Chapter- 1

# LEAF

**STUDY NOTES**

There are different types of plants in our surroundings. They are of different sizes varying from microscopic forms to complex tall trees.

They are different in shape, size and colour of flowers. Some common features seen in all plants are root, stem and leaf.

We know that a plant mainly consist of two systems –

1.Root system–It is the underground part of the plant which develops from the radicle body. Radicle is the embryonic root contained in the seed of the plant. Roots grow towards the ground and absorb water and minerals from the soil.

2.Shoot System–It consists of a stem, the part which is above the ground. It bears braches, leaves, flowers, buds, and fruits.

LEAF –It is thin, flat and green part of the shoot system. It is also known as food factory of a plant. It arises from nodes of stem and grows up to a certain size.

External Structure of a leaf–The leaf constitutes of following parts –

1.Lea Lamina –The green, flat and expanded part of the leaf is known as leaf lamina or leaf blade. Thetip of lamina is called apex.

2.Leaf Stalk (Petiole) –The basal by which the leaf is attached to the node of stem is called petiole.

3.Midrib –The petiole enters the lamina forming the midrib. The midrib branches out to form veins which bear branches to form veinlets. Vein provides supportive framework to the leaves.

Functions of leaf –

1. The primary function is to perform photosynthesis which means to prepare food with the help of carbon dioxide and water in the presence of sunlight and chlorophyll.
2. It also helps in transpiration i.e. loss of water through stomata.
3. It also stores food like in spinach.
4. Leaves give rise to new plants like in Bryophyllum.

5. Leaves get modified into spines in desert plants which help the plant to reduce water loss by transpiration.

Kinds of leaves–There is a variety of leaves around us. They can be rectangular, circular, needle-shaped, tapered in shape. They may differ in terms of leaf margin which may be complete (Peepal), toothed (rose), wavy (mango), spinous (pricklypoppy).

These leaves can be classified into two categories.

1. Simple leaf–In this type of leaf lamina of leaf has a single blade without cuts or incisions. If present, do not reach the midrib. Example –mango, radish etc.
2. Compound leaf–In this type of leaf lamina has divided into a number of leaflets. In this, the margin has incisions which reach down to the midrib leading to formation of small leaflets. Therefore, the leaf appears as a group of leaflets. Example –rose and neem.

To differentiate between leaf and leaflet, we must locate the axillary bud. It is always present at the base of the leaf petiole but not at the base of leaflet.

Types of venation–The fine lines running through within the lamina forming different patterns are called veins. Veins distribute water and minerals to various parts of leaf blade. The arrangement of veins and their veinlets within a leaf bade is called venation.

There are two types of venation.

1. Parallel venation–In this type of venation, the veins run parallel to each other and join the midrib. This type of venation can be seen in the leaves of monocotyledonous plants like maize, rice and sugarcane etc.
2. Reticulate venation–In reticulate venation, the veins divide and redivide into a number of veinlets. This pattern can be observed in the leaves of dicotyledonous plants such as mango and peepal

Arrangement of leaves–The arrangement of leaves on branches or stem is called phyllotaxy. This prevents the leaves from overlapping so that every leaf may get sufficient sunlight.

There are three types of leaf arrangements.

1. Alternate –In this arrangement, only one leaf is arises from at a node. The next arising on the following node is opposite to the previous. Example –mustard and sunflower.

2. Opposite–In this arrangement, two leaves are arranged one node but these are opposite to each other. Example –jasmine and guava. But in some plants, leaves show opposite arrangement with each pair of leaves arising at right angle to each other. Example – calotropis.
3. Whorled–Inthis arrangement, three or more leaves arise from a node and form a whorl around it. Example –oleander.

Modification in leaves–It means a structural change is required to perform specific functions.

Some of the modifications are –

1. Leaf tendrils-The modification of leaves in thin thread-like coiled strand is called leaf tendrils. They are sensitive to touch. They coil around a support in order to give support to weaker stems. Thus, help in climbing.
2. Leaf spines–The modification of leaved of desert plant into pointed spines, it is called leaf spines. They help to reduce water loss. They also perform defensive role as they keep away grazing animals. 3.Scale leaves–In this leaves get modified into scale leaves. They help to protect buds. They also store food and water. They may be dry (garlic) or fleshy (onion).

Modification of leaves in insectivorous plants –Insectivorous plants are also known as carnivorous plants as they feed on insects. As most of these plants are green, they can prepare their food by photosynthesis. Poor environmental soil supplements their diet by carnivorous habits. These plants are adapted to trap, capture and digest insects.

These traps are mostly the modification of leaves.

1. Pitcher plant–The leaf is modified in pitcher shape to trap and capture insects. The front part of petiole is coiled like a tendril that holds the pitcher in erect position. The leaf tip forms the lid. Its leaf is filled with a liquid to collect and digest insects.
2. Bladderwort–In this plant, the leaves are highly segmented and modified into sacs called bladders. The bladder has a trap door in which the minute organisms can only go but cannot come out. It can be observed in aquatic plants.

3. Venus flytrap–In this plant, the edge of leaf has longpointed stiff hair. The leaf blade is divided into two parts and the midrib acts as hinge of the door. When any insects touch the leaf, the edge of leaf interlocks and prevents the escape of insect.

Vegetative Propagation–It is an asexual method of reproduction in plants. In this method, new plants are produced from the parts of a plant like roots, stems, and leaves.

This process is known as vegetative propagation. It usually involves the growth and development of one or more buds on the vegetative parts of an old plant. After providing suitable conditions to the bud, it grows to form a new plant. Example –rose and champa.Vegetative propagation in leaves -In this method, plant grows from leaves. Leaves of some plants develop buds on them. Such leaves having buds are used for vegetative reproduction. Example –Bryophyllum.

Artificial Vegetative Propagation –The methods of vegetative propagation which are developed by man are called artificial vegetative propagation.

Some of the methods are –

1. Cutting–In this method, the stems of the plants are cut into small pieces. Each stem is kept in moist soil. After some time, roots develop at the base and new plant develops. Example –rose and sugarcane
2. Grafting–This method is used to obtain a plant by combining two different plants. Thus, it produces a variety with the features of two different plants. In this method, a stem cutting called scion (without roots) from one plant is attached to the other stem cutting part of stock (with roots). After fewdays, both fuses and new cells develop having characteristics of both plants. Example –mango and lemon.
3. Layering–In this method, a branch of a plant is pulled and its part is covered with moist soil leaving the top part outside in the air. After some time, new roots develop from buried part and it grows to become a new plant. Example –layering is done in jasmine.
4. Tissue culture–It involves growing of plants in test tubes. A small piece of plant is grown in suitable conditions in the test tube. An organized mass of cell is called callus develops from it. It is put in hormone containing medium which include cell differentiation and

formation of plantlets. These plantlets grow into an independent plant when transferred to the soil. Example –orchid

**Advantages of Vegetative propagation –**

1. It is faster method to grow new plants.
2. There is no difference between produced plant and parent plant.
3. It is very useful for production of seedless plants.
4. The plants produced by this method bear flowers and fruits earlier than the plants produced by seeds

**Disadvantages of Vegetative propagation –**

1. All the plants produced by this method have same features. Thus, they are likely to be infected by the same infections.
2. It can results in destruction of entire crop. As there is no dispersal of plants, there are chances of overcrowding

◆◆◆