

# CLASS III:

## ANGIOSPERMS

Greek: Angio → sac  
Sperma → seeds

Angiosperms form one of the most highly evolved group of spermatophyta (seed plants). As the name shows the seeds of angiosperms are enclosed in the fruits. They are flowering plants. The most successful and important of these plants belong to grass family which have colonized great areas of earth surface in practically all sort of soil and climatic conditions. They constitute the main source of man's food supply.

## CHARACTERISTIC FEATURES

### FORM

The basic angiosperm form is woody or herbaceous. Woody forms (generally trees and shrubs) are rich in secondary tissues, while herbaceous forms (herbs) rarely have any.

### STRUCTURE

### PLANT BODY

The basic angiosperm body



has three parts: roots, stems, and leaves. These primary organs constitute the vegetative (non-reproductive) plant body. Together, the stem and its attached leaves constitute the shoot. Collectively, the roots of an individual plant make up the root system and the shoots the shoot system.

## SUB-CLASSES

Angiosperms are typically divided into two classes: monocots (including grasses, grains, and spring-flowering bulbs such as daffodils) and dicots (including oaks, elms, sunflower, and roses).

## DIFFERENCE BETWEEN MONOCOTS AND DICOTS

Following are the differences between monocot and dicot:

### 1. COTYLEDONS

In dicotyledons, the embryo bears two cotyledons; whereas ~~the~~ in monocotyledons, it bears only one.

### 2. ~~PLUMULE~~ EMBRYO

In the dicotyledenous embryo, the plumule is terminal and the two cotyledon lateral; but in the monocotyledenous embryo, the plumule is lateral and the cotyledon terminal. This is, however, not true in all cases.



### 3. ROOT

In dicotyledonous embryo, the ~~primary root is terminal and~~ primary root persists and give rise to the tap root; while in monocotyledons, the primary root soon perishes and is replaced by a group of adventitious roots.

### 4. VENATION (the arrangement of veins in a leaf)

As a rule venation is reticulate in dicotyledons, and parallel in monocotyledons. Among monocotyledons, sarsaparilla, Smilax and yams (Dioscorea), however, show reticulate venation and among dicotyledons, Alexandrian laurel (Calophyllum) shows parallel venation.

### 5. FLOWER

The dicotyledenous flower has commonly a pentamerous symmetry; while the monocotyledenous has has trimerous symmetry.

### 6. VASCULAR BUNDLES

In the dicotyledenous stem, the vascular bundles are arranged in a ring and they are collateral ~~stems~~ and open. In the monocotyledenous stem, the bundles are scattered in the ground tissue and are collateral and closed. Also the bundles



are more numerous in monocotyledons than in dicotyledons. Further, the bundles are more or less oval in monocotyledons and wedge-shaped in dicotyledons.

## 7. NUMBER OF XYLEM BUNDLES IN ROOTS

In the dicotyledenous root, the number of xylem bundles varies from 2 to 6, seldom more, but in the monocotyledenous root, these are numerous, seldom a limited number (5 to 8)

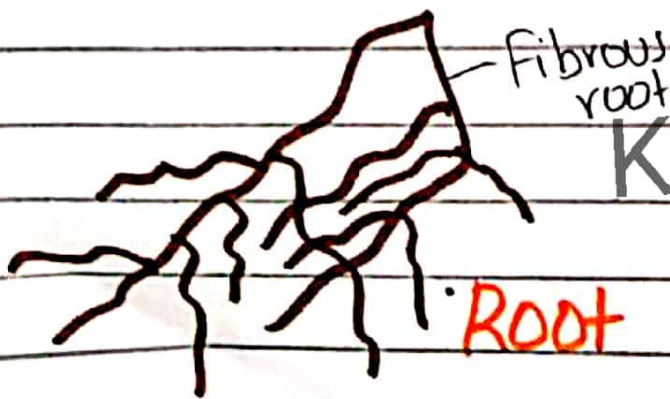
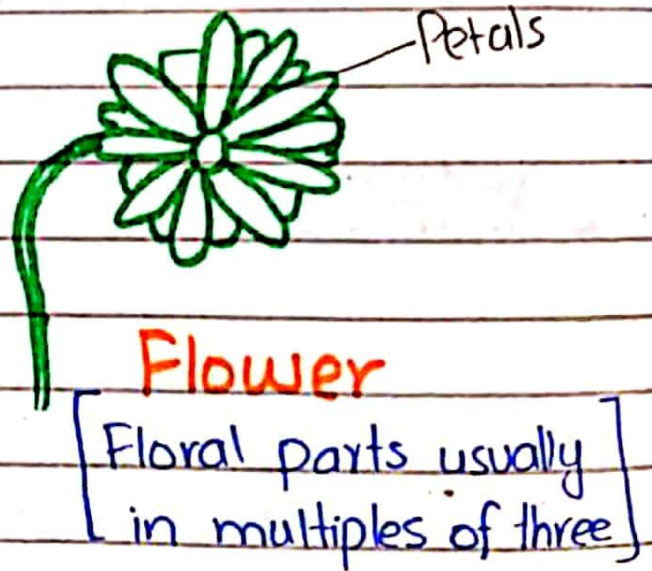
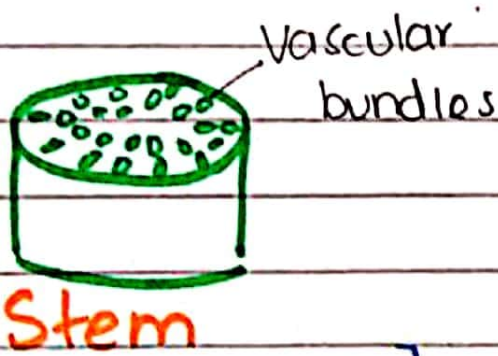
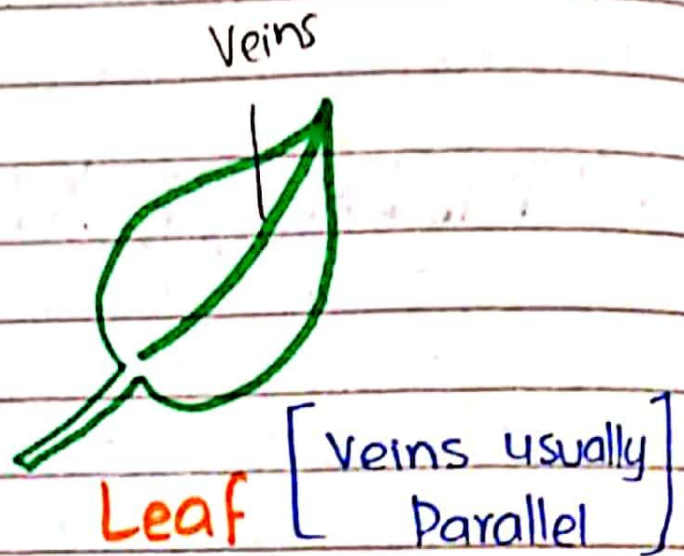
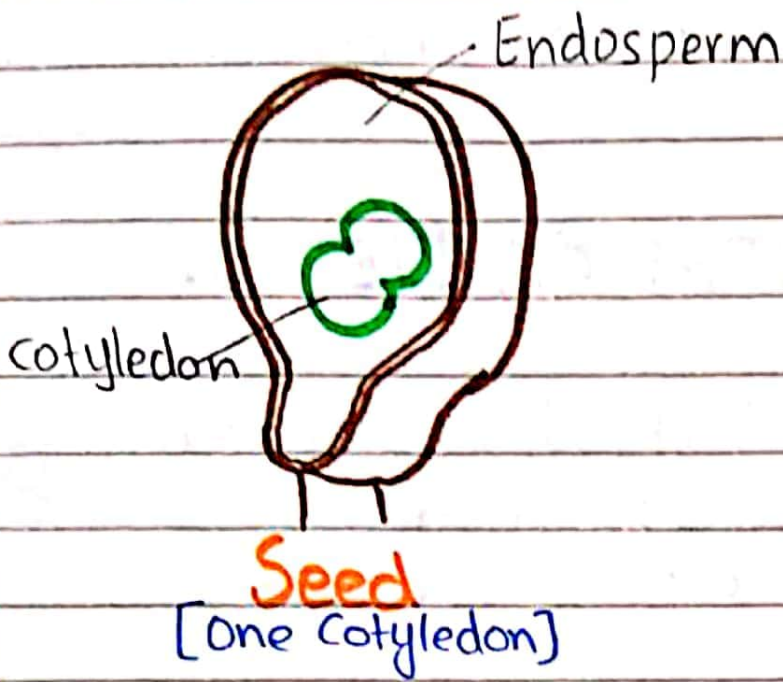
## 8. CAMBIUM

(A tissue that produces new xylem and phloem)

Cambium soon makes its appearance in the dicotyledenous root as secondary meristem and gives rise to secondary growth, but in the monocotyledonous root cambium is altogether absent, and hence there is no secondary growth



# MONOCOTS



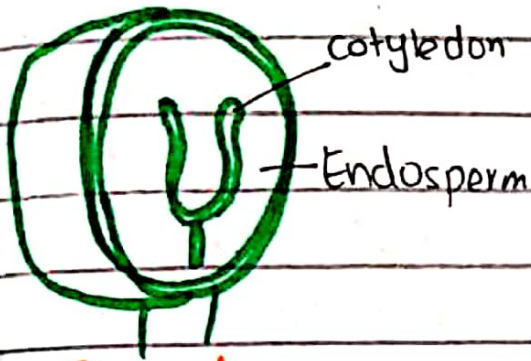
[Fibrous root system]

Koracademy.com

MONOCOTS:  
Lilies, orchids,  
grasses, wheat,  
rice.



# DICOTS



Seed

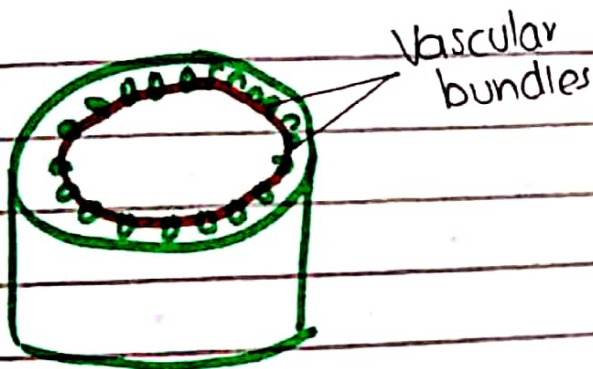
[Two cotyledons]



Veins

[Veins usually branched]

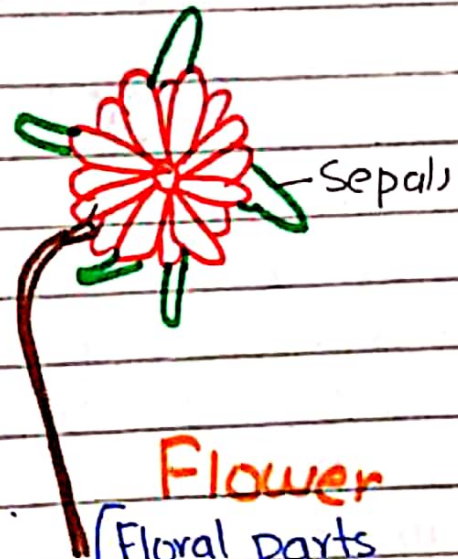
Leaf



Vascular bundles

Stem

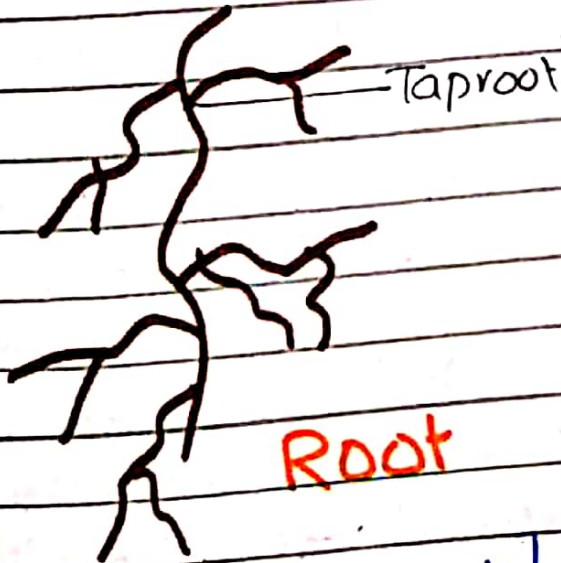
[Vascular bundles arranged in ring]



Sepals

Flower

[Floral parts usually in multiples of four or five]



Taproot

Root

[Taproot present]

~~Monocots~~ <sup>DICOTS</sup>  
Rose, pea, buttercup etc



# LIFE CYCLE OF ANGIOSPERMS

The angiospermic plant is a diploid sporophyte which is composed of root, stem, leaves and flowers. Flower is the reproductive organ while stamens and the carpels are the <sup>male and</sup> female reproductive parts.

## STAMEN

Stamens are male reproductive parts. Each stamen consists of an anther with four pollen sacs. A large number of microspores are produced by meiosis in each pollen sac. The wall of microspore becomes thick and is known as pollen grain.

Koracademy.com

## CARPEL

Carpels are the female reproductive parts. The carpel consists of a basal swollen part, the ovary, which contains one or many ovules. The carpel consists of stigma, style and ovary. The ovule consists of a tissue called nucellus, which is covered by the integument. (Nucellus is the central main portion of ovule which contains the embryo sac). Certain changes occur in the ovule, leading to the formation of megaspore. The megaspore generally develops into seven celled female

Koracademy.com



gametophyte or embryo sac. One of these seven cells is the egg or oosphere, one as endosperm mother cell which is diploid in nature, two synergid cell and 3 antipodal cells.

## POLLINATION

Upon pollination the pollen grains are transferred to the stigma of the carpels. The pollen grains germinates and develops into male gametophyte or microgametophyte. The nucleus of the pollen grain divides into a generative nucleus and vegetative or tube nucleus. The generative nucleus divides into two male gametes. The pollen grain sends down a tube called the pollen tube which contains two male gametes and tube nucleus. The pollen tube together with the two male gametes and a tube nucleus constitutes the male gametophyte.

## DOUBLE FERTILIZATION

The pollen tube enters the female gametophyte. The tip of the pollen tube ruptures and the two sperms are released into the female gametophyte. One sperm fuses with the egg to form zygote or oospore and the other sperm fuses with the endosperm mother cell to form fusion nucleus. The fusion of one sperm with the egg to form zygote and that of the other with the endosperm mother cell to form



fusion nucleus is called double fertilization, which occurs only in angiosperms.

## EMBRYO

The oospore develops into an embryo which consists of a radical, hypocotyle, plumule and one or two cotyledons.

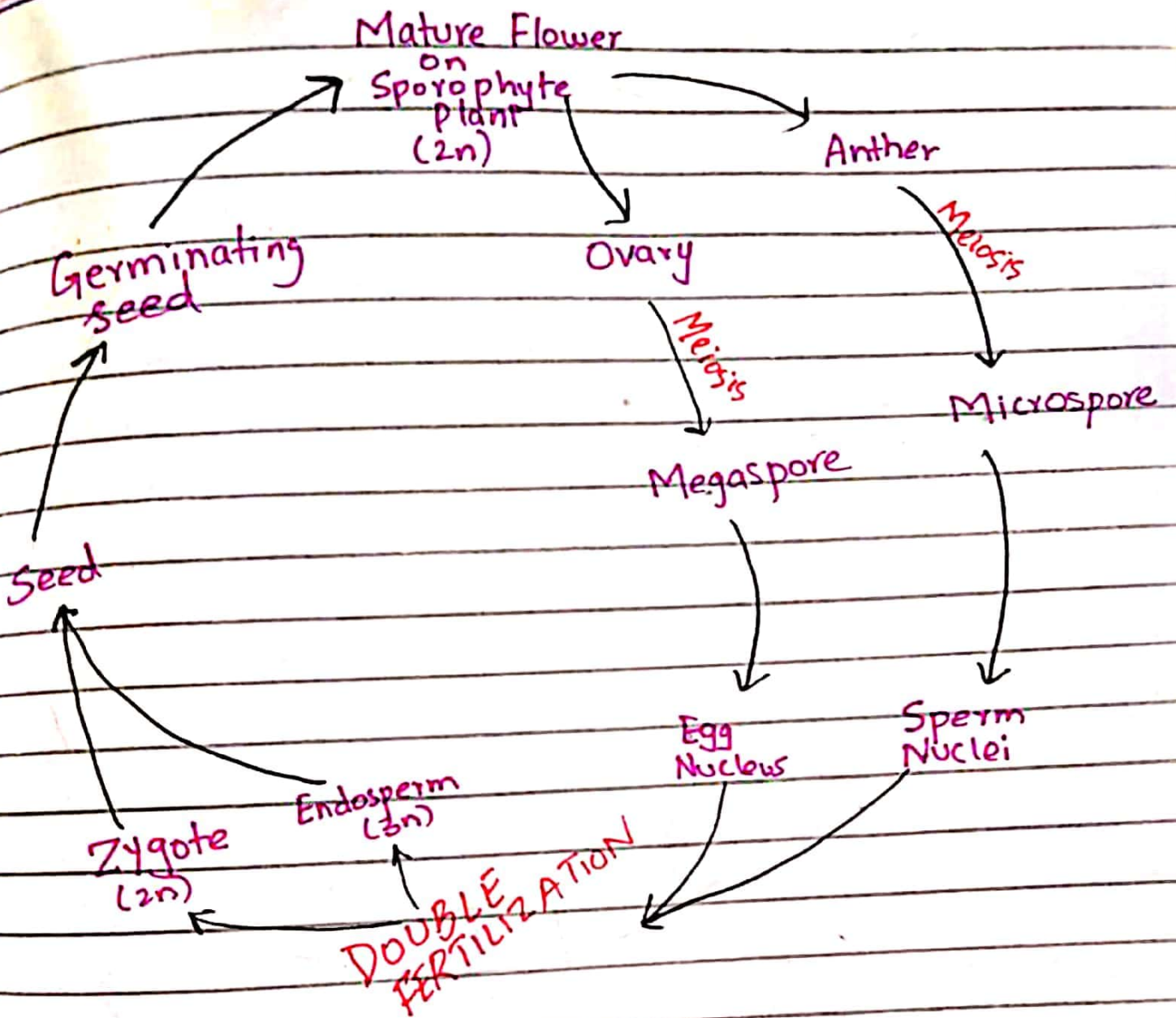
## SEED

The fusion nucleus develops into a nutritive tissue called endosperm. After fertilization the ovule matures into seed. The integuments of the ovule form the seed coats called testa and tagmen. The walls of the ovary develops into fruit on ripening. Under favourable conditions, the seed germinates to produce seedling which on development becomes sporophyte.

## ALTERNATION OF GENERATIONS

The two kinds of generation i-e gametophyte and sporophyte, one after the other shows alternation of generations.





# LIFE CYCLE OF ANGIOSPERMS

Koracademy.com