# MORPHOLOGY OF FLOWERING PLANTS THE FRUIT

# THE FRUIT

The fruit is the characteristic feature of the flowering plants. It is the mature of ripened ovary, developed after fertilization. If a fruit is formed without fertilization of ovary, it is called a parthenocarpic fruit. In some fruits like grapes, banana seeds are not found and such type of fruits are called parthenocarpic or seedless fruits. Parthenocarpy can be induced through the application of growth hormones.

**PERICARP (Fruit wall) :** After ripening, the ovary wall changes into pericarp. This pericarp may be thick and fleshy or thick and hard or thin and soft.

In fleshy fruits pericarp (fruit wall) is made up of 3 layers :-

(a) Outermost layer	=	Epicure
(b) Middle layer	=	Mesocarp
(c) Innermost layer	=	Endocarp

- (a) Epicarp It is the outermost layer, it may be thick or thin and hard or soft. It forms outermost layer of fruit which is also called rind
- (b) Mesocarp : It is the middle layer which is thick and fleshy in mango, peach and date palm. In coconut, this layer is made up of fibres which is also called coir
- (c) Endocarp : It forms the innermost layer, it may be thin membranous (eg. Orange, Datepalm) or thick and hard (eg: Mango, Coconut)

**TRUE FRUIT OR EUCARP :** When the fruit is developed only from the ovary then the fruit is called true fruit.

Eg. Mango, Coconut, Zizyphus

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**FALSE FRUIT OR PSEUDOCARP :** In some fruits, in place of ovary, some other parts of flower like thalamus, calyx and inflorescence are modified into fruit or a part of fruit.

Eg. Apple, Strawberry, Pear, Mulberry, Fig, Cashew nut



False fruits of apple and strawberry

In apple, strawberry, cashew, etc. the thalamus also contributes to fruit formation. Such fruits are called flase fruits.

## **CLASSIFICATION OF FRUITS:**



## SIMPLE FRUIT:

Fruit develops from the ovary of the single flower with or without accessory parts. It is of two types.

#### (A)Dry fruit

- (B) Succulent or Fleshy fruit.
- (A)Dry fruit: Its pericarp becomes dried at maturity. e.g., mustard and groundnut It is of

three types

(a) Capsular fruits (b) Achenial fruits (c) Schizocarpic

## Types of Dry fruit

(a) Capsular fruits: It is simple, dry, dehiscent and many seeded fruit in which the pericarp splits to expose the seeds. It is of following types

S.No.	Type of Capsular	Ovary	Example and diagram
	fruit		
1.	Legume	Superior and monocarpellary	Pea (Fabaceae family)
-	0.11		
2.	Siliqua	Superior bicarpellary	Mustard
		syncarpous	
3.	Silicula (Short	Superior bicarpellary	Capsella, Iberis amara
	broad flat siliqua)	syncarpous	
4.	Follicle	Superior Monocarpellary,	e.g. Larkspur
		unilocular	(Delphinium)
5.	Capsule	Syncarpous,	e.g. Cotton, Datura,
		multicarpellary ovary	Portulaca, Okra, Poppy.

(b) Achenial fruits: It is simple, dry, indehiscent and single seeded fruit. They do not split at the maturity therefore seeds are liberated only by the destruction of pericarp. It is of following types.

S.No.	Type of fruit	Ovary	Examples
1.	Achene (Leathery pericarp)	Unilocular, Superior	Mirabilis jalapa
2.	Cypsela (Pappus will be	bicarpellary,	Sunflower
	there for fruit dispersal)	syncarpous, Inferior	
3.	Caryopsis	monocarpellary,	Wheat, Maize, Rice, Oat
	(Pericarp fused with testa)	unilocular, superior	
4.	Samara (Pericarp forms	superior, bicarpellary	Shorea robusta and
	wing like structures)		Нореа
5.	Nut (Woody and hard	superior	Cashewnut, walnuts,
	Pericarp )		Litchi (edible part is
			Aril), Trapa



Fig. Capsular fruits



**(c) Schizocarpic fruit:** It is intermediate between capsular fruit (dehiscent fruit) and Achenial fruit (indehiscent fruit). It breaks into a number of indehiscent pieces at maturation. It is of following types-

S.No.	Types of fruit	Ovary	Example
1.	Lomentum (Constricted mericarp)	Superior	(i) Lomentaceous Pod- e.g.
			Acacia, Groundnut.
			(ii) Lomentaceous Siliqua -
			e.g. Radish.
2.	Cremocarp	bicarpellary and	Coriander , Foeniculum
		inferior	(Sonf)
3.	Compound Samara (Winged	Superior	Acer
	pericarp)		
4.	Carcerulus	bi or	Ocimum, Salvia
		multicarpellary	
		superior ovary	
5.	Regma (Fruits split in cocci)	Tricarpellary to	Ricinus
		pentacarpellary,	
		Syncarpous,	
		Superior ovary	
1			1

## Pictures of Schizocarpic Fruits

Ridge

Vascular bundle

1



Fig. Groundnut (Lomentum)

Fig. Coriander (Cremocarp) 1. T.S. of fruit ; 2. Fruit showing two mericarp after dehiscence

Stylopodium

Pericarp — Embryo

> Oil cavity Mericarp

> > Carpophore

Fork of Carpophore

A 2



# Comparison between 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	Fruits do not dehisces &	Fruits after ripening are
	ruptured after	after ripening and seeds	divided into one seeded
	ripening and seeds	remain inside the pericarp.	segments or mericarps.
	are dispersed.	e.g. Wheat, maize, Mirabilis,	e.g. Coriander, Double
	e. g. Pea, Bean, Madar,	Sunflower, etc,	samara, Acacia, etc.
	Candytuft, Cotton, etc.		

# FLESHY OR SUCCULENT FRUITS:

When pericarp is thick and fleshy, it is differentiated into the outer epicarp, the middle mesocarp and the inner endocarp. It is of three types

(a) Berry

(b) Drupes

(c) Pomes

## **TYPES OF FLESHY OR SUCCULENT FRUIT**

(a) Berry: Pericarp is differentiated into epicarp, mesocarp and endocarp. Berries are of four types.





# (b) Drupes:

- In mango and coconut, the fruit is known as a drupe.
- They develop from monocarpellary superior ovaries and are one seeded.
- In mango the pericarp is well differentiated into an outer thin epicarp, a middle fleshy edible mesocarp and an inner stony hard endocarp.
- In coconut which is also a drupe, the mesocarp is fibrous.





## (c) Pomes:

• It is developed by multicarpellary syncarpous, inferior ovary in which edible part is fleshy thalamus hence it is a false fruit. e.g. Apple (Pyrus malus), Pear (Pyrus communis)



Fig. : False fruit of apple

## AGGREGATE FRUITS

These fruits develop from multicarpellary, apocarpous gynoecium. In apocarpous condition each carpel is free from each other and it forms a fruitlet. Aggregate fruits are made up of a bunch of fruitlets which is known as etaerio.

(1) Etaerio of achenes : In this type of aggregate fruit, each fruitlet is an achene. Eg. Ranancu/us, strawberry, rose, lotus.

In lotus, thalamus becomes spongy and some achenes are embedded in it. In strawberry, thalamus is fleshy and small achenes are found on its surface. In rose, many achenes are present on a saucer (cup) like inner surface of fleshy thalamus.

- (2) Etaerio of berries : It is an aggregation of small berries. Eg. Polyalthia, Annona squamosa (custard apple = sitaphal). In etaerio of Anona all the berries are arranged densly on thalamus.
- (3) Etaerio of drupes : In this type of fruit, many small drupes develop from different carpels.

Eg: Raspberry, blackberry.

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**Etaerio of Achenes** 



**Etaerio of Berries** 



## COMPOSITE FRUITS = MULTIPLE FRUITS

All composite fruits are false fruits.

In composite fruits, generally whole inflorescence is modify into fruit. These are of two types :

- (1) SOROSIS : This fruit develops from spike, spadix or catkin inflorescence.Eg. : Pineapple (annanas) jack fruit (kathal), mulberry (shahtoot).
- (2) SYCONUS OR SYCONIUM : This fruit develops from hypanthodium inflorescence. Many achenes develop from the pistillate flowers. Eg. Ficus species like Fig [anjeer (Ficus carica)], peepal (Focus religious)



Geocarpic fruits : Underground fruits are called geocarpic fruits. E.g. A rachis (groundnut)