

CONCEPT MAP

MORPHOLOGY OF FRUITS AND SEEDS

A **true fruit (or eucarp)** is a ripened ovary. It consists of a thin or thick pericarp formed from the wall of ovary and seeds formed from the ovules. A fruit in which other floral parts (e.g., thalamus, base of sepals, petals, etc.), participate in its formation is called **false fruit (or pseudocarp)** e.g., apple and pear. The seeds within the fruits have reserve food for nourishing the young seedlings till they become nutritionally independent.

Some fruits are formed without fertilisation i.e., seedless fruits. They are called as **parthenocarps** (e.g., banana). Fruits are classified into three main categories – **simple fruits, aggregate fruits and composite fruits.**

Simple fruits

Simple fruits develop from monocarpellary ovary or multicarpellary syncarpous ovary. Simple fruits may be **dry** (pericarp is undifferentiated) or **succulent** (pericarp is differentiated into epicarp, mesocarp and endocarp).

Dry fruits

Dry fruits are of three types – **Achenial** (single seeded, indehiscent), **capsular** (many seeded, dehiscent) and **schizocarpic** (many seeded, after ripening divide into single seeded segments).

Succulent fruits

Succulent fruits can be divided into three main types: berry, drupe and pome.
 (i) **Berry**: In superior or true berry (derived from superior ovary) usually all the three layers of fleshy pericarp are edible, e.g., grape, tomato. In inferior or false berry (derived from inferior ovary) epicarp is fused with thalamus to form exocarp, e.g., banana (parthenocarpic), guava. There are some special berries also such as **balausta** (e.g., pomegranate), **pepo** (e.g., cucumber), and **hesperidium** (e.g., orange).
 (ii) **Drupe (or stone fruit)**: In this fruit, epicarp forms the rind, mesocarp is fleshy and endocarp is hard and stony, e.g., almond, mango, *Zizyphus*, etc.
 (iii) **Pome**: It is a false fruit that develops from the fleshy thalamus of multicarpellary, syncarpous, inferior ovary, e.g., apple, pear, etc.

Pome of Apple

Inferior Berry of Banana

Berry of Tomato

Drupe of Mango

Composite fruits

A composite or multiple fruit develops from the whole inflorescence. It is of two main types: sorosis and syconus.
Sorosis: These fruits develop from spike, spadix or catkin inflorescence. Sorosis of pineapple develops from an intercalary spike of sterile flowers with persistent bracts. Sorosis of mulberry develops from a female catkin.
Syconus: It develops from hypanthodium inflorescence. Receptacle becomes fleshy and edible, many achenes develop from pistillate flowers, e.g., *Ficus carica*.

Sorosis of Morus

Syconus of Fig

Aggregate fruits

Aggregate fruits are the groups of fruitlets which develop from the multicarpellary, apocarpous ovaries. The individual carpel or pistil develops into a fruitlet and these fruitlets occur as a clustered unit on a single receptacle, which is referred to as an aggregate fruit or etaerio, e.g., etaerio of achenes (*Ranunculus*, lotus), etaerio of follicles (*Calotropis*), etaerio of berries (Custard apple), etaerio of drupes (e.g., *Rubus idaeus*), etc.

Etaerio of achenes in Lotus

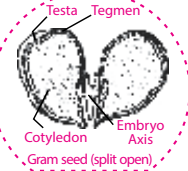
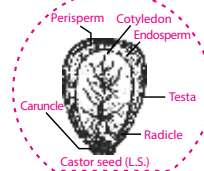
Etaerio of berries in Custard Apple

Seed

Seed is a ripened ovule which contains an embryo, adequate reserve food and a covering for protection against mechanical injury. A seed may have 1 or 2 coverings called **seed coats**. Outer is **testa** and inner is called **tegmen**. Seeds can be endospermic and non-endospermic.

(i) **Endospermic or albuminous seeds**: Endosperm is present and food reserve remains in endosperm, e.g., most monocots and some dicots (*Ricinus communis*).

(ii) **Non-endospermic or exalbuminous seeds**: The endosperm is consumed during seed development and the food is stored in cotyledons, e.g., majority of dicot seeds (*Cicer arietinum*) and in some monocot seeds.



Achenial fruits (Indehiscent fruit)

Achenial fruits are of five types:
 (i) **Achene**: It develops from monocarpellary, superior, unilocular and uniovuled ovary, pericarp is free from seed except at one point, e.g., *Mirabilis jalapa*. (ii) **Caryopsis (or Grain)**: It develops from monocarpellary, superior, unilocular ovary. Pericarp is completely fused with the testa, e.g., members of family Poaceae. (iii) **Cypsel**: It develops from bicarpellary, syncarpous, inferior and unilocular ovary. Pappus may be present for dispersal, e.g., *Taraxacum*. (iv) **Nut**: Pericarp becomes hard, woody or leathery. Fruit may develop from monocarpellary, superior ovary (e.g., cashew nut); trilocular, syncarpous, trilobular ovary (e.g., litchi), etc. (v) **Samara**: Pericarp becomes flat like wings and thus help in wind dispersal e.g., *Holoptelea*.

Capsular fruits (Dehiscent fruit)

Capsular fruits are of five types:
 (i) **Legume (or pod)**: The fruit develops from superior, monocarpellary, unilocular ovary with marginal placentation. It dehisces by both dorsal and ventral sutures, e.g., members of family Leguminosae. (ii) **Follicle**: The fruit dehisces by only one suture, e.g., *Delphinium*. (iii) **Siliqua**: It develops from a bicarpellary, superior ovary with parietal placentation and a false septum called replum. It dehisces by two valves, e.g., members of family Brassicaceae. (iv) **Silicula**: It is a shortened and flattened siliqua, e.g., *Capsella bursa-pastoris*. (v) **Capsule**: According to the mode of dehiscence, capsule may be **porocidal capsule** (e.g., *Papaver*), **denticidal capsule** (e.g., Pink), **pyxidium** (e.g., *Portulaca*), **loculicidal capsule** (e.g., *Gossypium*), **septicidal capsule** (e.g., *Viola*), **septifragal capsule** (e.g., *Datura*), etc.

Schizocarpic fruits (Splitting fruits)

Schizocarpic fruits are of five types:
 (i) **Cremocarp**: It develops from a bicarpellary, syncarpous, bilocular, inferior ovary. On maturity, the fruit splits into two mericarps, each with one seed, e.g., members of family Apiaceae. (ii) **Lomentum**: The fruit is a modification of legume, which is constricted in between the seeds, e.g., *Mimosa*, *Acacia*, etc. (iii) **Carcerulus**: At maturity, the fruit breaks up into single seeded indehiscent mericarps, e.g., *Althaea*. (iv) **Compound samara**: At maturity, the fruit splits up into single seeded winged mericarps, e.g., *Acer*. (v) **Regma**: It develops from multicarpellary pistil and on maturity, splits into as many cocci as the number of carpels, e.g., *Geranium*.

