CLASS – 11

BIOLOGY

Chapter – 5

PLANT MORPHOLOGY

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PGT- Biology

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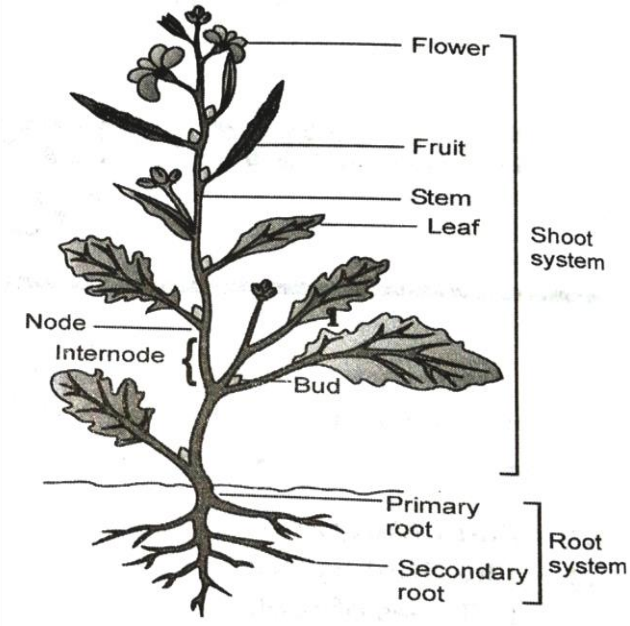
Morphology of flowering plant

- Flowering plant also called ***angiosperm*** which *enclosed seed and bear flower, Vary in size and range from small grasses to tall Eucalyptus or giant Banyan tree* and classified into monocot and dicots.
- Plant morphology deal with study of external form and structure of plants.
- All plant have two major system:

1. **Root system:**

✓ It *is underground system* which found below the soil and **originates from radical**.



2. **Shoot system:**

- ✓ It is an aerial system present above the soil and originates from plumule.
- ✓ It consists of stem, ranches leaves, flowers, fruits, and seeds.
- Parts of flowering plants are classified into two groups (according to their functions):

1. **Vegetative parts:** Roots, Stems, Branches and leaves.
2. **Reproductive parts:** Flowers, fruits, and seeds.

Root system

- It remains inside the soil, provide anchorage and help in water and minerals absorption.
- First root arises from the radical of the embryo plant is called ***primary root***.
- In majority of dicotyledonous plants ***secondary root*** (i.e. *lateral roots) are* arises from primary root.
- Three type of root system are found:

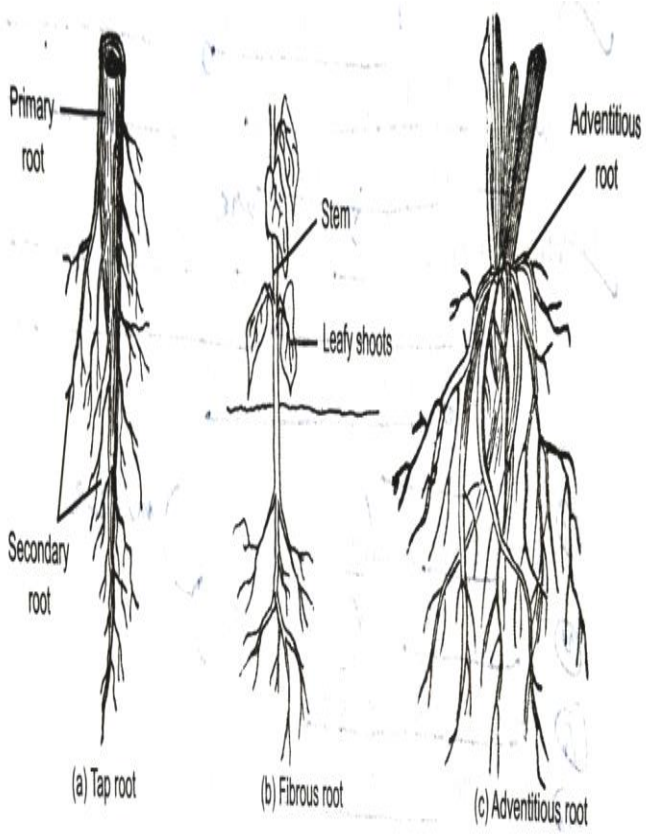
1. **Tap root system:** it consist of *primary root and its branches*, ***common in dicot***.

   Example: *mustard, carrots, turnip etc.*

2. **Fibrous root system:** found in ***monocot***, primary root are *originate from base of the stem*.

3. **Adventitious root system:** found in ***monocot*** and ***dicot*****,** *originate any part of plant other than radicle or true root.*

Example: *Grass and Banyan tree.*



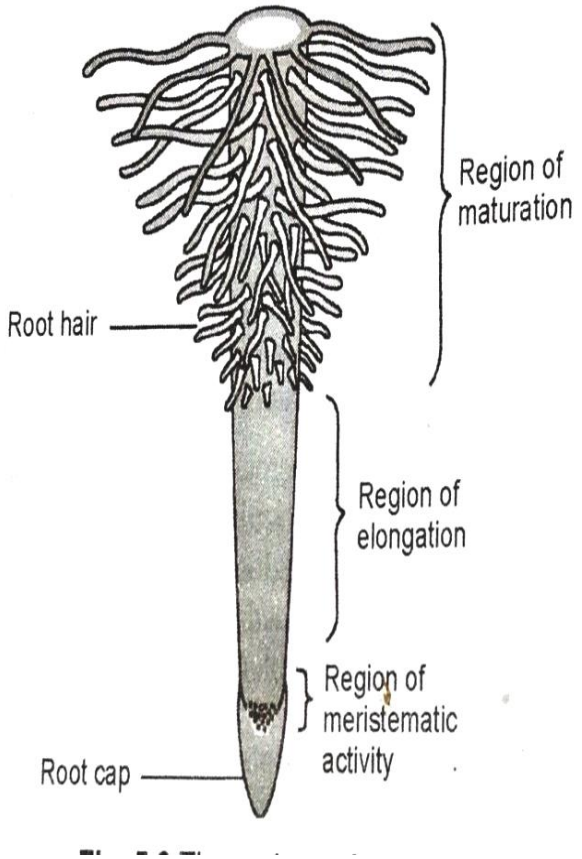
Function of root system

- Provide anchorage to the plant.
- Help in ***absorption and conduction*** of *water* and *menials salts* from the soil.
- Serve as ***food storage house*** (*e.g. beetroot, radish, turnip, carrot, sweet potato etc*).
- They can be modified by ***assimilation and additional support*** to the plant.
- It also acts as ***site for the synthesis*** of *plant growth regulators*.

Regions of Root

1. **Root cap:**

- A thimble like structure is ***present at the apex or tip*** of root.
- I t *protect the delicate apex of the root* and *make its way through soil*.



2. **Region of merisematic activity:**

- Present just above the root cap and consist of meristematic cells (i.e. have capability to divide rapidly.
- Cell of this region have very small, thin wall with dense cytoplasm.

3. **Region of elongation:**

- Present above the meristematic region.
- Cells of this region undergo rapid elongation and enlargement and responsible for the growth of root in length.

4. **Region of maturation:**

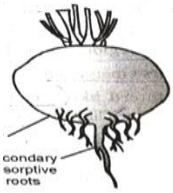
- Present above the region of elongation in which cell are gradually differentiated and mature.
- From this region root hair (*i.e. very fine structure that arise from the epidermal cell and absorb water and minerals from the soil)*.

Modification of root

For storage of food		For mechanical support	For vital functions	
Tap root	**Adventitious root**	**Adventitious root**	**True root (fibrous)**	**Adventitious root**
Fusiform	Tuberous	Prop roots	Nodulated root	Sucking root
Napiform	Fasciculated	Slit roots	Respiratory root	Epiphytic root
Conical	Nodulose	Climbing roots		Respiratory root

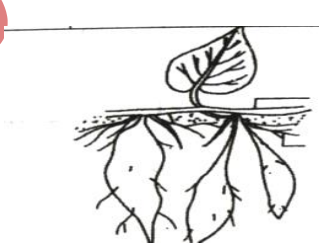
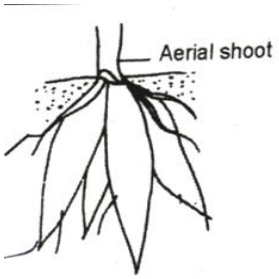
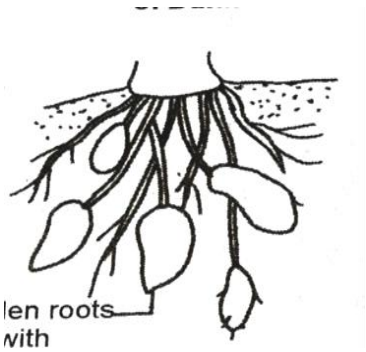
Tuberous	Beaded	Buttess roots		Assimilatory roots
				Mycorrhizal

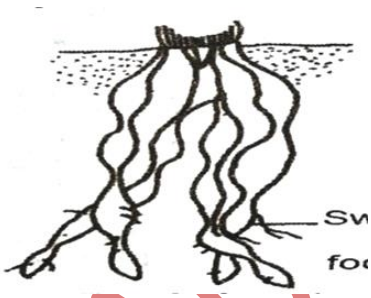
Modification of tap root for storage of food

Type	**Important feature**	**Example**
Fusiform	Swollen root *tapering at both the end*	*Radish* 
Napiform	Large globular root with *swollen at the upper end and taper sharply at lower end*.	*Turnip, Beetroot* 
Conical	*Broad at the base and gradually taper at the apex*	*Carrot* 
Tuberous	Thick and fleshy root *without any particular shape*	*Merabilis*

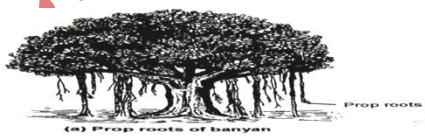
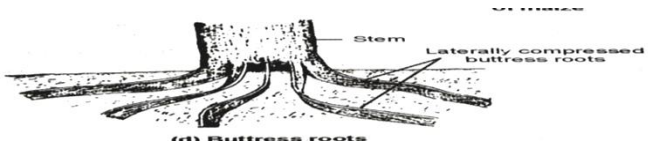
		

Modification of Adventitious root for storage of food

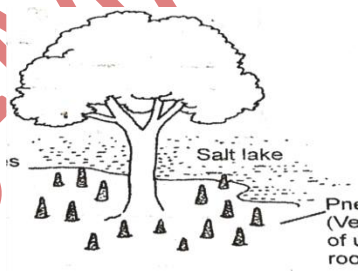
Type	Important feature	Example
Tuberous root	Swollen root without any shape, *produce singly never in cluster*	*Sweet potato* 
Fasciculate root	Several swollen root at the base of stem *in cluster*	*Dahlia, Asparagus* 
Nodulose root	Slender root become suddenly *swollen at the apex*	*Turmeric* 

Beaded	Root have swelling at regular interval which *give beaded appearance*	*Indian spinach* 

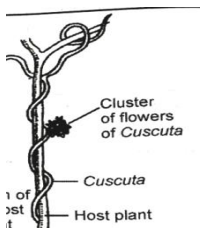
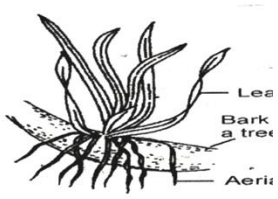
Modification of Adventitious roots for Mechanical support

Type	Important feature	Example
Prop roots	It *produce from the stem and aerial branch* that *grow vertically downwards and support the branches or the plant as a whole*	*Great banyan tree* 
Slit roots	It is small *cluster of aerial root* which *develop from their lower nodes of plant near the base*, grow obliquely and *support the plant as slits*.	*Maize, Sugarcane* 
Climbing roots	Plant with week stem *produce roots from the nodes and internodes* that *support the planting climbing to nearby objects*.	*Betel* 
Buttress roots	It *grow obliquely downwards from the base of main trunk* and *provide support to huge trunks of trees*.	*Silk-cotton tree* 

Modification of fibrous root for vital function

Type	Important feature	Example
Nodulated root (nitrogen fixation)	Due to *presence of symbiotic bacteria* (*i.e. Rhizobium that fixes the nitrogen for the plant*) root of leguminous plant *show nodule*.	*Pea, Gram, Peanut*
Respiratory roots	This root are *grow vertically upward from the underground root of the plants* that growing in marshy pace and salt lakes	*Rhizophora* 

Modification of adventitious root for vital function

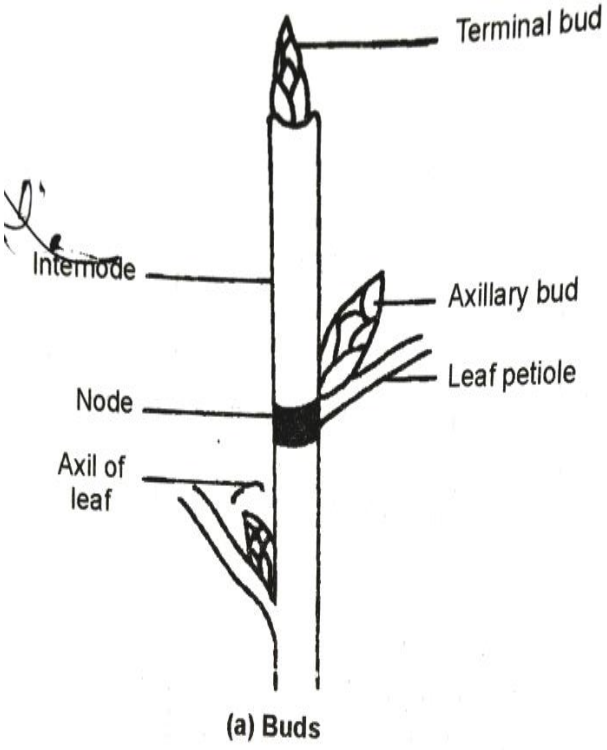
Type	Important feature	Example
Sucking roots	These r*oots are given out by parasitic plants* that penetrate into the tissue of the host plant and *absorb food*.	*Cuscuta* 
Epiphytic roots	It is aerial root that given out by plants that *grow in branches of tree*, they *do not draw nutrition but absorb moisture from the surrounding air*.	*Orchids* 

Respiratory root	In some aquatic plant a soft, light spongy and colorless roots *develop above the water surface of water and store air* which help *in respiration and act as floating organ*	*Jussiaea*

Stem

- It is ascending part of plant which directs prolongation of the plumule.
- It show ***negative geotropic movement*** (*i.e. grow away from the soil*) and ***positive phototropism*** (*i.e grow or bend towards the light*).
- It bear ***branches leave flower and fruits*** and differentiate into ***node*** (i.e. *branches and leaves arise from nodes*) and ***internodes*** (*i.e. space between two nodes*).
- It bears different kind of buds:

1. ***Terminal bud*** (*i.e. present at end of shoot and covered by tiny leaves*) – it help the plant to grow upwards.



(a) Buds

2. ***Axillary or lateral bud*** (*i.e. present at the axil of the leaf*) – help the plant to grow in different directions by given rise to new shoots sideways.
3. ***Floral bud*** (*i.e. could be terminal or axillary*) – grown into a flower.

Function of the stem

- Provide ***support a***nd bear *leaves buds flower and fruits*.
- To ***transport water and minerals nutrients*** from the roots to the rest of the plant and ***food manufactured by the leaves*** to the rest of the plant body.
- They serve as ***store house of the food material***.
- It also acts as ***organ of vegetative propagation*** and ***organ of perennation*** (*i.e. surviving year after year through unfavorable conditions)*.
- It also ***carries out photosynthesis*** as well.

Modification of stem

1. Underground stem:

- The aerial part are arise from underground stem which are modified to serve two basic functions:

I. ***As organ of perennation*** (*i.e. remain permanently underground in a dormant leafless condition during winter and under favorable condition that gives off aerial shoot in the next season*).

II. ***As storage organs*** (*i.e. always thick and fleshy and have heavy deposits of reserve food materials in them*).

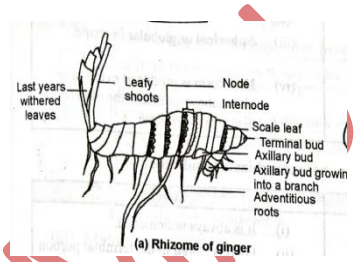
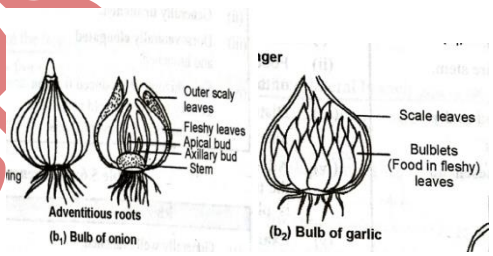
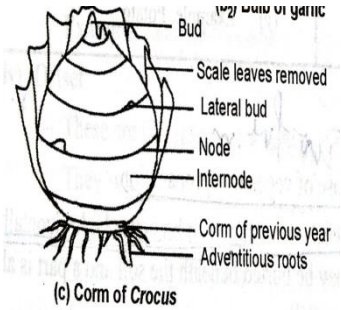
- Underground stem can be distinguished by the presence of following features:

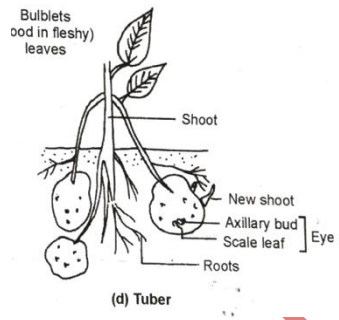
a. *Posses node and internodes.*

b. *Have scaly leaves.*

c. *Have axillary and terminal buds.*

Types of underground stem

Type	Characteristics	Example
Rhizome	- Thick and fleshy stem , grow horizontally near the soil surface - has dry scaly leaves at distinct nodes, - Bear bud in axial of each scaly leave and terminal bud.	Ginger, Banana, Iris, Water lily 
Bulb	- Ha short flattened disc like stem with number of scaly leaves. - Leaves are arranged in concentric layers and in some may be narrow and no overlapping. - Bulb has terminal bud with foliage leaves at the center that give off aerial shoot.	Onion, Garlic, Daffodils, Lilies 
Corn	- It is short vertical underground stem that contain food reserves. - Enclosed by several dry thin scaly leaves. - Have distinct nodes and internodes. - During the growing season lateral bud at the nodes of the corn develop into new corns that grow into new plants in the next season.	Gladiolus, Crocus, Colocasia, Alocasia, Amorphophallus 
Tuber	- Swollen terminal portion of an underground stem which stores large	Potato

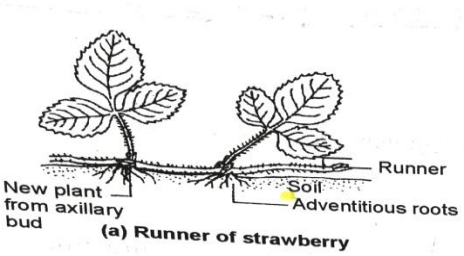
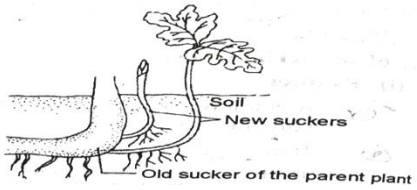
	amount of food material in the form of starch. - Underground stem arise from axillary bud.	

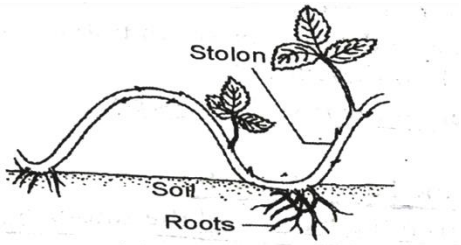
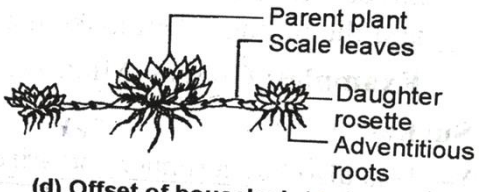
2. **<u>Subaerial stems</u>**

- It involve in vegetative propagation and found in plants with weak stem in which branches lie horizontally on ground.
- It I short slender aerial branches develop adventitious roots at the nodes and new plant are develop by detachment of branches.
- Commonly called creepers.

- According to their origin, nature and mode of propagation it have been grouped into following types:

1. *Runner*
2. *Sucker*
3. *Stolon*
4. *offset*

Type	**Characteristics**	**Example**
Runner	- It is long thin green stem with long internodes growing horizontally on the soil surface. - Arise from axillary bud - It gives out root at nodes.	Grasses, Mint, Wood sorrel, Strawberry 
Sucker	- It arises from lateral branch and differs from runner as it originates from the basal and the underground part of the stem.	Chrysanthemum 
Stolon	- It is lateral branch and arise from the base of the stem. - Bend downwards and swells and give out adventitious root where it touches the	Jasmine , Blackberry

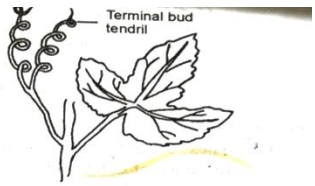
	ground. - Terminal bud develops into new shoot which grow into a new plant. - It giving out roots and a bud at each node.	 (c) Stolon of blackberry
Offset	- It is like runner butt differ in being thicker and shorter. - Originate from axial of a leaf and extend for a short distance and then produce a cluster of leaves above and adventitious root below . - Generally found in aquatic plant.	Water hyacinth  (d) Offset of houseleek (water plant)

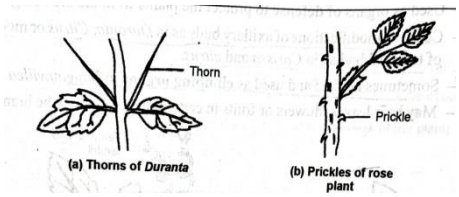
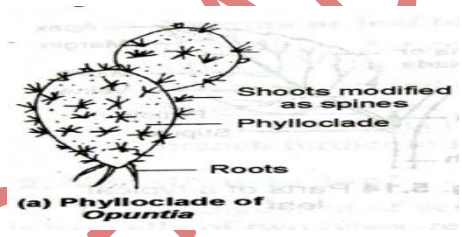
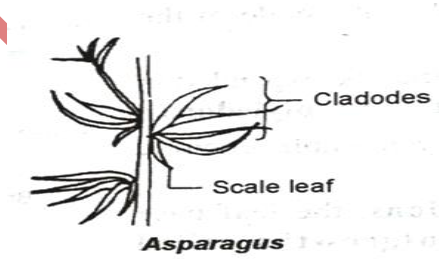
3. Aerial stem

- In this ***whole stem or part of stem*** (*i.e. like axillary or terminal buds*) develop into branches and flowers are ***modified to perform specific functions*** like *support, protection, photosynthesis, vegetative propagation etc*.
- This modification look very different from stem but following point help to determine their status as stem like:

1. *Origin is in the axial of a leaf*
2. *Bear node and internodes and leave bud and flower.*
3. *Show exogenous branching pattern like stem.*
4. *Have internal structure like stem.*

Types of aerial stems

Type	**Character tics**	**Example**
Stem tendril	- It is tiny wire thread like spirally coiled leafless structure that help to climb.	Passiflora, Vitis, Pumpkin, Antigonon  (b) Terminal bud tendril in grapevine
Throns	- It is straight pointed often hard and woody	Citrus, Carissa

	structures. - It is modification of axiallary buds or lateral buds. - Sometime hocked and used as climbing organs.	
Phylloclades	- It is flattened or cylindrical stem that carry out photosynthesis and store water for plant. - Found in xerophytes plant and show unlimited growth with several nodes and internodes. - Leaves modified into spines or scales to reduce evaporation.	Opuntia, Phyllocactus and Euphorbia 
Cladode	- It is short green cylindrical or flattened branch often resembling like a leaf. - Arise from the node of a stem in the axial to reduced scale leaf but have only one or two internodes. - Has limited growth and help in photosynthesis.	Asparagus, Ruscus 
Bulbil	- It is special modification that meant for reproduction of the plant. - Some plant the floral bud develops into bulbils. - It arises from the node of a stem in the axial of reduced scale leaf.	Agava, Lily

Home Work

1. ***Morphological difference between root and stem.***

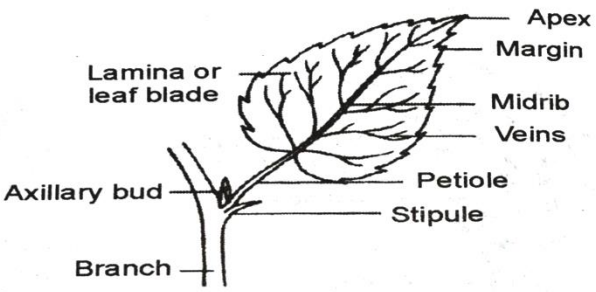
Leaf

- It is specialized organ of photosynthesis and generally flattened structure borne on the stem.
- It develop from ***nodes*** as a lateral outgrowth of the stem or branch.
- It bear ***axillary bud*** which *develop into branch*.
- First leaf originates from the *shoot apical meristem* as ***leaf primordial***.

Structure of leaf

- A typical leaf has three part-

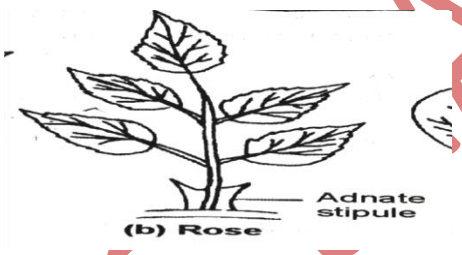
1. **Leaf base –**



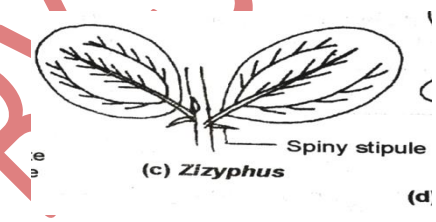
- The lowermost part of leaf by which it attached to the node of the stem.
- Expended form of leaf base in monocot called ***sheath*** that may partially or wholly encircle the stem while in dicotyledons leaf base bears ***stipules*** (*i.e. two laterals out growth*).
- ***Stipules*** may vary in forms and size:

a) Free lateral stipules – ***china rose***

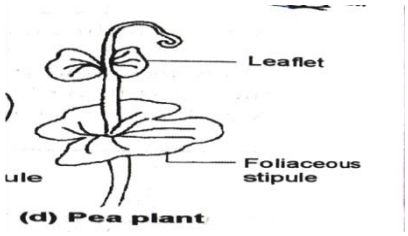
b) Adherent stipules – ***rose plant***



c) Spiny stipules – ***acacia or zizyphus***



d) Foliaceous stipules - ***pisum***



2. **Petiole** –

- It is stalk of the leaf by which it is attached to the stem and help leaf to get more sunlight.
- On the basis of presence or absence of petiole leaf is called –

1. Petiolet (*i.e. leaf has petiole*) example – ***dicot.***
2. Sessile (i.e. leaf is without petiole) example – ***monocot.***

- Petiole are modified in certain plant for specific functions and it could be –

a. Spongy petiole – *water hyacinth*

b. Phyllode – *Acacia*

c. Winged petiole – *orange*

d. Tendril petiole – *clematis*

3. **Lamina or leaf blade:**

- It is thin green flattened expanded green portion of the leaf that has numerous of thin ***veins*** and ***veinlets*** in which vein *provide support and conduct water, minerals and food through the leaf*.

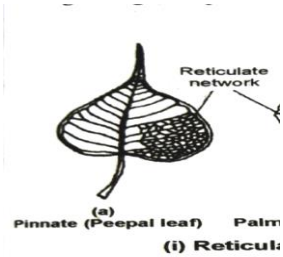
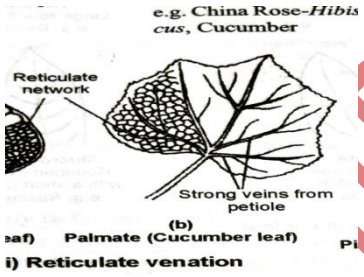
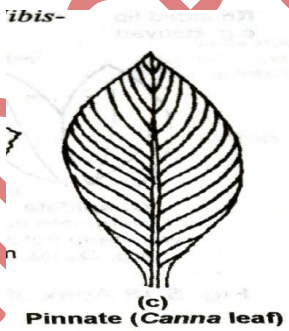
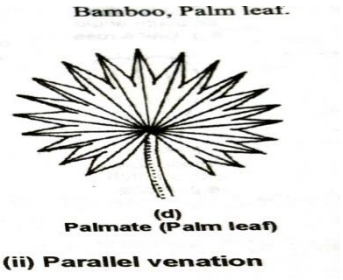
4. **Midrib**-

- It is most prominent vein ***present in the middle of the leaf blade*** *running from its base to the apex*.
- Midrib gives off numerous thin lateral veins which branch further to form the veinlets.

Venation in leaf

Arrangement of vein and vein lets in the lamina of a leaf is known as venation.

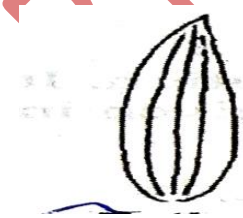
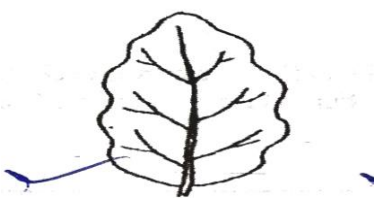
Reticulate	**Parallel**
• In this vein are irregularly distributed without any definite pattern and vein form a network in leaf. **Example :** *Dicot* (except *caophyllum* – show parallel venation)	• In this vein are arranged in parallel rows and do not form a network in the leaf. **Example:** *monocot* (*smilax and Yam* – show reticulate venation)

Pinnate	**Palmate**	**Pinnate**	**Palmate**
In this midrib with lateral veins (*i.e. run from the center towards the margin or apex of leaf*) present. **Example:** *Mango, Peepal*  	In this many equally strong veins like midrib arising *from the petiole towards the margin or apex*. **Example:** *china rose , cucumber*  	Strong midrib with lateral veins running parallel *towards the margin or apex.* **Example:** *Canna*  	Many strong veins form the petiole running parallel towards the margin pf the leaf blade. **Example:** *Bamboo, Palm leaf* 

Leaf morphology

- Leaf may vary in their margin, apex and shape of the lamina:

Margin of the lea

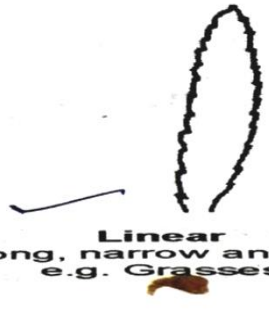
1. ***Entire*** – motha grasses 	2. ***Undulate*** – polyalthia 	3. ***Denate*** – melon 

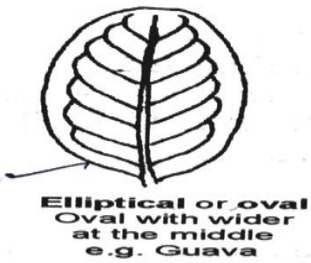
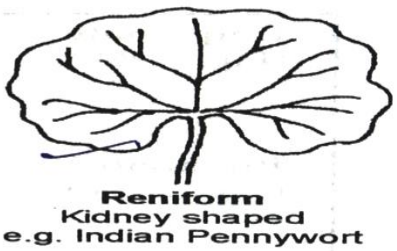
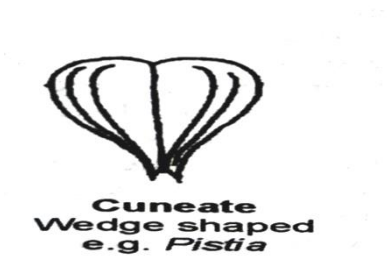
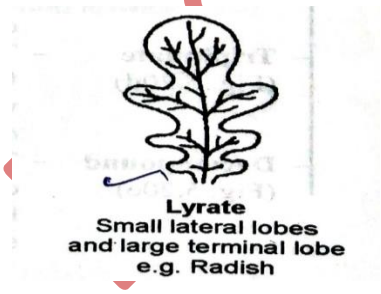
4. ***Serrate*** – rose 	5. ***Crenate*** -bryophyllum 	6. ***Spinous and lobed***- prikly poppy 

3. Apex of the leaf:

1. Acute – *china rose* 	**2. Obtuse** – *banyan* 	**3. Acuminate** – *peepal* 	**4. Trunate** – *banana* 
5. Retuse – *pistia* 	**6. Caspidate** – *oxalis* 	**7. Mucronate** – *ruscus* 	

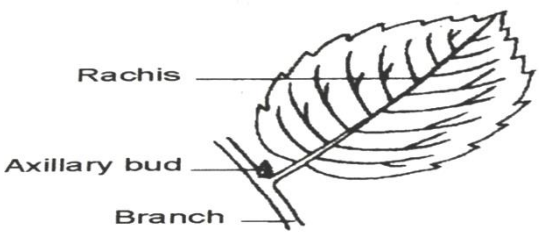
3. Shape of the lamina

1. Acicular – *pine* 	**2. Linear** – *grasses* 	3. Lanceolate – *bamboo* 

4. Ellipticaal or oval – *guava* 	**5. Ovate** – *china rose* 	**6. Oblong** – *banana* 
7. Orbicular - *nasturtium* 	**8. Cordate** – *betel* 	**9. Renifom** – *indian pennywort* 
10. Sagittate – ***sagittaria*** 	**11. Hastate** – ***Ipomoea*** 	***12. Cuneate*** – ***pistia*** 
13. Lyrate – ***radish*** 		

Type of leaf

1. **Simple leaf:**
   - When the leaf is undivided although it may be deeply indented.
   - Leaf should have simple lamina and indention or incisions should not touch the midrib.



(a) Simple leaf

2. **Compound leaf:**

- In this leaf blade is divided into several part or segments called leaflets.
- The indentation or incisions go up to the mid hence the leaflets are not connected by lamina and free from one another.

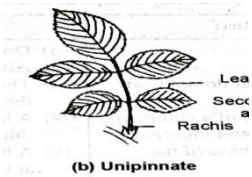
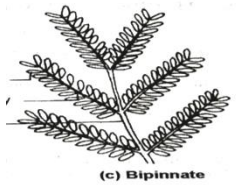
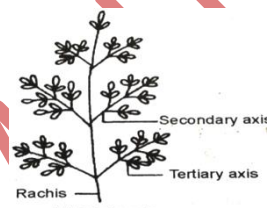
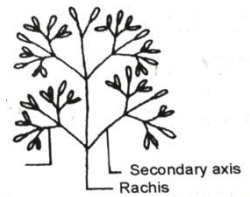
Types of compound leaf

- Compound leaf are two types:

1. **Pinnate compound leaf:**

In this leaflets are attached to the midrib or rachis and arranged laterally (alternate or opposite) to midrib.

Types of pinnate compound leaf:

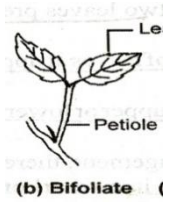
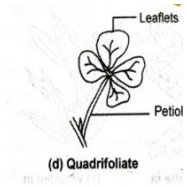
Type	Example
Unipinnate – all leaflets touch the midrib of the leaf	*Cassia, Rose*  (b) Unipinnate
Bipinnate – leaflets are further divided and midrib gives out number of secondary axes at which leaflets are attached.	*Acacia*  (c) Bipinnate
Tripinnate – secondary axes divide further into tertiary axes at which the leaflets are attached.	*Drumstick*  (d) Tripinnate
Decompound – tertiary axes further divide and they bear the leaflets	*Coriander*  (e) Decompound

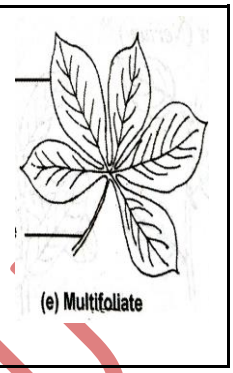
2. **Palmate compound leaf:**

- In this the leaflets radiate from the end of the petiole and joint at the common point which look like finger of palm.

Types of palmate compound leaf:

Type	Example
Unifoliate – have single leaflets joint to petiole.	*Citrus*  (a) Unifoliate
Bifoiate – have two leaflets	*Hardwickia*

joints to petiole	
Trifoliate – have 3 leaflets joint to the petiole	*Methi, Clover* 
Quadrifoliate – have 4 leaflets joined to a petiole	*Marsilea* 
Multifoliate – have 5 or more leaflets that joint to a petiole.	*Silk cotton*



Phyllotaxy

- It is arrangement of leave on a stem or a branch which help to get appropriate amount of sunlight for photosynthesis and avoid overcrowding of leaves at one place.

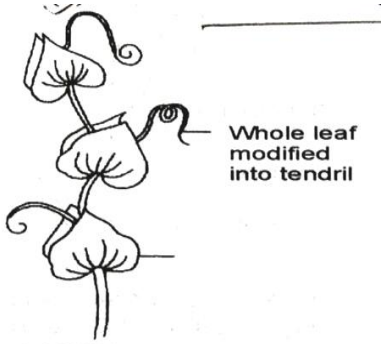
Alternate	Opposite	Whorled
- It have ***only single leave at node*** and leave may *arranged in the same plane or spirally around the main stem or branch*. - **Example:** *china rose , mango* 	- It has ***two leaves present at same node*** opposite to each other. - It could be a. Decussate – in this the arrangement of *leaves at upper or lover nodes is at right angles*. **Example:** *Ocimum, Calotropis* b. Superposed – it has leave pair at *upper or lower node are exactly in the same plane*. **Example:** *Guava* 	In this arrangement ***more than two or three leaves are present at each node*** and *present in a whorl or a circle*. **Example:** *Oleander (Nerium)* 

a. **Leaf tendrils:** it is thin wiry slender and coiled structure that helps the plant in climbing to nearby objects.

Modification of leaves

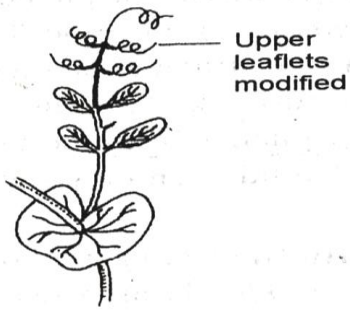
- Leaves are modified to perform the specific functions like:

1. **Whole leaf modified** – *Lathyrus aphaca*



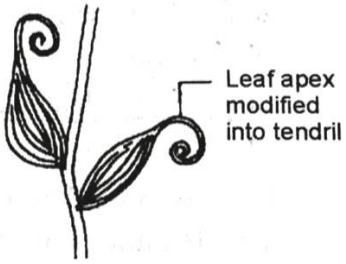
(a) Wild pea

2. **Upper leaflets modified** – *Pisum*



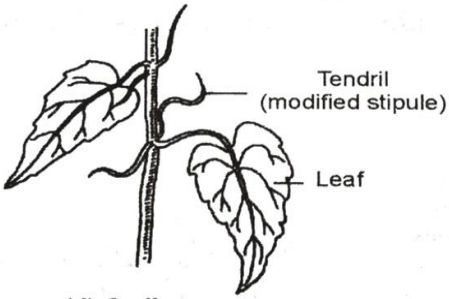
(b) Pea (*Pisum*)

3. **Leaf apex modified** - *Nasturtium*



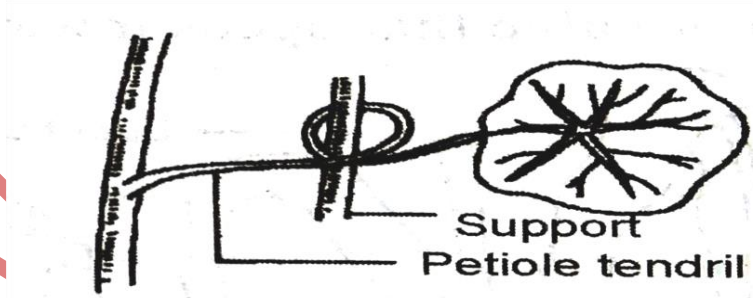
(c) Glory lily (*Gloriosa*)

4. **Stipule moddified** - *Smilax*

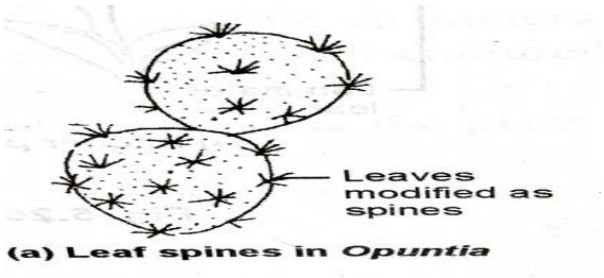


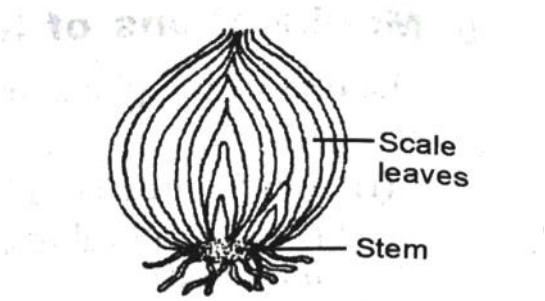
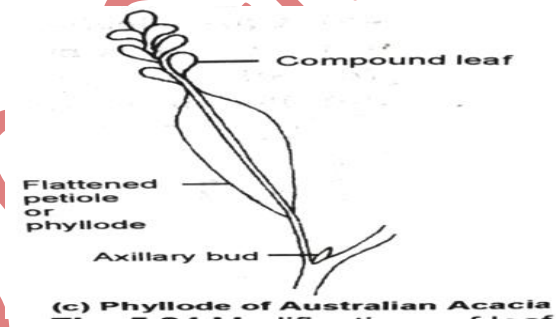
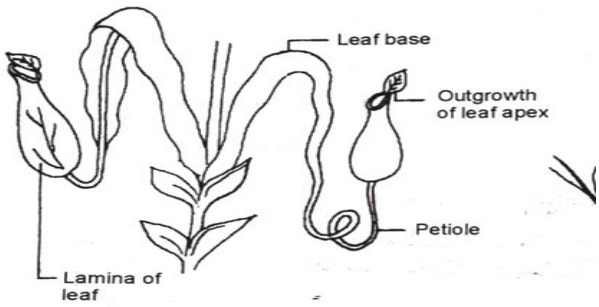
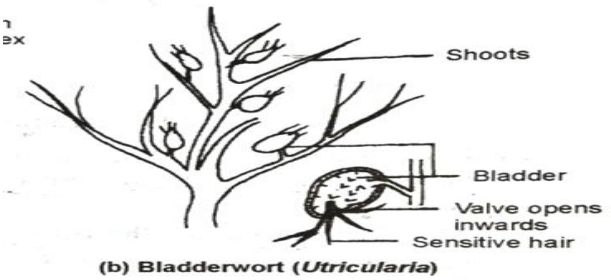
(d) *Smilax*

5. **Petiole modified** - *Nasturtium*



(e) *Nasturtium*

Type	Characteristics	Example
Leaf spines	- Leave may be wholly or partially modified into sharp and pointed structures. - It help to reduce the transpiration and protect plant from browsing animal.	Cactus , Opuntia  (a) Leaf spines in *Opuntia*

Scale leaves	- It may dry, brown and membranous and help to reduce transpiration - Thick or fleshy and help to store the food materials	Asparagus Onion  **(b) Fresh scale leaves in onion**
Phyllode	- Petiole of compound leave become green flanttened and leaf like that help in photosynthesis while compound laminas frequently disappear.	*Australian acacia*  **(c) Phyllode of Australian Acacia**
Pitcher shaped leaves	- - It *has flattened leaf like structure* of **leaf base,** *long coiled tendril* like **petiole** and *actual pitcher is modified* **lamina** or a leaf blade	*Pitcher plant* 
Leaves modified as bladder	- In bladderwort plant at of its segment leaves are some leave are modified into *tiny bladders* in which each bladder has tiny valve that opens inwards only.	*Utricularia*  **(b) Bladderwort (*Utricularia*)**

Function of leaf

1. **Photosynthesis** – due to presence of ***chlorophyll pigment*** they manufacture food in presence of sunlight
2. Exchange of gases – due to ***presence of stomata*** (i.e. minute opening) it help in *exchange of gases* which is very important in photosynthesis and respiration.
3. Transpiration – excess of water in plants evaporate through ***stomata*** that not only help to *cool the leaf surface* but also help in *ascent of sap*.

Importance of studying the leaf morphology

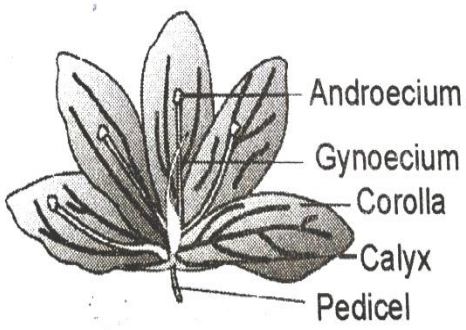
1. ***Help in accurate identification and classification.***
2. ***For crop productivity***
3. ***For identifying the physiological maturity***
4. ***For understanding the adaptive significance.***
5. ***For horticulture***

Flower

- It is ***reproductive organs*** in flowering plant.
- It is regarded as ***organs of sexual reproduction*** which produce ***gamete by meiosis***.
- Sexual reproduction in flowering plant is done by the ***fusion of nuclei*** rather that cells and these nuclei are termed as ***gametes***.

Structure of a flower

- A flower is modified for sexual reproduction which has condensed internodes and floral leave that arrange in ***whorls***.
- A typical flower has ***four whorls*** that arranged successively around the receptacle or thalamus.



(a) Parts of a typical flower

1. **Pedicle:** it is stalk of the flower which may be short, long or even absent.
2. **Receptacle:** it is swollen or expended portion of stalk that bears the floral leaves.
3. **Calyx:** it is *first whorl* which is a collection of **sepals.**

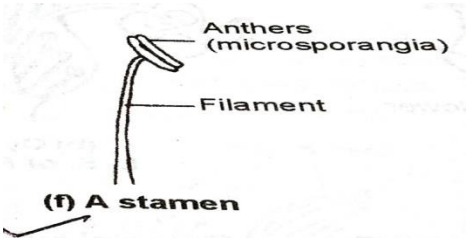
- It is generally green and leaf like that protect the flower bud before it opens.

4. **Corolla:**

- It *is second whorl* which is a collection of ***petals***.
- Petals are generally *large, bright colored and have fragrance* that helps to attract the insect for ***pollination***.

5. **Androcium:**

- It is third whole or the male whorl which consist of collection of ***stamens***.
- Each androcium is modified leaf or microsporophyll.



- A stamen consist of two parts like ***filament*** (i.e. long slender stalk that carries food and water to

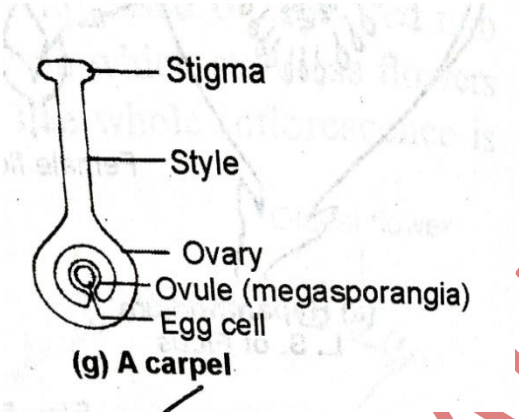
anther) and ***anther*** (bilobed structure present at the tip of the filament which near 4 pollen sac that filled with pollen grain).

6. **Gynocium or pistil:**

- It is fourth and innermost whorl containing female part which consists of a collection of ***carpels***.
- Each carpel has three parts like:

a. **Ovary:** swollen basal part of the carpel that contain ovule (i.e. enclosed an embryo sac).

b. **Style:** long slander shaped which connect stigma to ovary.



c. **Stigma:** flattened feathery structure which attach to style and help to land the pollen grain or receive the pollen grain.

Type of flower

- According to presence of number of whorls flower are:

1. **Complete flower:** it is a flower that ***contains all four whorls***.
2. **Incomplete flower:** in this ***any one of four whorls is absent***.

- As per the presence of reproductive part at same flower or different flower the flower are:

1. **Bisexual or hermaphrodite flower** (*i.e. has both stamens and carpels*).
2. **Unisexual flower** [i.e. it could have either **stamens** (*staminate flower or male flower*)or **carpels** (*pistillated flower or female flower*)].
3. **Neutral flower** (*i.e. flower in which both stamens and carpels are absent*).

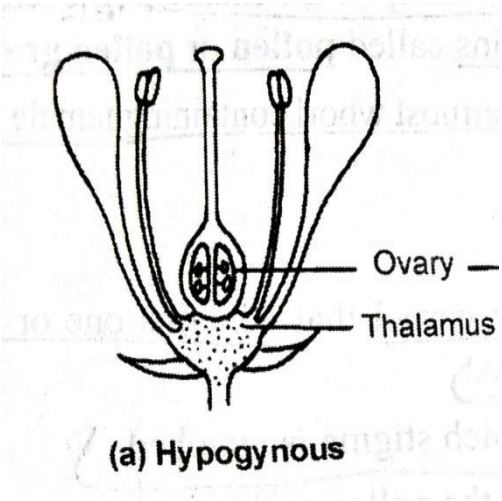
- Plant are also categorized into ***monoecious plant*** (*i.e. plant **bear both male and female flower** at same plant, **example:** maize, bean and cucurbit*) or ***dieocious plant*** (*i.e. plant that bear either male or female plant , **example:** papaya, mulberry and datepalm*).

Kind of flower

- According to position of floral leaves on thalamus with respect to ovary flower could be following type:

1. **Hypogynous flower:**

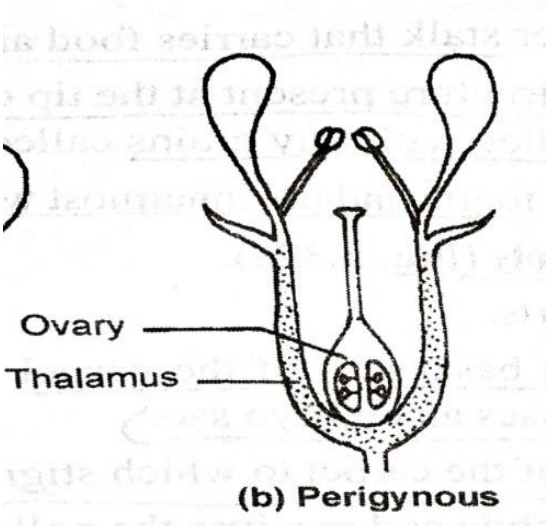
- In this ***ovary occupies the higest position*** on thalamus and other part are present below the ovary.
- In this ovary is called ***superior***.



Example: *mustard, tomato*

2. **Perigynous flower:**

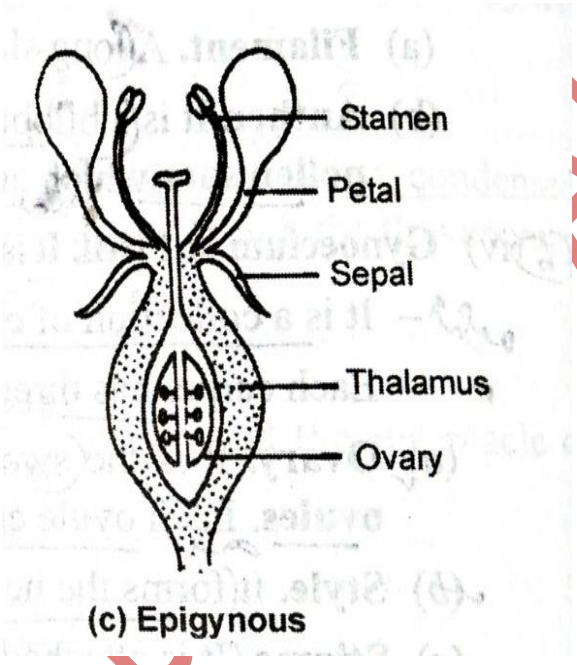
- In this thalamus forms cup shape structure and bear sepals petals and stamens, and ***overy is half inferior***.



Example: *rose, plum*

3. **Epigynous flower:**

- In this the cup shaped thalamus fused with ovary and ***all other parts are present above the ovary***.
- In this ovary is called ***inferior***.

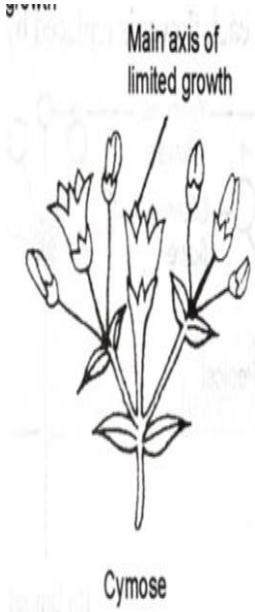


Example: *cucumber, apple*

1. **Placenta:** it is points of attachment of ovary.
2. **Monocarpellary:** it is condition when gynoecium consists of single carple.
3. **Bicarpellary:** here gynoecium consists of two carpels.
4. **Polycarpellary:** gynoecium consists of three or more carpels.
5. **Apocarpous:** it is polycarpellary condition when carpeels are free.
6. **Syncarpous :** it is polycarpellary condition when carpels are wholly or partially united.

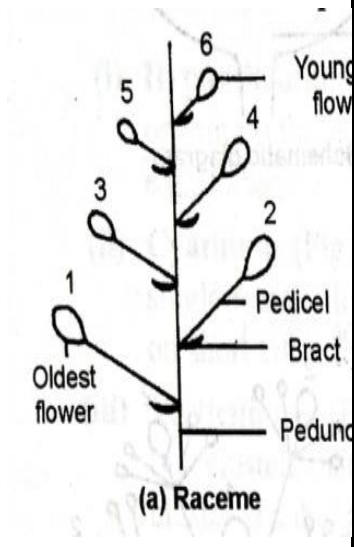
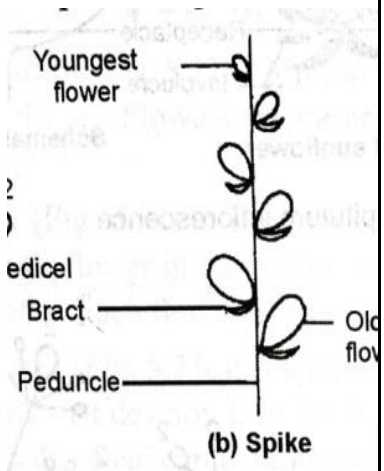
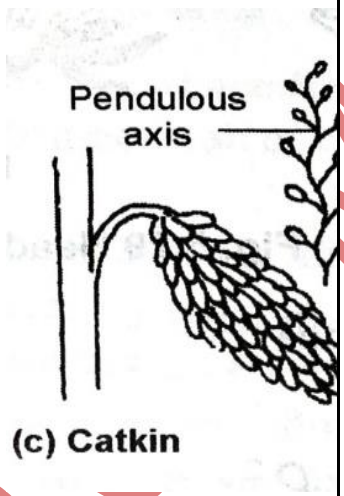
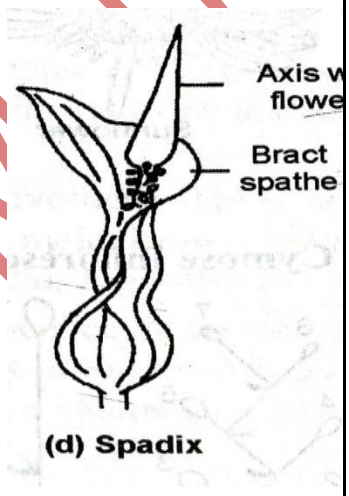
Inflorescence

- It is a *cluster of flower present on the same stalk*.
- Depending upon the position on the stem it could be ***terminal or axillary***.
- In the basis of kind of branching and arrangement of lower the inflorescence are basically three type:

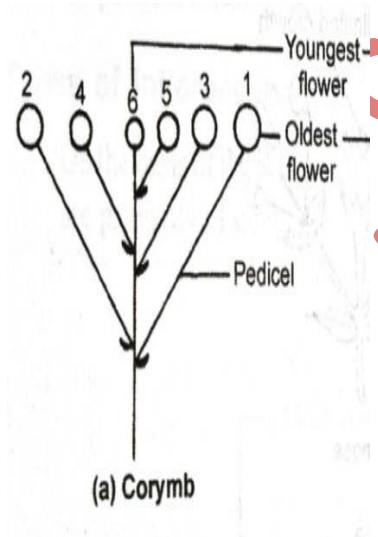
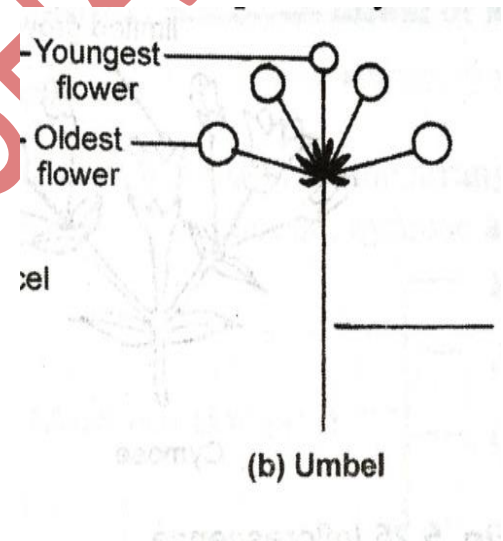
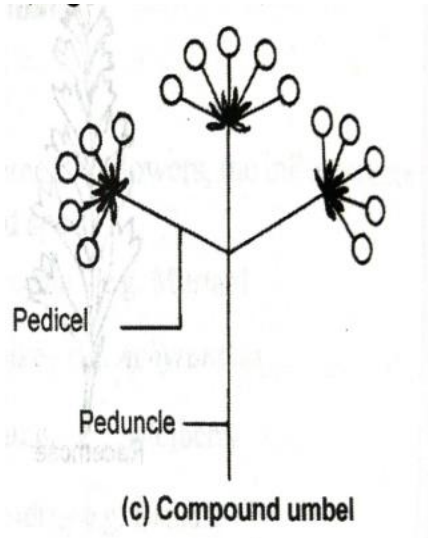
Type of inflorescence		
Racemose Inflorescence 	Cymose Inflorescence 	Special Inflorescence

Racemose inflorescence

A. Main axis elongated

1. Racem	2. Spike –	3. Catkin –	4. Spadix –
 (a) Racem	 (b) Spike	 (c) Catkin	 (d) Spadix
Mustard	*Achyranthes*	*Mulberry*	*Banana*

B. Main axis shortened:

1. Corymb -	2. Umbel –	3. Compound umbel -
 (a) Corymb		
candytuft	*Indian pennywort*	*coriander*

C. **Main axis flattened**

Head or capitulum - ***Sunflower***

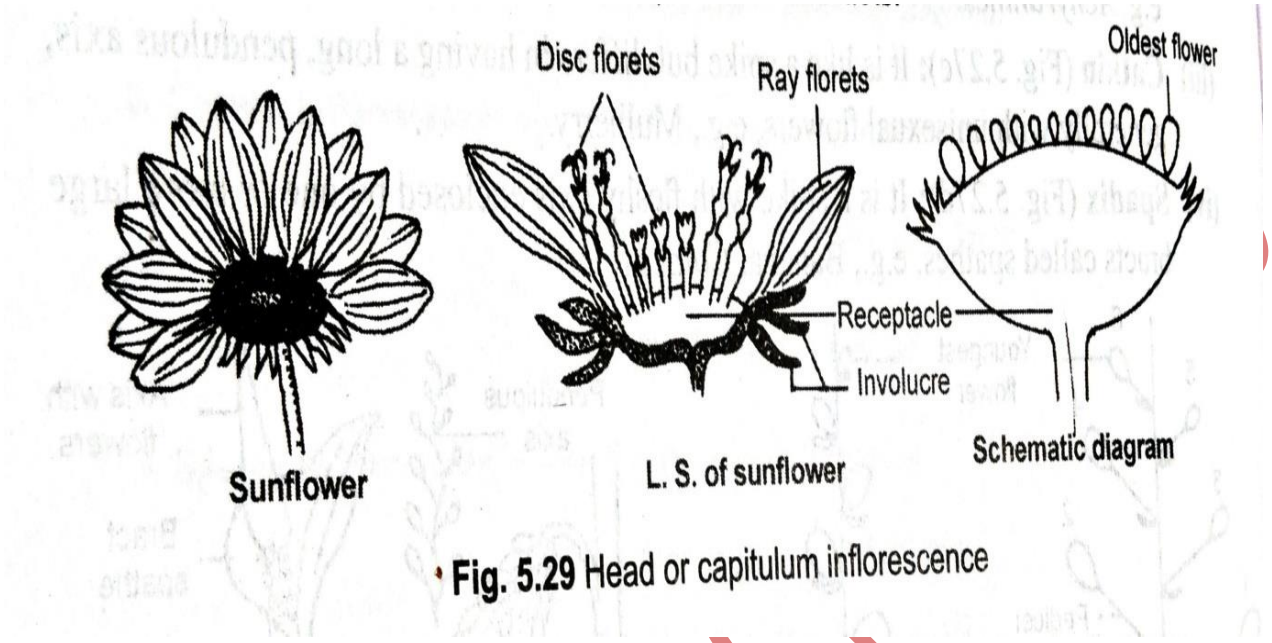
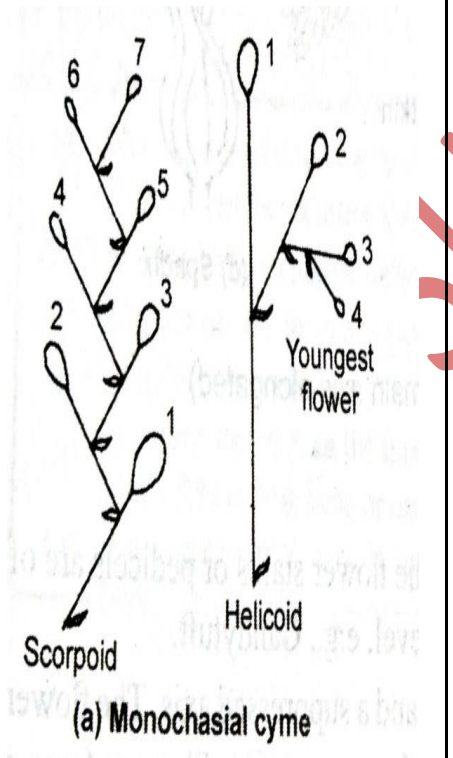
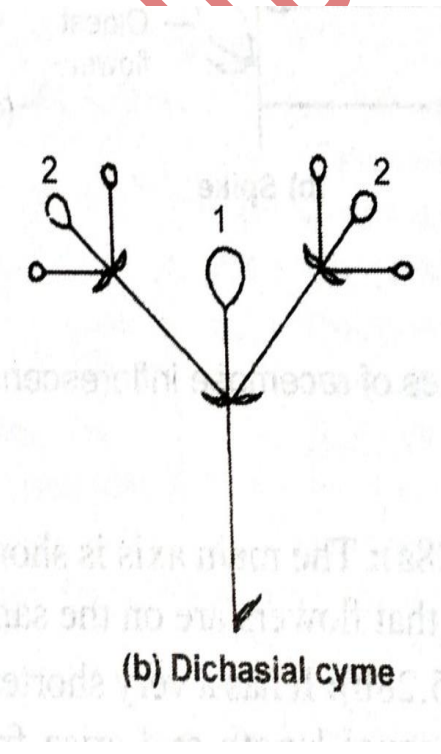
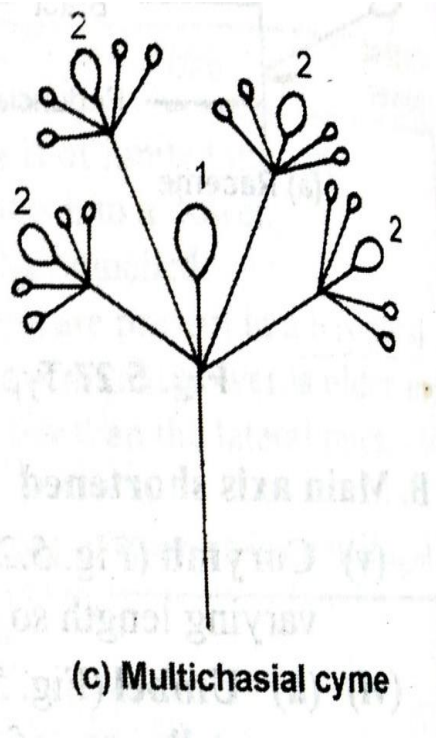
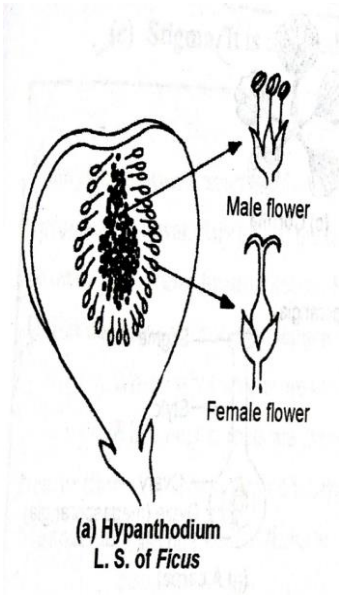
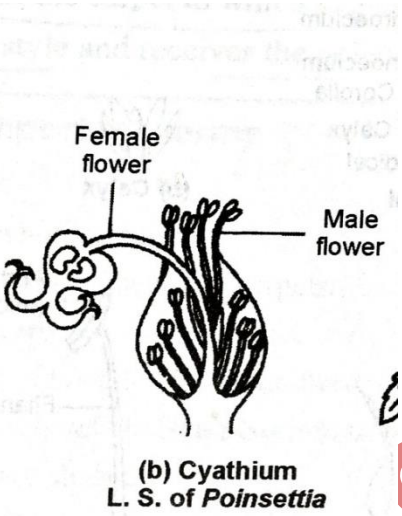
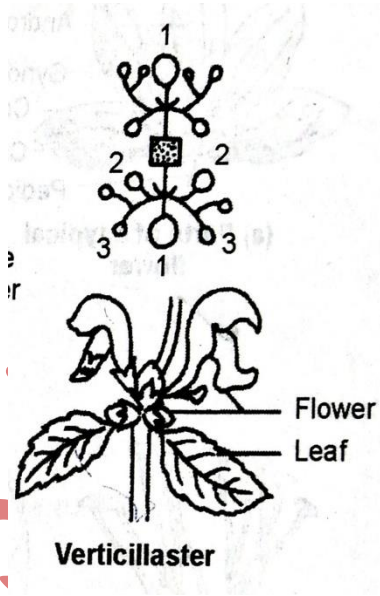


Fig. 5.29 Head or capitulum inflorescence

Cymose Inflorescence

1. Monochasial cyme	2. Dichasial cyme	3. Multichasial cyme
		
(a) Monochasial cyme Scorpoid Helicoid Youngest flower ***Begonia***	(b) Dichasial cyme ***Jasmine***	(c) Multichasial cyme ***Calotropis***

Special inflorescences

1. **Hypanthodium**	2. **Cyathium**	3. **Verticillaster**
		
Ficus	***Euphorbia***	***Coleus***