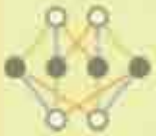
Chapter 9

Types and Parts of Plants

Points to study

9.1 Types of plants (on the basis of size)
- Herb
- Shrub
- Tree

9.2 Classification of plants (on the basis of life span)
9.3 Types of plants on the basis of ascent
9.4 Plant habitats
9.5 Functions of various parts of plants



You might have visited a garden near your house or school. Which type of plants have you seen there? Were all the plants very big? Were all the plants very small? Were there some plants equal to your height?

9.1 Types of plants (on the basis of size)

Various types of plants are grown in a garden, out of which some are very small, some are medium sized and some are big trees.

So let us examine the plants present in the garden and try to complete the following table with the help of your teacher-

Table 9.1 Different types of plants present in the garden

S.No.	Types of plants	Name of the plant
1.	Very small plants like grass	
2.	Medium sized plants	
3.	Bush sized plants	
4.	Thorny plants	
5.	Flowering plants	
6.	Fruit bearing plants	
7.	Aquatic plantss	
8.	Plants with long leaves	

9.	Vegetable bearing plants	
10.	Shady plants	
11.	Plants that climb up by twinning around support	
12.	Wall climbing plants	
13.	Small plants grown on the walls	

Do you know which is the smallest flowering plant in the world and which is the world's largest tree?

The smallest flowering plant is **Wolffia**. The largest tree in thickness is **General Sherman** and its scientific name is **Sequoia dendron giganteum**. The tallest tree is **Eucalyptus** which is also known as 'safeda' in hindi.

You have learnt that there are different types of plants in the world, some are very small, some are very large, some bear white flowers while some bear red, yellow or other coloured flowers, some are thorny while some are without thorns. The plant kingdom is full of such diversity.

Figure 9.1 Sequoia dendron giganteum

Let us study plant classification into different groups on the basis of size and what are they called in scientific language?

On the basis of size, plants are mainly divided into three groups-

1. Herb 2. Shrub 3. Tree

1. Herb : Herbs are plants of short height. Basil (tulsi) plant found in our houses and turmeric, used as medicine for many diseases are herbs. These plants have very short height (less than 1 meter). Their stems are also green in colour. These short sized plants are extremely soft and can be easily bent. For example- wheat, rice, basil, turmeric, chilli, tomato etc.

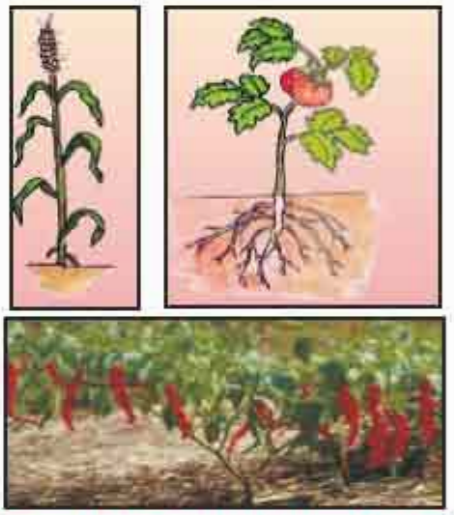


Figure 9.2 Herbs- wheat, tomato, chilli

2. Shrub : Shrubs are small and medium sized woody plants and their height is nearly less than 6 meter. Their stem is usually brown in colour. Their main stem branches out near the base. Their stem is often hard. For example- henna, rose, plum etc.


Figure 9.3 Shrub (a) Rose (b) Capparis decidua (kair)

3. Tree : Some plants are very tall and have hard stem with bark. The stems have branches in the upper part, much above the ground, like- mango, Azadiracta indica (neem), banyan and sacred fig (peepal) etc.


Figure 9.4 Tree (a) Banyan (b) Neem

Let's Know

Sometimes, in farms or garden, unwanted plants grow alongwith the main plant or crop, which are harmful for the growth of the main plant. They harm the main plant by competing for nutrition, respiration, sunlight etc. Such unwanted plants are called **weeds.**

Do all plants have the same life span? Are some plants short lived while others are long lived? Let us try to understand this.

Visit a farm near your house or school, and discuss the following points with the farmer working there :

1. At present, which crop is grown in the farm?
2. When is this crop sown?
3. When are fruits or other edible products obtained from this crop?
4. What is the time duration between sowing and harvesting the crop?
5. Which crops ripe in one year?
6. Which plants have life span of two years?
7. Which plants or tress have a life span of many years?

9.2 Classification of Plants (on the basis of life span)

From the above activity, you know that different plants have different life span. The life span of plants can be from few months to one year, some plants have life span of two years and some plants live for many years.

So, on the basis of the life span, plants are broadly divided into three groups -

1. Annual plants: Plants that have life span of one year or one season are called annual plants. For example- maize, sorghum, millet, mustard etc.

2. Biennial plants: Plants which generally have a life span of two years are called biannual plants. For example- onion, cabbage, carrot etc.

3. Perennial plants: They are the plants which live for more than one year and they produce wood. These plants usually flower in summer or spring season. Perennial plants are usually large and shady trees. For example- neem, pine, banyan etc.

9.3 Types of plants on the basis of ascent

Have you ever seen a plant with soft stem near your house or in a garden? Are the stems of such plants, strong enough to stand upright on their own? Do these plants need any support?

In nature, there are some plants with weak stem, so they need a support to stand or grow vertically. These plants ascend with the help of a support.

On the basis of ascent, plants are of two types -

1. Climber - Climbers are those plants that need a support to climb up. Some plants have thread- like structures which are called tendrils. Tendrils are the modified form of petiole, leaf or stem. Pea, cucumber, bitter gourd, ridge gourd etc. are climbers.

Figure 9.5 : Climber - money plant

2. Creepers- These plants have very weak stem. They cannot stand upright. They spread on the ground and grow horizontally and acquire large space. Unlike climbers, they do not have tendrils. For example - water melon, pumpkin, musk melon etc.

Figure 9.6 Creeper - water melon

Climbers	Bitter gourd	Money plant	Cucumber
Creepers	Musk melon	Water melon	Pumpkin

9.4 Plant habitats

You have read different types of plants on the basis of their size, life span and their ascent. Do you have any curiosity to know about their habitat? Various types of animals are found in the world, some of them live on land, some in water, some in depths of the oceans, some at the top of mountains, some are also found on snow capped mountains while some live in hot deserts. Just like animals, plants are also distributed in different regions.

On the basis of the habitat, plants are of following two types :

- **Aquatic plants :** Those plants which are found in water bodies like rivers, ponds, lakes, sea etc. are called **aquatic plants**. For example- lotus, vallisneria, water chestnut, hydrilla, water hyacinth (jalkumbhi) etc. These plants are called **hydrophytes**. Roots of aquatic plants are less developed. Air chambers in the stem provide buoyancy and help the plants in floating. The leaves of these plants are ribbon-like and finely dissected. On the basis of position in water, aquatic plants are divided into three groups :
  1. Floating plants like - water hyacinth (jalkumbhi)
  2. Submerged plants like hydrilla
  3. Amphibious plants like vallisneria
- **Terrestrial plants:** Plants found on land are known as terrestrial plants. Terrestrial plants can be classified into the following groups on the basis of their varied habitats.
  1. Mesophytes like- neem and bamboo.

2. Plants of cold habitat like- soldanella, lichen etc.
3. Dry habitat (xerophytes) like- Prosopis cineraria (khejdi), Euphorbia royleana (thor), Opuntia etc.

Let us find out -

With the help of your teacher, make a list of plants grown in garden or pots which are flowering or non-flowering and are grown for decorative purposes in lawns.

Table 9.2 : Various types of flowering and non- flowering plants present in garden

S. No.	Name of flowering plants	Name of non-flowering plants
1.		
2.		
3.		
4.		
5.		
6.		
7.		

Plants which bear flowers are called flowering plants, like rose, china rose, Delonix regia (gulmohar), Cassia fistula (amaltas) etc.

Those plants which do not have flowers are called non- flowering plants. For example- fern, mosses etc.

Figure 9.7 Flowering Plants - Delonix regia (Gulmohar)

Figure 9.8 : Non flowering plants, moss

9.5 Functions of various parts of the plant

The main parts of a plant are root, stem, leaves and flower. All these fepan, most parts of a plant perform specialized functions. What are the functions of these plant parts? Let us try to understand-

1. What do we call that part of plant which is below the ground?
2. Which parts of a plant are found above the ground?
3. Name that part of a plant where exchange of gases takes place?

Roots

Roots absorb water and minerals from the soil. Roots absorb water present between the soil particles and send it to the stem, branches and leaves.

Activity 1

- Take a glass beaker, fill it with water and mix it with blue coloured fluid.
- Keep a fresh carrot or radish in the beaker.
- After two days, cut it as shown in the figure.

Blue colour is visible in Carrot which shows that the absorbed solution moves upwards.

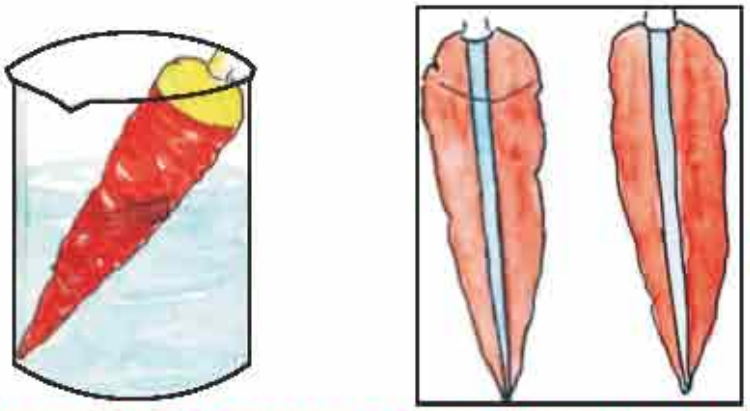


Figure 9.9 Demonstration of the process of water absorption by roots in Carrot

Roots provide stability to the plant.

Roots tightly hold the soil and perform an important task of preventing soil erosion.

Do all plants have similar roots? Is it possible to uproot a big tree? Are the structure of roots of xerophytic plants and mesophytic plants similar?

Let us find answers to these questions.

Mainly, two types of roots are found in plants-

- Tap root
- Fibrous root

Tap root - Tap root are roots that have a main root and other roots arise laterally from the main root. For example- mango, neem etc.

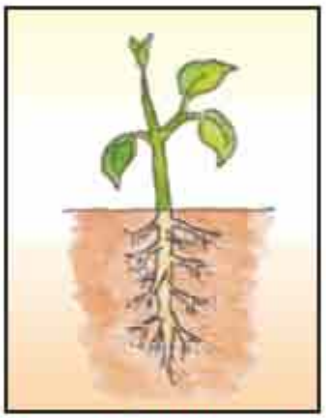


Figure 9.10 Tap root

Fibrous root- In fibrous roots, no main root is present and all roots appear similar and form a cluster. For example- maize, wheat, onion, sugarcane etc.

Figure 9.11 Fibrous root

Can you name a root which can be consumed as a dish or can be eaten raw? Carrot and radish are such plants, whose roots can be consumed after preparing a dish or can be eaten raw. It has stored food.

Do you know about more such roots that are used for eating? The roots of many plants store food in them. The roots of many plants get modified in order to perform specialized functions.

They are of the following types-

1.	For storing food	Carrot, radish, sweet potato
2.	For climbing	Money plant
3.	For reproduction	Dahlia
4.	For providing support	Sugarcane, banyan

Stem

Activity 2

- Take a glass beaker and fill it one third with water. Put a few drops of red ink in water.
- Take a herb plant, and cut it at the base and let it stand in the glass beaker with the help of a support.
- Examine the leaves and branches of the plant after 24 hours.
- Take out the branch and cut few transverse sections of it with the help of a blade.
- Place the transverse section on a slide and put a drop of glycerin and place a cover slip over it. Now, examine under a microscope.

You will notice some red colour in branches and leaves. After observing the transverse section under the microscope, red lines become clearly visible.

On this basis, we can say that the main function of stem is to carry the water and minerals absorbed by the roots and sending them to the aerial parts of the plant.

Apart from this, some other important functions of the stem are as follows-

- Stem bears leaves, flowers, fruits etc.
- To store food material prepared in the leaves.
- To make food by chlorophyll present in green stems like- asparagus.
- Adapting the xerophytic plants by storing water like- cactus.

- Vegetative propagation, for example- rose, jasmine.
- Provides support (tendrils) like- Cocculus pendulus (Peelwan)

Like roots, do the storage of food occur in the stem also? Does stem play an important role in the development of the plant?

Potato, ginger, turmeric etc are modifications of underground stem that store food. Ginger and turmeric are used in the preparation of various types of medicines.

Apart from food storage, stem performs other functions also, in absence of which it is impossible for the plant to survive.

Leaf

You have read the functions of root and stem. Now, let us read about leaf which is another important part of the plant. Leaves are present on the stem and branches of the plant and the arrangement of leaves on the stem is also of varied types.

Do the leaves of all the plants look alike? Are they similar in their size and shape?

Activity 3

Make a collection of leaves of plants found in your neighbourhood and paste them in your notebook. With the help of your teacher, fill the table given below-

S. no	Name of the plant	Shape of the leaf	Size of the leaf	Colour	Other descriptions
1.					
2.					
3.					
4.					

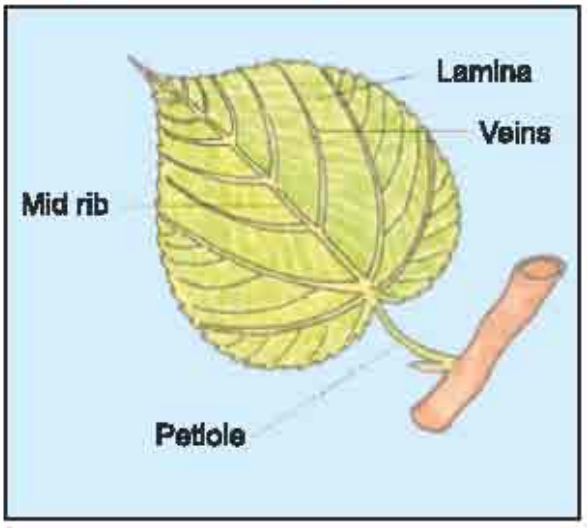


Figure 9.12 : Different parts of a leaf

The part of leaf which is attached to the stem is called petiole. The broad and flat part of the leaf is called lamina. An emerging line in the middle of the lamina is called midrib and numerous veins arise from it.

Activity 4

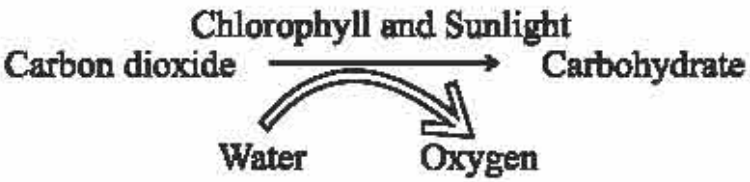
- Put a leaf under a white sheet of paper or a sheet in your notebook.
- Hold your pencil tip sideways and rub it on the portion of the paper having the leaf below it. You will get a clear impression of the leaf on the paper.
- You can see some lines in the impression of the leaf. These lines are called veins.

The thick vein in the middle of the leaf is called the midrib. The veins arising from the midrib form a net-like design on both the side of the midrib, and this type of venation is called reticulate venation. Example- mango, neem, sacred fig (peepal).

- In leaves of some plants, the veins are parallel to one another. This type of venation is called parallel venation.

Functions of leaf- The process by which leaves of green plants prepare food material in the presence of sunlight, carbon dioxide, water and chlorophyll is called **photosynthesis.**

The process of photosynthesis can be represented by the following equation-



Plants store food in the form of starch. This starch gets stored in leaves, fruits and stem.

- Plants synthesize glucose in the presence of light and chlorophyll. This process involves the use of water and carbon dioxide. In this process, oxygen is produced as a bi-product from water. Food synthesized by leaves ultimately gets stored as starch in different parts of the plant.
- Stomata are present on the surface of the leaves. Leaves respire through these stomata. The gaseous exchange depends on the opening and closing of the stomata.

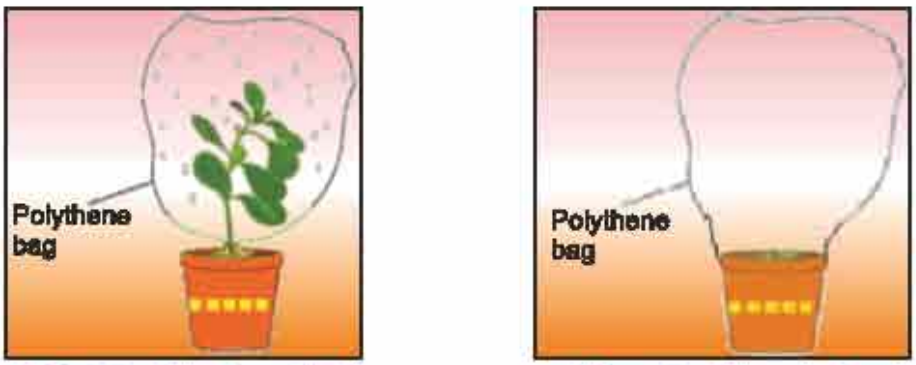
Do plants perform functions other than photosynthesis and respiration?

Let us find out-

Activity 5

- Use a flower pot with a healthy plant in it. Enclose the plant in a polythene bag and tie its mouth up with a thread as shown in the figure.
- Enclose another empty flower pot containing dry soil, with a polythene bag.
- Now keep both the pots in the sun for a few hours.
- After few hours, observe the polythene on both the pots.

We will see droplets of water on the inner surface of the polythene bag tied around the plant.



(a) Pot with plant in it **(b) pot without plant**

Figure 9.13 Transpiration Process

These drops of water have come out of leaves due to the process known as **transpiration.**

The process of transpiration also balances the water cycle in the environment. It also help plants in regulation of their temperature.

Professor Shipra Guha Mukherjee

She was born on 13 July, 1938 in Calcutta. She achieved graduate and post graduate degrees from Delhi University. She achieved a Ph.D degree under the guidance of Prof. B.M. Johari on the subject "Tissue Culture of Flowers of Alium cepa". Under the guidance of S.C. Maheshwari, she invented a technique for production of haploid plant by culturing stamen from the flowers of Datura innoxia. This technique is utilized in the field of agriculture to develop new varieties of crop plants. She died of brain tumour on 15 September, 2007.

What have you learnt

- Plants are classified as herb, shrubs and tree on the basis of their height, stem and branches.
- On the basis of life span, plants are annual, biannual and perennial.
- On the basis of ascent, plants are divided into climbers and creepers.
- On the basis of habitat, plants are mainly aquatic or terrestrial.
- On the basis of flowers, plants are divided into two groups as flowering and non-flowering plants.
- Stem bears leaves, flowers and fruits.
- Leaf mainly consists of leaf lamina, petiole and veins.
- Photosynthesis, transpiration and respiration occur in the leaves.
- Green leaves prepare food in the presence of sunlight by using carbon dioxide and water by the process known as photosynthesis.
- The food material prepared in the leaves is stored in different parts of the plant through stem.
- Basically, there are two types of roots- tap root and fibrous root.

Exercises

Choose the correct option

1. Which One of the following is a biannual plant-
   (a) wheat (b) gram ( )
   (c) onion (d) pine
2. How many types of plants are there on the basis of size?
   (a) three (b) four ( )
   (c) two (d) six
3. Which of the following is an aquatic plant?
   (a) Prosopis cineraria (khejri) (b) water hyacinth ( )
   (c) plum (d) Capparis decidua (kair)

Fill in the blanks

1. On the basis of size, plants can be divided into _____ , _____ and _____.

2. Plants respire through the _____.
3. Climbing plants climb up with the help of _____.
4. Roots are of two types (a) _____ (b) _____.

Short answer type questions

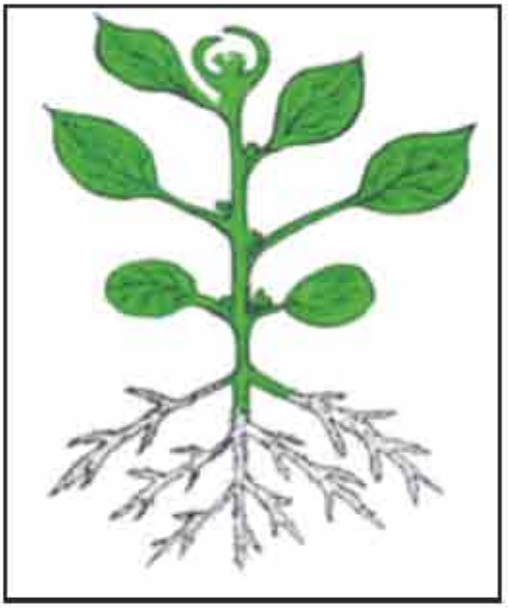
1. What is photosynthesis?
2. In how many categories can plants be classified on the basis of life span? Name them.
3. What is the difference between the stems of herbs and shrubs?

Long answer type questions

1. What are the different categories into which plants can be classified on the basis of size?
2. Describe the features of plants living in aquatic habitat?
3. Draw a labelled diagram of leaf?

Practical work

1. You have studied the classification of plants found in nature on different-different basis. So, on the basis of these classifications, make a scrap book of various plants.
2. Label the different parts of the plant given below-



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