

Pharmaceutical Botany Practice-  
Lab Number 11  
**MICROSCOPE and MORPHOLOGIC  
WORK:  
“FRUIT”**

# Fruit (FRUCTUS)

- Fruit is the organ that emerges after the fertilization of the flower's pistil (or ovary), which develops and matures.
- During ripening of the fruit, perianth, stigma and style are usually shed.
- Carpels turn into fruit coat and ovules into seeds.

# **Fruit (FRUCTUS)**

## **-The tasks of fruit:**

- 1. Protect the seed, the embryo.**
- 2. Store the nutrient.**
- 3. Provides seed spreading.**

**\*The PERICARP is the fruit wall derived from the ovary.**

**\*In other words: «The layer outside the fruit seed is called pericarp.»**

**It consists of three layers, the outer EXOCARP (=Epicarp), middle fleshy MESOCARP, and inner ENDOCARP.**

# Fruit (FRUCTUS)

The fruits are grouped under three main groups:

1. **Simple Fruits:** Fruits that have one pistil and arise from a single flower.
2. **Aggregate fruits:** It has many pistils and arise from a single flower.
3. **Compound fruits:** The fruit occurs with the development of inflorescence.

# 1. Simple Fruits

- Simple fruits grouped as;
- **1. Fleshy fruits**
- **2. Dry fruits**

# 1. Simple Fruits

## 1. Fleshy Fruits

### A.BERRY:

\*A berry is a fleshy fruit containing many seeds where the **entire pericarp is soft**.

\*In berries, the endocarp may **not** be distinct from the mesocarp.

# 1. Simple Fruits

## 1. Fleshy Fruits

### **B. BERRY-HESPERIDIUM:**

\*A **hesperidium** is a specialized berry with a **leathery outer rind** (exocarp), a spongy middle layer (mesocarp) and an inner section (endocarp).

\*It is the common fruit type in citrus (Rutaceae family).

\*In citrus the endocarp is composed of juice sacs (vesicles).



# 1. Simple Fruits

## 1. Fleshy Fruits

### C. BERRY-PEPO:

\*A pepo is a specialized **berry with a hard outer covering** (exocarp) at maturity.

\*It is common in the cucurbit family (Cucurbitaceae).

# 1. Simple Fruits

## 1. Fleshy Fruits

### D.DRUPE:

\*A drupe is a single-seeded, fleshy fruit with a **soft mesocarp** and a **hard endocarp**.

\*In members of the rose family (Rosaceae) like cherry and plum, the **endocarp is called a stone**.

# 1. Simple Fruits

## 1. Fleshy Fruits

### E. POME:

- \*A fleshy **fruit** having several **seed chambers** and an **outer fleshy part largely derived from the hypanthium**.
- \*The seeds are inside the papery endocarp.
- \*It is found in some members of the rose family (Rosaceae) like apple, pear and quince.

Pome is an «**ACCESSORY FRUIT**» which is a **fruit** in which some of the flesh is derived not from the ovary.

**Pomes**, such as apples and pears, are also accessory **fruits**, with much of the **fruit** flesh derived from a hypanthium.

# 1. Simple Fruits

## 2. Dry Fruits

### a. Indehiscent\* fruits

- Caryopsis
- Samara
- Achene
- Nut

### b. Dehiscent\*\* fruits

- Capsule
- Follicle
- Silique
- Legume

\***indehiscent**: remaining closed at maturity.

\*\***dehiscent**: open spontaneously at maturity.

# 1. Simple Fruits

## 2. Dry Fruits

### a. Indehiscent fruits

#### A. Caryopsis

A caryopsis is a dry, indehiscent fruit with the pericarp and seed coat fused to form a single seed.

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# 1. Simple Fruits

## 2. Dry Fruits

### a. Indehiscent fruits

#### B. Samara

A samara is a one-seeded, dry, indehiscent fruit with a specialized wing for wind dissemination. Maple and ash fruit are easily recognized as samaras and are examples where the wing is on one side of the fruit.

# 1. Simple Fruits

## 2. Dry Fruits

### a. Indehiscent fruits

#### C. Achene

An achene is a small, dry, indehiscent, single-seeded fruit.

# 1. Simple Fruits

## 2. Dry Fruits

### a. Indehiscent fruits

#### **PAPPUS:**

A ring of fine feathery hairs surrounding the fruit (=achene) in Compositae plants, such as the thistle; aids dispersal of the fruits by the wind.



# 1. Simple Fruits

## 2. Dry Fruits

### a. Indehiscent fruits

#### D. Nut

A nut is a dry, indehiscent fruit usually containing only a single seed with a hard, outer wall.

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# 1. Simple Fruits

## 2. Dry Fruits

### b. Dehiscent fruits

#### A. Capsule

A capsule is a dry, dehiscent fruit containing multiple seeds. Dehiscence indicates that the capsule opens when mature to release the seeds. Capsules are a common fruit type and there are numerous different forms.

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# 1. Simple Fruits

## 2. Dry Fruits

### b. Dehiscent fruits

## Capsule

Capsules contain several to many seeds and are categorized by the way they split to release the seeds in a variety of ways. The simplest capsule has only two chambers (locules) with two seeds as shown in lilac.

# 1. Simple Fruits

## 2. Dry Fruits

### b. Dehiscent fruits

## Capsule

Pansy exhibits a typical type of loculicidal capsule. This type is common and the capsule opens down the back of each cell exposing the seeds along the septum of the pod.

Loculus (singular) ...Loculi (plural)

Ovary is divided into two or more compartments, chambers or **loculi**.

# 1. Simple Fruits

## 2. Dry Fruits

### b. Dehiscent fruits

## Capsule

Capsules may be pod-like. The examples below are septicidal capsules where the fruit separates along the septa between the locules.

# 1. Simple Fruits

## 2. Dry Fruits

### b. Dehiscent fruits

**PYXIDIUM**

# 1. Simple Fruits

## 2. Dry Fruits

### b. Dehiscent fruits

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#### **B. Follicle**

A follicle is a dry, dehiscent fruit that opens along one side.

# 1. Simple Fruits

## 2. Dry Fruits

### b. Dehiscent fruits

## Follicle

Follicles can appear similar to types of capsules, but each fruit in the cluster is derived from a single carpel. A follicle illustrates why it is thought that a carpel is evolved from a single folded modified leaf.



# 1. Simple Fruits

## 2. Dry Fruits

### b. Dehiscent fruits

## Follicle

Milkweed produces large follicles with many seeds topped with tufts of hairs.

# 1. Simple Fruits

## 2. Dry Fruits

### b. Dehiscent fruits

## C. SILIQUE and SILICLE

**Silique** is a dry, dehiscent, **elongated** fruit, typically **more than twice as long as wide**, formed from **one flower** having a **single ovary** divided into **two carpels**, separated by a partition (septum) that bears the ovules/seeds.

A **silicle** is a **short silique**, no more than **twice as long as broad**.

# 1. Simple Fruits

## 2. Dry Fruits

### b. Dehiscent fruits

#### D. Legume

A legume is a dry, dehiscent pod that opens along two sides. It is derived from a single carpel and is characteristic of the legume family (Fabaceae). Each seed is attached to one edge of the pod wall by a seed stalk (funiculus).

## 2. Compound Fruits

### A. AGGREGATE FRUITS

#### Aggregate fruits

Aggregate fruits are formed from single flowers with many separate carpels.

## 2. Compound Fruits

### A. AGGREGATE FRUITS

#### Aggregate fruits

Lotus produces a distinctive aggregate fruit with individual nut-like fruits imbedded in a flat receptacle.

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## 2. Compound Fruits

### A. AGGREGATE FRUITS

#### Aggregate fruits

Magnolia fruit is an aggregate of follicles attached to an elongated receptacle.  
Each follicle contains a seed surrounded by a fleshy aril.

## 1. Compound Fruits

### B. AGGREGATE ACCESSORY FRUITS

#### **Aggregate** *Accessory* fruits

In accessory fruits, the receptacle forms the fleshy edible portion. The botanical fruits are achenes, which are produced on the surface of the receptacle.

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## 2. Compound Fruits

### C. MULTIPLE FRUITS

#### Multiple fruits

Multiple fruits develop from several flowers where the carpels stay together to resemble a single fruit. In Osage orange, the individual fruits are achenes completely enclosed in receptacle and sepal (calyx) tissue.



## 2. Compound Fruits

### C. MULTIPLE FRUITS

#### Multiple fruits

Mulberry produces a cluster of fruits each enclosing an achene. Notice the persistent style (arrow) protruding from each fruit. The fleshy part of each fruit is swollen sepal (calyx) tissue.

# 1. Compound Fruits

## D. SCHIZOCARP FRUITS

### Schizocarps

A schizocarp is a fruit that develops from a compound ovary where the carpels break apart into separate single-seeded, achene-like, fruit units called mericarps.

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# 1. Compound Fruits

## D. SCHIZOCARP FRUITS

### Schizocarps

Maple is a simple schizocarp composed of paired samaras that separate for wind dissemination.

# 1. Compound Fruits

## D. SCHIZOCARP FRUITS

### Schizocarps

Sycamore is a more complex schizocarp with hundreds of mericarps (achenes) united in a ball-like fruit.

# 1. Compound Fruits

## E.SYCONIUM

### Syconium

Figs produce syconium fruits. In a syconium, the entire inflorescence ripens into a hollow fruit with the seeds attached to an inverted receptacle.

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# 1. Compound Fruits

## F.HIP

### Hip

Hips are the fruits in rose. Hips are produced from an enlarged hypanthium that grows to surround the numerous achenes.

# SEED (SEMEN)

- The fertilized ripened ovule of a flowering plant containing an embryo and capable normally of germination to produce a new plant.
- 1. Testa
- 2. Embryo
- 3. Endosperm

# MICROSCOBIC WORK



•A **seed** is a fertilized ovule that has undergone growth and development. A seed consists of the following parts;

•**Embryo:** It consists of *radicle* and *plumule*.

•**Radicle:** It develops to form the root.

•**Plumule:** It occurs above the radicle. It develops to form the shoot.

•**Endosperm:** It stores food substances.

•**Cotyledon:** It transfers food substances from the endosperm to radicle and plumule.

•**Testa:** It is the outer seed coat or covering of a seed.

•**Micropyle:** It is a tiny pore occurring at one end of a seed. Seeds absorb water through the micropyle.

•**Hilum:** It is the point of attachment of a seed to the ovary wall.

**Functions of seeds:** It protects the embryo. It stores sufficient food for the development of the embryo.

# FRUIT INVESTIGATION

## i) Anatomical work:

### A) Cross-section

1. P.N: *Foeniculum vulgare* (Fennel; Rezene)

• D.N: Fructus Foeniculi

#### a) Schematical drawing

• I.M.: Sartur

• M.M.: 10x4

#### b) Anatomical drawing

I.M.: Sartur

M.M.:10x40

# **i)Anatomical work:**

**B) Powdered Drug**

**Fruit investigation (Powdered Drug)**

# MORPHOLOGIC WORK

# MORPHOLOGIC WORK

\*Each fruit must be drawn roughly

**To be written for each fruit;**

- **Fruit type**
- **Pericarp features**
- **Outer surface structure (Hairy or hairless)**
- **Approximate sizes (in centimeters)**
- **Characteristic structures specific to fruit type (Please label each part on the drawing)**

# MORPHOLOGIC WORK

## Drugs to be investigated (Fruits):

- 1) P.N: *Foeniculum vulgare* (Fennel, Rezene)  
D.N: Fructus Foeniculi
  
- 2) P.N : *Cuminum cyminum* (Cumin, Kimyon)  
D.N : Fructus Cumini
  
- 3) P.N. : *Pimpinella anisum* (Anise, Anason)  
D.N. : Fructus Anisi
  
- 4) P.N. : *Coriandrum sativum* (Coriander, Kışniş)  
D.N.:Fructus Coriandri
  
- 5) P.N.:*Piper nigrum* (Black pepper, Karabiber)  
D.N.:Fructus Piperis nigri

# MORPHOLOGIC WORK

## Drugs to be investigated:

6) P.N.: *Piper cubeba* (Cubeb, Kübabe)

D.N.: Fructus cubebae

7) P.N.: *Ligustrum vulgare* (Privet, Kurtbağrı)

8) B.A.: *Corylus avellana* (Nut, Fındık)

9) B.A.: *Helianthus annuus* (Helianthus, Ayçiçeği)

10) B.A.: *Prunus armeniaca* (Apricot, Kayısı)

# MORPHOLOGIC WORK

**Drugs to be investigated (Seeds):**

**11) P.N.: *Linum usitatissimum* (Linum, Keten)**

**D.N.: Semen Lini**

**12) P.N.: *Ricinus communis* (Castor Bean, Hintyağı)**

**D.N.: Semen Ricini**