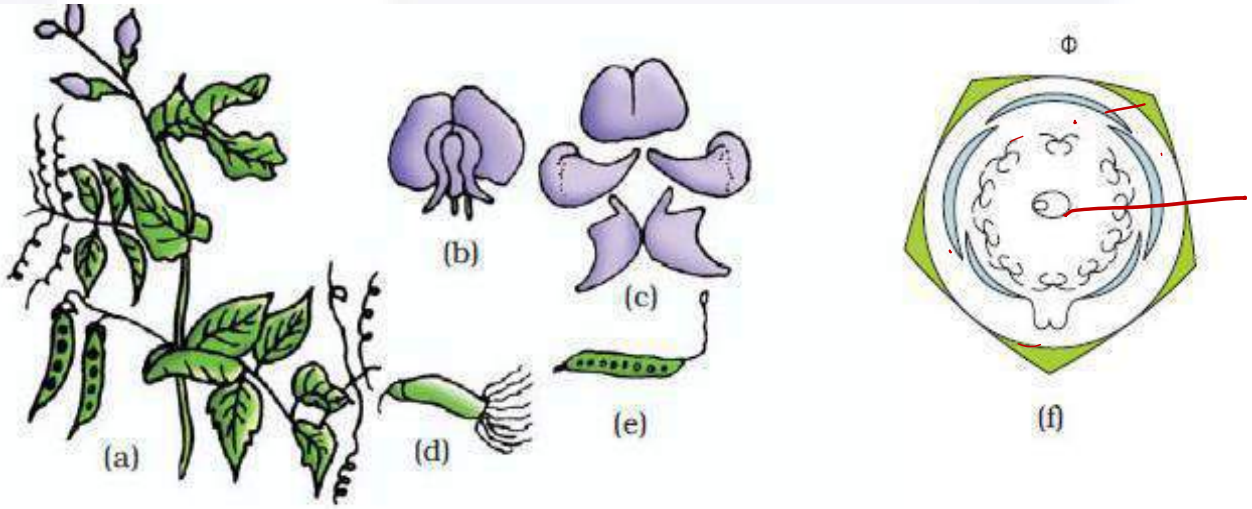


Figure 5.21 *Pisum sativum* (pea) plant : (a) Flowering twig (b) Flower (c) Petals (d) Reproductive parts (e) L.S.carpel (f) Floral diagram

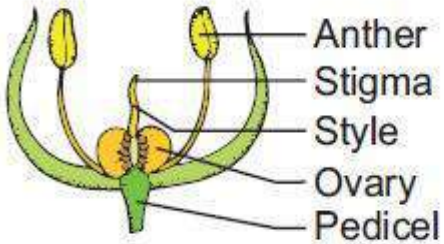
unilocular ovary

% ♂ ♀ K (5) C 1+2+(2) A (9)+1 G 1

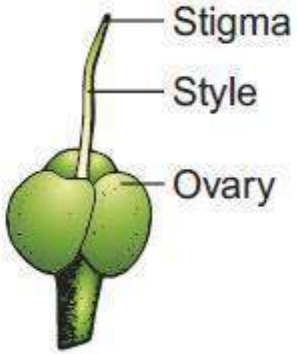
"kaccha"

Vexillary aestivation

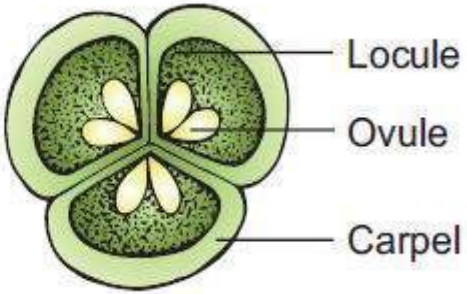
Liliaceae family



L.s of flower



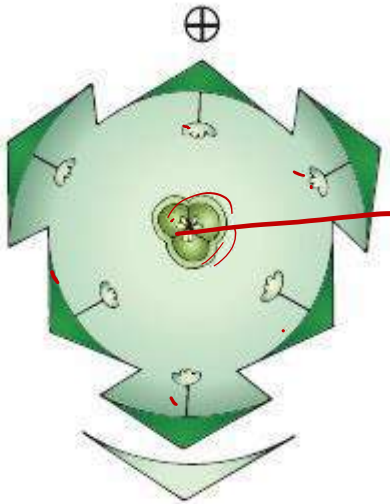
Gynoecium



C.S. of ovary

Floral formula

$$Br.,Ebrl.,\oplus,\male,\female,P_{(3+3)}+A_{3+3},\underline{G}_{(3)}$$



Floral diagram

Br ⊕ ♂ + P A (3+3) 3+3 G (3)

PG

PLANT FAMILIES

Trick for bracket → Kaccha Karele Ca Glass in PG

Fabaceae – % ⚥ — K (5), C 1+2+(2), A (9)+1, G 1

Trick = 5 + 5 = 10

Solanaceae – ⊕ ⚥ — K (5), C (5), A 5, G (2)

Trick 5 5 5

Karele ca glass

Liliaceae – Br ⊕ ⚥ — P (3+3), A 3+3, G (3)

PG

Trick → 3 idiot / 3 pagal