Morphology of Flowering Plants

CHAPTER 5

NCERT FOCUS

ANSWERS

Topic 1

1. The compound leaves may be of two types, pinnately compound leaf and palmately compound leaf. In pinnately compound leaf, a number of leaflets are present on a common axis, the rachis, which represents the midrib of the leaf as in neem. Pinnately compound leaf may be of different types as unipinnate, bipinnate, tripinnate and decompound. In palmately compound leaf, the leaflets are attached at a common point, *i.e.*, at the tip of petiole, as in silk cotton. Palmately compound leaf may be of different types as unifoliate, bifoliate, trifoliate, quadrifoliate and multifoliate.

2. Phyllotaxy is the pattern of arrangement of leaves on the stem or branch. It is usually of three types – alternate, opposite and whorled. In alternate type of phyllotaxy, a single leaf arises at each node in alternate manner, as in China rose, mustard and sunflower plants. In opposite type, a pair of leaves arises at each node and lie opposite to each other as in *Calotropis* and guava plants. If more than two leaves arise at a node and form a whorl it is called whorled phyllotaxy as in *Alstonia*.

Topic 2

1. (a) Aestivation : The mode of arrangement of accessory floral organs (sepals and petals) in relation to one another in floral bud is known as aestivation.

(b) Placentation : The arrangement of ovules within the ovary is known as placentation.

(c) Actinomorphic : When flower can be divided into equal halves in any radial plane passing through the centre, it is said to be actinomorphic, *e.g.*, mustard, *Datura*, etc.

(d) Zygomorphic : When a flower can be divided into two similar halves only in one particular vertical plane, it is said to be zygomorphic, *e.g.*, pea, gulmohar, bean, *Cassia*.

(e) Superior ovary : In hypogynous flower, the gynoecium occupies the highest position while the other parts are situated below it. The ovary in such flowers is said to be superior, *e.g.*, mustard, brinjal.

(f) Perigynous flower : If gynoecium is situated in the centre and other parts of the flower are located on the rim of the thalamus almost at the same level, it is called perigynous. Here ovary is half superior, *e.g.*, peach, plum.

(g) Epipetalous stamen : When stamens are attached to the petals, they are called epipetalous stamens *e.g.*, brinjal.

2. (a) Differences between racemose and cymose inflorescence are as follows:

S.No.	Racemose inflorescence	Cymose inflorescence
(i)	The main axis continues to grow.	The main axis terminates in a flower.
(ii)	Growth is unlimited.	Growth is limited.
(iii)	The flowers are borne in an acropetal succession.	Flowers are borne in a basipetal succession.
(iv)	The grouping of flowers is less common and arrangement of flowers in a group is centripetal.	The grouping of flower is more common and arrangement of flowers in a group is centrifugal.

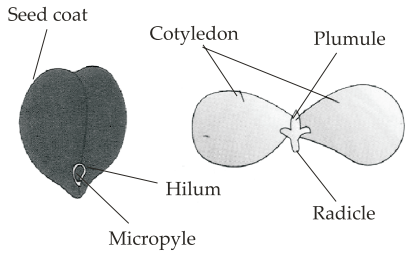
(b) Differences between fibrous and adventitious roots are as follows :

S.No.	Fibrous roots	Adventitious roots
(i)	It occurs in place of tap root system at the base of main stem.	Roots arise from various parts of the plant other than the radicle.
(ii)	The roots are thin and fibrous.	The roots can be thin, thick or variously modified.
(iii)	The root system is underground.	It can be underground or above ground.
(iv)	Fibrous root system takes part in fixation of plant, absorption of water and mineral salts, etc.	It performs several functions like clinging, support, storage, reproduction, fixation, absorption, etc.

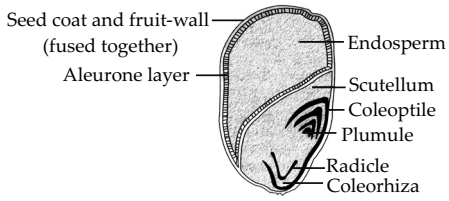
(c) Differences between apocarpous and syncarpous ovary are as follows :

S.No.	Apocarpous ovary	Syncarpous ovary
(i)	The flower has several free ovaries.	There is a single ovary.
(ii)	It is always unilocular.	It can be unilocular or multilocular.
(iii)	On maturity it forms fruitlet of aggregate type.	On maturity it forms a simple fruit.

3. (i) The labelled diagram of gram seed is as follows :



(ii) V.S. of maize seed is as follows :



4. Flower is the reproductive unit in the angiosperms. It is meant for sexual reproduction. A typical flower has four different kinds of whorls arranged successively on the swollen end of the stalk or pedicel, called thalamus or receptacle. These are calyx, corolla, androecium and gynoecium. Calyx and corolla are accessory organs, while androecium and gynoecium are reproductive organs.

Calyx : The calyx is the outermost whorl of the flower and its units are called sepals. Generally, sepals are green, leaf like and protect the flower in the bud stage. The calyx may be gamosepalous (sepals united) or polysepalous (sepals free).

Corolla : Corolla is composed of petals. Petals are usually brightly coloured to attract insects for pollination. Like calyx, corolla may also be free (polypetalous) or united (gamopetalous). The shape and colour of corolla vary greatly in plants. Corolla may be tubular, bell-shaped, funnel-shaped or wheel-shaped.

Androecium : Androecium is the male reproductive part of the flower. It is composed of stamens. Each stamen which represents the male reproductive organ consists of a stalk or a filament and an anther. Each anther is usually bilobed and each lobe has two chambers, the pollen-sacs. The pollen grains are produced in pollen-sacs.

Gynoecium : Gynoecium is the female reproductive part of the flower and is made up of one or more carpels. A carpel consists of three parts namely stigma, style and ovary. Ovary is the enlarged basal part, on which lies the elongated tube, the style. The style connects the ovary to the stigma. The stigma is usually at the tip of the style and is the receptive surface for pollen grains. Each ovary bears one or more ovules attached to a flattened, cushion-like placenta. When more than one carpel is present, they may be free (as in lotus and rose) and are called apocarpous. They are termed syncarpous when carpels are fused, as in mustard and tomato. After fertilisation, the ovules develop into seeds and the ovary matures into a fruit.

5. The arrangement of flowers on the floral axis is termed as inflorescence. A flower is a modified shoot wherein internodes do not elongate and the axis gets condensed. The apex produces different kinds of floral appendages laterally at successive nodes instead of leaves. When a shoot tip transforms into a flower, it is always solitary. Depending on whether the apex gets converted into a flower or continues to grow, two major types of inflorescence are defined – racemose and cymose. In racemose type of inflorescence the main axis continues to grow, the flowers are borne laterally in an acropetal succession. In cymose type of inflorescence the main axis terminates in a flower, hence is limited in growth. The flowers are borne in a basipetal order.

Topic 3

1. The floral formula for actinomorphic, bisexual, hypogynous flower with five united sepals, five free petals, five free stamens and two united carpels with superior ovary and axile placentation is : $\oplus ♀♂ K_{(5)} C_5 A_5 \underline{G}_{(2)}$.

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