

## Chapter 9: Morphology of Flowering Plants

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### EXERCISE [PAGES 114 - 115]

#### Exercise | Q 1. (A) | Page 114

**Choose the correct option.**

Which one of the following will grow better in moist and shady region?

1. Opuntia
2. **Orchid**
3. Mangroove
4. Lotus

### SOLUTION

**Orchid**

#### Exercise | Q 1. (B) | Page 114

**Choose the correct option.**

A particular plant had a pair of leaves at each node arranged in one plane. What is the arrangement called?

1. Alternate phyllotaxy
2. Decussate phyllotaxy
3. **Superposed phyllotaxy**
4. Whorled phyllotaxy

### SOLUTION

**Superposed phyllotaxy**

#### Exercise | Q 1. (C) | Page 114

**Choose the correct option.**

In a particular flower the insertion of floral whorls was in such a manner, so the ovary was below other three whorls, but its stigma was taller than other three whorls. What will you call such flower?

1. Hypogynous
2. Perigynous
3. **Inferior ovary**
4. Half superior - half inferior

### SOLUTION

**Inferior ovary**

#### Exercise | Q 1. (D) | Page 114

**Choose the correct option.**

Beet and Arum both store food for perennation. Are the examples for two different types?

1. Beet is a stem but Arum is a root

2. Beet is a root but Arum is a stem
3. Beet is a stem but Arum is a leaf
4. Beet is a stem but Arum is an inflorescence

#### **SOLUTION**

**Beet is a root but Arum is a stem**

#### **Exercise | Q 2. (A) | Page 114**

**Answer the following question.**

Two of the vegetables we consume are nothing but leaf bases. Which are they?

#### **SOLUTION**

Onion, Garlic

#### **Exercise | Q 2. (B) | Page 114**

**Answer the following question.**

Opuntia has spines but Carissa has thorns. What is the difference?

#### **SOLUTION**

1. In Opuntia, stem is modified into leaf like photosynthetic organ known as phylloclade.
2. Spines growing on phylloclade of Opuntia are leaves, modified to reduce the loss of water through transpiration.
3. Thorns in Carissa are modified apical buds. They provide protection against browsing animals.
4. Thus, spines in Opuntia and thorns in Carissa have different origin and function.

#### **Exercise | Q 2. (C) | Page 114**

**Answer the following question.**

Teacher described Hibiscus as solitary Cyme. What it means?

#### **SOLUTION**

1. In Cymose inflorescence, growth of peduncle is finite and it terminates into flower.
2. In Hibiscus, flower is borne singly at the tip of peduncle.  
Hence, teacher described Hibiscus as solitary cyme.

#### **Exercise | Q 3. (A) | Page 114**

Write a short note on fusiform root.

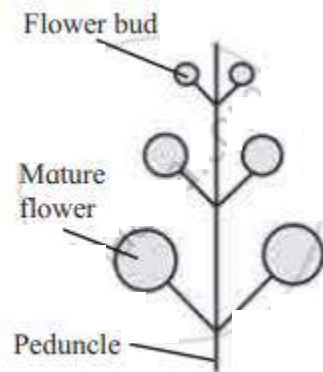
#### **SOLUTION**

1. Fusiform root is the modification of tap root for food storage.
2. The fusiform root is swollen in the middle and tapering towards both ends forming spindle shaped structure.  
e.g. Radish (*Raphanus sativus*).

### Exercise | Q 3. (B) | Page 114

Write a short note on Racemose inflorescence.

#### **SOLUTION**



1. Growth of peduncle is infinite or unlimited.
2. Apical bud never terminates into flower.
3. Flowers are arranged in acropetal succession (i.e. younger flower at the apex and older at the base)
4. Opening of flowers is centripetal (younger flowers towards the centre and open later while older towards periphery and open first)
5. e.g. Gold mohur, Sunflower, *Caesalpinia*.

### Exercise | Q 3. (C) | Page 114

Write a short note on fasciculated tuberous root.

#### **SOLUTION**

1. Fasciculated tuberous roots are modification of adventitious roots for storage of food.

2. Fasciculated tuberous roots do not develop any definite shape like modified tap roots.



3. A cluster of roots arising from one point which becomes thick and fleshy due to storage of food is known as fasciculated tuberous root.
4. These clusters are seen at the base of the stem. e.g. Dahlia, Asparagus, etc.

### Exercise | Q 3. (d) | Page 114

Write a short note on Region of cell maturation.

#### **SOLUTION**

1. It is the uppermost major part of the root.
2. The cells of this region are quite impermeable to water due to thick wall.
3. The cells show differentiation and form different types of tissues.
4. This region helps in fixation of plant and conduction of absorbed substances.
5. Development of lateral roots also takes place from this region.

### Exercise | Q 3. (E) | Page 114

Write a short note on rhizome.

#### **SOLUTION**

1. Rhizome is a modification of underground stem for storage of food.
2. It is prostrate, dorsiventrally thickened and brownish in colour.
3. It grows either horizontally or obliquely beneath the soil.
4. Rhizome shows nodes and internodes. It bears terminal and axillary buds at nodes.
5. Terminal bud under favourable conditions produces aerial shoot which degenerates at the end of favourable condition.
6. Growth of rhizome takes place with lateral buds, such growth is known as sympodial growth. e.g. Ginger (*Zingiber officinale*), Turmeric (*Curcuma domestica*), Canna etc.

7. In plants where rhizomes grow obliquely, terminal bud brings about growth of rhizomes. This is known as monopodial growth. e.g. Nymphaea, Nelumbo (Lotus), Pteris (Fern) etc.
8. Rhizomes perform functions like storage of food, vegetative propagation and perennation.

### Exercise | Q 3. (F) | Page 114

Write a short note on stolon.

#### **SOLUTION**

1. The slender lateral branch arising from the base of main axis is known as stolon.
2. In some plants it is above ground (wild strawberry).
3. Primarily stolon shows upward growth in the form of ordinary branch, but when it bends and touches the ground terminal bud grows into new shoot and develops adventitious roots. e.g. Wild Strawberry, Jasmine, Mentha, etc.

### Exercise | Q 3. (G) | Page 114

Write a short note on leaf venation.

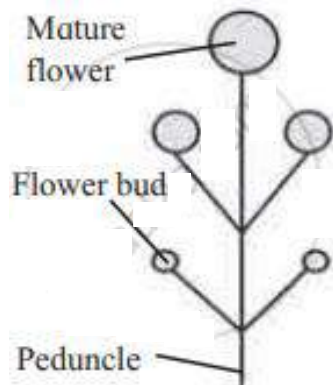
#### **SOLUTION**

1. Arrangement of veins and veinlets in leaf lamina is known as venation.
2. Veins are responsible for conduction of water and minerals as well as food.
3. The structural framework of the lamina is developed by veins.
4. There are two types of leaf venation: parallel venation which is found in monocot leaves and reticulate venation which is found in dicot leaves.

### Exercise | Q 3. (H) | Page 114

Write a short note on Cymose inflorescence.

#### **SOLUTION**



1. Growth of peduncle is finite or limited.
2. Apical bud always terminates into flower.
3. Flowers are arranged in basipetal succession (i.e. older flowers at the apex and younger at the base)
4. Opening of the flower is centrifugal (older flowers at the centre and open first while younger towards the periphery and open later)
5. e.g. China rose, Jasmine.

### Exercise | Q 3. (I) | Page 114

Write a short note on Perianth.

#### **SOLUTION**

1. Many times, calyx and corolla remain undifferentiated. Such member is known as tepal.
2. The whorl of tepals is known as Perianth.
3. It protects other floral whorls.
4. If all the tepals are free the condition is called as polyphyllous and if they are fused the condition is called as gamophyllous.
5. Sepaloid perianth shows green tepals, while petaloid perianth shows brightly coloured tepals. e.g. Lily, Amaranthus, Celosia, etc.
6. Petaloid tepal helps in pollination and sepaloid tepals can perform photosynthesis.

### Exercise | Q 3. (J) | Page 114

Write a short note on vexillary aestivation.

#### **SOLUTION**



Corolla is butterfly-shaped and consists of five petals. Outermost and largest is known as standard or vexillum, two lateral petals are wings and two smaller fused forming boat shaped structures keel. e.g. *Pisum sativum*.

### Exercise | Q 3. (K) | Page 114

Write a short note on axile placentation.

#### SOLUTION

1. **Placentation:** The mode of arrangement of ovules on the placenta within the ovary is called placentation.
2. **Axile:** Ovules are placed on the central axis of a multilocular ovary. e.g. China rose, Cotton, etc.

### Exercise | Q 4 | Page 114

Identify the following figures and write down the types of leaves arrangement.



#### SOLUTION

1. The given figures represent phyllotaxy. It is the arrangement of leaves on the stem and branches in a specific manner.
2. In first and second figure represents, alternate phyllotaxy. In this type of phyllotaxy, single leaf arises from each node of a stem. e.g. Mango
3. In third figure represents opposite decussate phyllotaxy. In this type of phyllotaxy, a pair of leaf arise from each node and the consecutive pair at right angle to the previous one. e.g. *Calotropis*.

### Exercise | Q 5. (A) | Page 114

**Students were on an excursion to a botanical garden. They noted the following observation. Will you be able to help them in understanding those conditions?**

A wiry outgrowth was seen on a plant arising from in between the leaf and stem.

#### **SOLUTION**

A wiry outgrowth on a plant arising from in between the leaf and stem can be an axillary stem tendril.

#### **Stem tendrils:**

1. Tendrils are thin, wiry, photosynthetic, leafless coiled structures.
2. They give additional support to developing plant.
3. Tendrils have adhesive glands for fixation.

### Exercise | Q 5. (B) | Page 114

**Students were on an excursion to a botanical garden. They noted the following observation. Will you be able to help them in understanding those conditions?**

There was a green plant with flat stem, but no leaves. The entire plant was covered by soft spines.

#### **SOLUTION**

Student must have observed phylloclade, which is a modification of stem.

#### **Phylloclade:**

1. Modification of stem into leaf like photosynthetic organ is known as phylloclade.
2. Being stem it possesses nodes and internodes.
3. It is thick, fleshy and succulent, contains mucilage for retaining water e.g.  
Opuntia, Casuarina (Cylindrical shaped phylloclade) and Muehlenbeckia (ribbon like phylloclade).

### Exercise | Q 5. (C) | Page 114

**Students were on an excursion to a botanical garden. They noted the following observation. Will you be able to help them in understanding those condition?**

Many oblique roots were given out from the lower nodes, apparently for extra support.

#### **SOLUTION**

1. Students must have observed adventitious roots in monocotyledonous plants like maize, sugarcane, wheat, etc.
2. Adventitious roots develop from any part of a plant other than the radicle.



3. In such plants, adventitious roots arise from the lower node of a stem and provide extra support to the plant. These roots are also called as stilt roots.

#### Exercise | Q 5. (D) | Page 114

**Students were on the excursion to a botanical garden. They noted following observation. Will you be able to help them in understanding those condition?**  
Many plants in the marshy region had upwardly growing roots. They could be better seen during low tide.

#### **SOLUTION**

1. Plants growing in marshy region (halophytes) produce upwardly growing roots called as pneumatophores or respiratory roots.
2. The main root system of these plants does not get sufficient air for respiration as soil is water logged.
3. Due to this, mineral absorption of plant also gets affected.
4. To overcome this problem underground roots, develop special roots which are negatively geotropic; growing vertically upward.
5. These roots are conical projections present around main trunk of plant.
6. Respiratory roots show presence of lenticels which helps in gaseous exchange.

#### Exercise | Q 5. (E) | Page 115

**Students were on an excursion to a botanical garden. They noted the following observation. Will you be able to help them in understanding those condition?**  
A plant had leaves with long leaf apex, which was curling around support.

#### **SOLUTION**

1. Students must have observed leaf tip tendril.
2. In some weak stems, leaf apex modifies into thin, green, wiry, coiled structure called as leaf tendril.
3. Such leaf tendrils, help in climbing by curling around a support.

#### Exercise | Q 5. (F) | Page 114

**Students were on an excursion to a botanical garden. They noted the following observation. Will you be able to help them in understanding those condition?**  
A plant was found growing on other plant. Teacher said it is not a parasite. It exhibited two types of roots.

#### **SOLUTION**

- Student must have observed an epiphytic plants like Dendrobium, Vanda growing on other plant.

- The two types of roots exhibited by this plant must be clinging roots and epiphytic roots.

#### **Clinging roots:**

1. Clinging roots are tiny roots develop along internodes, show disc at tips.
2. It exudes sticky substance which enables plant to get attached to the substratum without damaging it.

#### **Epiphytic roots:**

1. Epiphytic plants like Vanda, Dendrobium grow on branches of trees in dense rain forests and are unable to obtain moisture from soil.
2. Such plants produce epiphytic roots which hang in the air.
3. The roots are provided with a spongy membranous absorbent covering of the velamen tissue.
4. The cells of velamen tissue are hygroscopic and have porous walls, thus they can absorb moisture from air.
5. Epiphytic roots can be silvery white or green and are without root cap.

#### **Exercise | Q 5. (G) | Page 115**

**Students were on an excursion to a botanical garden. They noted the following observation. Will you be able to help them in understanding those condition?**

While having lunch onion slices were served to them. Teacher asked which part of the plant are you eating?

#### **SOLUTION**

1. The edible part of an onion is fleshy leaves.
2. Onion is a bulb, in which stem is highly reduced, discoid and possesses adventitious roots at the base.
3. This stem bears a whorl of fleshy leaves which store food material.
4. The scale leaves or fleshy leaves are arranged in concentric manner over the stem. Some outer scale leaves become thin and dry. Thus, it is also called as tunicated or layered bulb.

#### **Exercise | Q 5. (H) | Page 115**

**Students were on the excursion to a botanical garden. They noted following observation. Will you be able to help them in understanding those condition?**

Students observed large leaves of coconut and small leaves of Mimosa. Teacher asked it what way they are similar?

#### **SOLUTION**

1. Both large leaves of coconut and small leaves of Mimosa show pinnately compound leaves.
2. In both plants, leaf lamina is divided into number of leaflets.
3. Leaflets are present laterally on a common axis called rachis, which represents the midrib of the leaf.

#### Exercise | Q 5. (I) | Page 115

**Students were on an excursion to a botanical garden. They noted the following observation. Will you be able to help them in understanding those condition?**

Teacher showed them Marigold flower and said it is not one flower. What the teacher meant?

#### **SOLUTION**

1. Marigold flower is an inflorescence in which flowers are produced in a definite manner on a peduncle.
2. In Marigold, racemose type of inflorescence can be observed.
3. In this, peduncle condenses to form a flat rounded structure called receptacle.
4. Opening of flower centripetal i.e. younger flowers are towards the centre and open later, while older flowers towards the periphery and open first.

#### Exercise | Q 5. (J) | Page 115

**Students were on the excursion to a botanical garden. They noted following observation. Will you be able to help them in understanding those condition?**

Students cut open a Papaya fruit and found all the seeds attached to the sides. Teacher inquired about the possible placentation of Papaya ovary.






#### **SOLUTION**

1. In Papaya, seeds are attached to the sides of a fruit. Thus, parietal placentation is possible in papaya ovary.
2. In parietal placentation, ovules are placed on the inner wall of unilocular ovary of multicarpellary, syncarpus gynoecium.


#### Exercise | Q 6 | Page 115





**Match the following.**

'Group A'	'Group B'
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1.		A. Marginal
2.		B. Basal
3.		C. Axile
4.		D. Free central
5.		E. Parietal

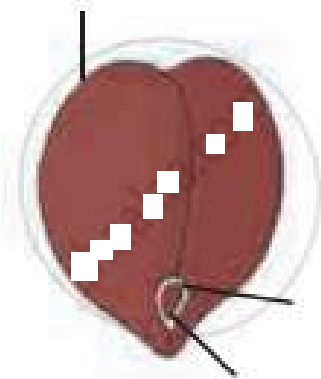
### SOLUTION

'Group A'	'Group B'
1.	C. Axile
	

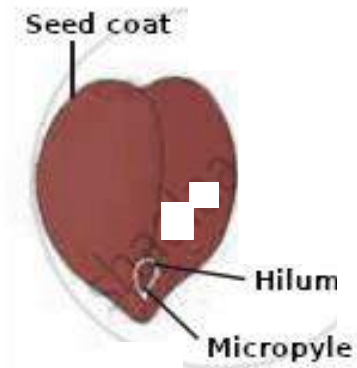
2.		E. Parietal
3.		A. Marginal
4.		B. Basal
5.		D. Free central

### Exercise | Q 7 | Page 115

Observe the following figure and label the different parts.

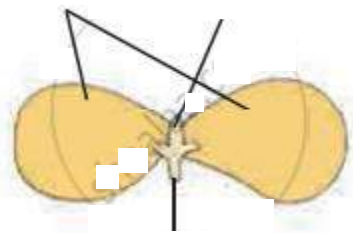


### **SOLUTION**

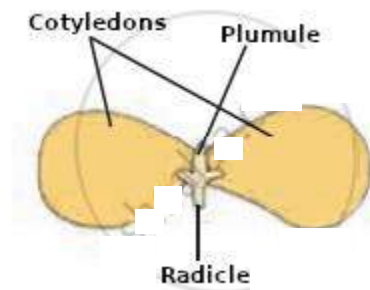


### **Exercise | Q 7 | Page 115**

Observe the following figure and label the different parts.



### **SOLUTION**

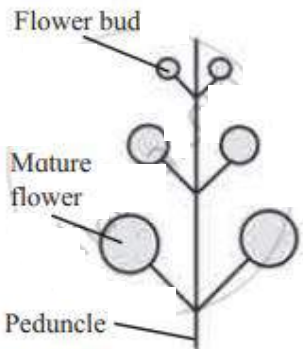
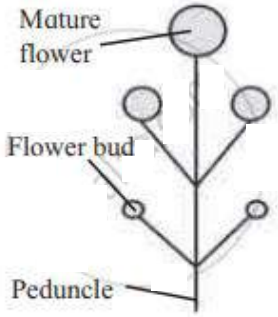


### **Exercise | Q 8. (A) | Page 115**

Differentiate with diagrammatic representation: Racemose and cymose inflorescence.

### **SOLUTION**

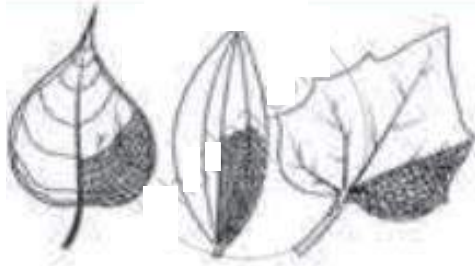

No.	Racemose Inflorescence	Cymose Inflorescence

		
1.	Growth of the peduncle is infinite or unlimited.	Growth of the peduncle is finite or limited.
2.	Apical bud never terminates into flower.	Apical bud always terminates into flower.
3.	Flowers are arranged in acropetal succession (i.e. younger flower at the apex and older at the base)	Flowers are arranged in basipetal succession (i.e. older flowers at the apex and younger at the base)
4.	Opening of flowers is centripetal (younger flowers towards the center and open later while older towards the periphery and open first)	Opening of the flower is centrifugal (older flowers at the center and open first while younger towards the periphery and open later)
5.	e.g. Gold mohur, Sunflower, Caesalpinia	e.g. China rose, Jasmine.

### Exercise | Q 8. (B) | Page 115

Differentiate with diagrammatic representation Reticulate and parallel venation

#### **SOLUTION**



No.	Reticulate venation	Parallel venation
		
1.	In reticulate venation, veins and veinlets form a network.	In parallel venation, veins run almost parallel to one another.

2.	It is found in dicotyledonous plants.	It is found in monocotyledonous plants.
3.	e.g. Mango, Peepal, etc.	e.g. Banana, Grasses, etc.

### Exercise | Q 8. (C) | Page 115

Differentiate with a diagrammatic representation Tap root and Adventitious roots.

#### **SOLUTION**

No.	Tap root	Adventitious roots
		
1.	It arises from radicle of an embryo during seed germination.	It arises from any part other than radicle.
2.	It is differentiated into primary, secondary and tertiary roots.	There is no such differentiation.
3.	It is usually found in dicotyledons.	It is usually found in monocotyledons.
4.	e.g. Pea, Bean, Sunflower, etc.	e.g. Maize, Wheat, Sugarcane, etc.