Chapter 7

Getting to Know Plants

Keywords : Venation, Transpiration, Xerophytic, Weeds, Pistil, Stamen

Go outside and observe all the plants around you. Do you see that some plants are small, some very big, while some are just patches of green on the soil? Some have green leaves, while some others have reddish ones. Some have huge red flowers; some have tiny blue ones, while some have none. We do see a variety of plants existing all around us — near our homes, in the school ground, on the way to the school, in the parks and gardens, isn't it?

Fig 7.1 *Parts of a plant*

Let us get to know the different parts of any plant. This will help us understand the differences between plants of different kinds. Can you label the stem, branches, roots, leaves, and flowers of the plant shown in Fig.7.1? Colour the parts of the plant.

Fig 7.2 *A Nature walk!*

Let us now go on a Nature walk, make friends with many different kinds of plants and examine them closely (Fig. 7.2).

7.1 HERBS, SHRUBS AND TREES

EHS8Z7

Activity 1

Look closely at the stem and branches of:

1. Plants much smaller than you.
2. Plants that are about your size, and
3. Plants which are much taller than you.

Feel their stem and try to bend them gently to see if they are tender or hard. Take care that the stem does not break. Hug the tall plants to see how thick their stems are!

We also need to notice from where the branches grow in some plants — close to the ground or higher up on the stem.

We will now group all the plants we observed, in Table 7.1. Some examples are shown. You can fill the Columns 1, 2 and 3 for many more plants. Fill Column 4 after you have studied later part of this section.

Table 7.1 Categories of Plants

Plant Name	**Column 1** Height	**Column 2 Stem**				**Column 3 Where do the branches appear**		**Column 4**
		Green	Tender	Thick	Hard	At the base of the stem	Higher up on the stem	Category of plant
Tomato	Shorter than me	yes	yes					herb
Mango	Much taller than me			yes	yes		yes	tree
Lemon	Slightly taller than me				yes	yes		shrub
Apple								

Based on these characters most plants can be classified into three categories: herbs, shrubs and trees. An example of each is shown in Fig.7.3.

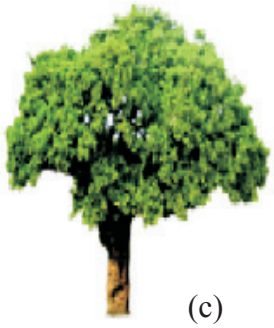
Plants with green and tender stems are called herbs. They are usually short and may not have many branches [Fig.7.3 (a)].

Some plants have the stem branching out near the base. The stem is hard but not very thick. Such plants are called shrubs [Fig .7.3(b)].

Some plants are very tall and have hard and thick brown stem. The stems have branches in the upper part, much above the ground. Such plants are called trees [Fig.7.3(c)].

(a)

(b)



(c)

Fig 7.3 *(a) Herb (b) Shrub (c) Tree*

Based on the above characteristics can you now correctly classify the plants listed by you and complete column 4 in Table 7.1?

Plants with weak stems that cannot stand upright and spread on the ground are called creepers, while those that take support on neighbouring structures and climb up are called climbers (Fig.7.4). These are different from the herbs, shrubs and trees.

Perhaps there are some plants in your school or at home that you take care of. Write down the names of any two trees, shrubs, herbs or creepers growing in your house or school.

Fig 7.4 *Climbers*

7.2 STEM

Activity 2

We would require a glass, water, red ink, a herb, and a blade for this activity.

Pour water to fill one-third of the glass. Add a few drops of red ink to the water. Cut the base of the stem of the herb and put it in the glass as shown in Fig.7.5. Observe it the next day.

Fig 7.5 *What does the stem do*

(a) **(b)**

Fig 7.6*(a)Water moves up the bottom (b) enlarged view of open end of stem*

Do any of the parts of the herb appear to have red colour? If yes, how do you think the colour reached there?

You can cut the stem across and look for the red colour inside the stem (Fig. 7.6).

From this activity we see that water moves up the stem. In other words, stem conducts water. Just like the red ink, minerals dissolved in water also move up in the stem, along with the water. The water and minerals go to leaves and other plant parts attached to the stem, through narrow tubes inside the stem.

Activity:

This activity could be done with herbs having white flowers. Put one branch with a white flower in the water in glass A and add a few drops of red ink to the water. Do a funny thing with another branch. Split it half way along its length and put the two ends in the water in glasses B and C (Fig. 7.7). Put a few drops of red ink in glass B and blue ink in glass C. Guess what would happen to the flower in glass A and the flower put jointly in B and C.

When you had cut across the stem in Activity 2, did you notice a number of spots of red colour arranged in a ring inside the stem?

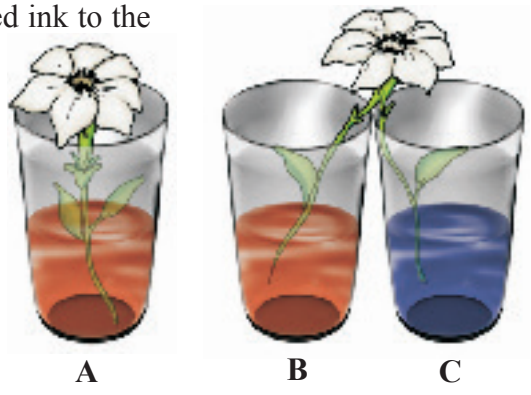


Fig 7.7 *Flowers*

More to Know

Potato, although remaining inside the soil, is not a root. It is a stem bearing nodes and internodes

7.3 LEAF

Look at leaves of plants around you and draw them in your notebook. Are all the leaves the same in size, shape and colour?

How are they attached to the stem? The part of a leaf by which it is attached to the stem is called petiole. The broad, green part of the leaf is called lamina (Fig. 7.8). Can you identify these parts of the leaves in plants around you? Do all the leaves have petioles?

Let us get to know the leaf better by taking its impression! If you thought that leaves cannot sign, here is an activity which will make you think again.

Fig 7.8 *A leaf*

Activity 3

Put a leaf under a white sheet of paper or a sheet in your notebook. Hold it in place as shown in Fig. 7.9. Hold your pencil tip sideways and rub it on the portion of the paper having the leaf below it. Did you get an impression with some lines in it? Are they similar to those on the leaf?

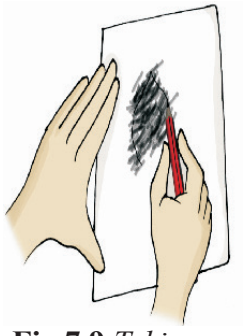


Fig 7.9 *Taking an impression of a leaf*

These lines on the leaf are called veins. Do you see a thick vein in the middle of the leaf? This vein is called the midrib. The design made by veins in a leaf is called the leaf venation. If this design is net-like on both sides of midrib, the venation is reticulate [Fig. 7.10 (a)]. In the leaves of grass you might have seen that the veins are parallel to one another. This is parallel venation [(Fig. 7.10 (b)]. Observe the venation in as many leaves as you can without removing them from the plant. Draw the pattern and write names of some plants having reticulate and parallel venation.

Shall we now find out some of the functions of a leaf?

(a) (b)

Fig 7.10 *Leaf venation (a) reticulate and (b) parallel*

Activity 4

We will require a herb, two transparent polythene bags and some string.

Fig 7.11 *What does the leaf do?*

Do this activity during day time on a sunny day. Use a healthy, well watered plant that has been growing in the sun, for this activity. Enclose a leafy branch of the plant in a polythene bag and tie up its mouth as shown in Fig. 7.11. Tie up the mouth of another empty polythene bag and keep it also in the sun.

After a few hours, observe the inner surface of the bags. What do you see? Are there any droplets of water in any of the bags? Which bag has the droplets? How do you think they got there? [Don't forget to remove the polythene bag after the activity!]

Water comes out of leaves in the form of vapour by a process called **transpiration.** Plants release a lot of water into the air through this process. We will learn more about this in Chapter 14.

Why did we tie a bag around the leaves? Would we have seen the water from the transpiration of plants otherwise? What makes the water appear on the polythene bag? In Chapter 5, we noticed water changing into different forms in some of our activities. Can you think of these and name the process that makes water drops appear on the polythene bag?

Leaves also have another function. Let us study this.

CAUTION!

Do not touch a cactus plant:

The leaves are reduced to spines in it.

Being a xerophytic plant, this modification helps it to reduce water loss from the plant body.

Activity 5

We would require a leaf, spirit, a beaker, test tube, burner, water, a plate and iodine solution for this activity.

Put a leaf in a test tube and pour spirit to completely cover the leaf. Now, put the test tube in a beaker half filled with water. Heat the beaker till all the green colour from the leaf comes out into the spirit in the test tube. Take out the leaf carefully and wash it in water. Put it on a plate and pour some iodine solution over it (Fig. 7.12).

Fig 7.12 *What does the leaf contain*

What do you observe? Compare your observations with those done in Chapter 2, when you tested food for presence of different nutrients. Does this mean that the leaf has starch in it?

In Chapter 2, we saw that a slice of raw potato also shows the presence of starch. Potatoes get this starch from other parts of the plant and store it. However, leaves prepare their food in the presence of sunlight and a green coloured substance present in them. For this, they use water and carbon dioxide from air. This process is called photosynthesis. Oxygen is given out in this process. The food prepared by leaves ultimately gets stored in different parts of plant.

How do we know that the leaf has prepared the starch and not received it from another part of the plant? To test this, the above activity can be repeated with a little difference.

Place a potted plant with green leaves, in a dark room for a day or two. Now, cover a portion of a leaf of the plant completely with black paper and leave the plant in the Sun for a day. Remove the leaf covered in black paper and repeat the test for starch.

What do you see? Which part of the leaf shows the presence of starch? Does this help us

understand that leaves produce starch in the presence of sunlight?

We see that the stem supplies leaf with water. The leaf uses the water to make food. The leaves also lose water through transpiration. How do the stem and leaves get the water? That is where the roots come in!

7.4 ROOT

Look at Fig. 7.13. Who do you think is watering their plant correctly, A or B? Why?

Which part of the plant is in the soil? Let us learn more about this part from the following activities.

A B

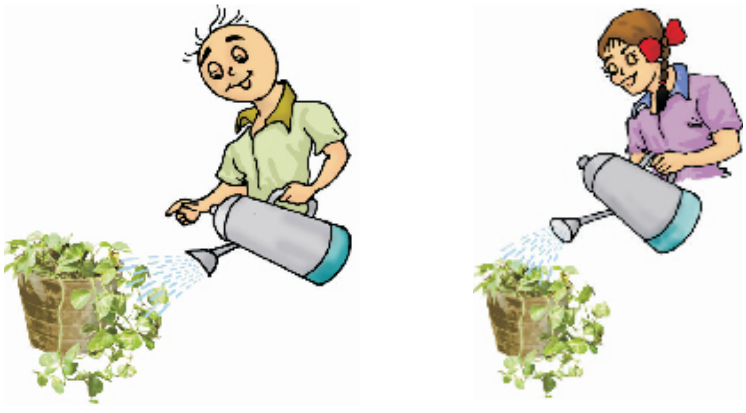


Fig 7.13 *Watering the plants*

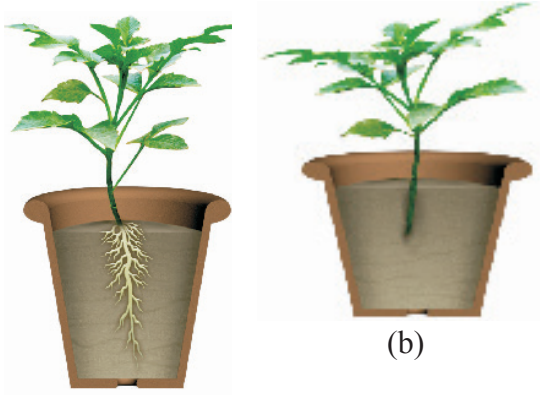
Activity 6

You would require two pots, some soil, khurpi (for digging), blade or a pair of scissors and water. This activity is to be done in groups of 4-5 students.

Select two weeds of the same kind from an open ground and dig them out. Take care that their roots do not break. Plant one of the weeds in the soil in pot A [Fig. 7.14 (a)]. Cut off the roots from the other weed and plant and put it in the soil in pot B [Fig. 7.14 (b)]. Water them regularly. Observe the plants after a week. Are both plants healthy?

Both the plants are watered regularly, but, one is without roots, isn't it? Does this activity helps you to understand an important function of the root?

Let us do an activity to study another function of root.



(a) (b)

Fig 7.14 *(a) Weed with roots and (b) without roots*

Activity 7

We would require seeds of gram and maize, cotton wool, katori and some water.

Take two katoris. Place some wet cotton wool in them. Put 3 or 4 seeds of gram in one and maize in the other. Keep the cotton wet by sprinkling water every day, until the sprouts have grown into young plants. After a week try to separate the young plants from the cotton wool (Fig. 7.15).

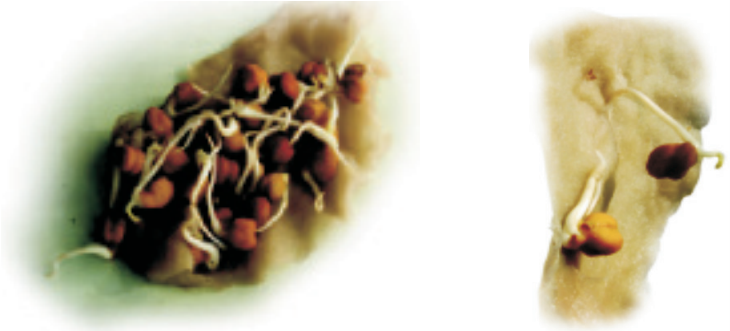


Fig 7.15 *Young plants grown on Cotton wool*

Was it easy to separate the cotton wool from the roots? Why?

In Activity 6, we could not easily pull out the plants from the soil, right? We dug them out. The roots help in holding the plant firmly in the soil. They are said to anchor the plant to the soil. You have seen that there are different kinds of stems and leaves. Do the roots also show a variety? Let us find out.

Activity 8

Study Fig. 7.16 (a) and (b) carefully. Now, look at the roots of the gram plants you have pulled out from the cotton wool. Do they look like the roots shown in Fig. 7.16 (a) or those in Fig. 7.16 (b)? How about the roots of the maize plant? Write 'gram' or 'maize' in the blank spaces in the figure after matching the roots with the figures.

In what way are the roots of gram and maize similar? In what way are they different? There seem to be two different types of roots, isn't it? Are there also other types of roots? Let us find out.

(a) (b)

Fig 7.16 (a) Roots of ------- (b) Roots of -------

Activity 9

Go to an open ground where many weeds are growing. Dig out a few weeds, wash the soil off the roots and observe them. Do you find that all the weeds that you have dug out have either the kind of roots shown in Fig. 7.17 (a) or as in Fig. 7.17 (b)?

For roots of the kind shown in Fig.7.17 (a), the main root is called tap root and the smaller roots are called lateral roots. Plants with roots as shown in Fig. 7.17 (b) do not have any main root. All roots seem similar and these are called fibrous roots.

(a) (b)

Fig 7.17 *(a) Taproot (b) fibrous root*

A Brilliant Idea

If you want to know what kind of roots a plant has, you need not pull it out. You just have to look at its leaves.

Separate the weeds you have collected into two groups. In group (a) put those that have tap roots and in group (b) those that have fibrous roots. Look at the leaves of the plants in Group (a). What kind of venation do they have? What kind of venation do you see for plants of Group (b)?

Do you notice that leaf venation and the type of roots in a plant are related in a very interesting way? In Table 7.2, can you match the type of leaf venation and the type of roots for some plants you have studied in all the activities so far?

Table 7.2 Types of roots and types of leaf venation

Name of plant	Type of leaf venation	Type of roots

We have learnt that roots absorb water and minerals from the soil and the stem conducts these to leaves and other parts of the plant. The leaves prepare food.

This food travels through the stem and is stored in different parts of a plant. We eat some of these as roots— like carrot, radish, sweet potato, turnip and tapioca. We also eat many other parts of a plant where the food is stored.

Do you agree that stem is like a two way street? Write down the name of material that goes up the stem and that which comes down, in Fig. 7.18.

In the next section, we will study about the structure of a flower.

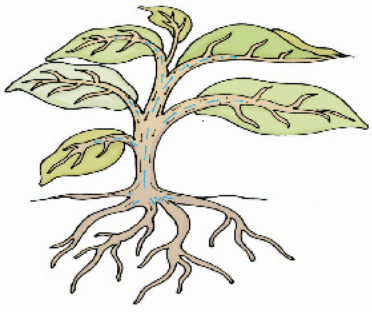


Fig 7.18 *A stem as a two way street*

7.5 FLOWER

You are shown three branches of a rose in Fig 7.19 (a), (b) and (c). Which one will help you best to recognize the plant?

Which colour did you use for the flower in Fig. 7.19? Are all flowers colourful? Have you ever seen flowers on the plants of grass, wheat, maize, mango or guava? If you see any flowers in these plants, are they brightly coloured?

Let us study a few flowers closely.

(a) (b) (c)

Fig 7.19 Rose *(a) A leaf less branch (b) a branch with leaves (c) A branch with leaves and flowers*

Activity 10

We would require one bud and two fresh flowers each, of any of the following– Datura, china rose, mustard, brinjal, lady's finger, gulmohur. Also a blade, a glass slide or a sheet of paper, a magnifying glass and water.

Observe Fig. 7.20 carefully. Look at the prominent parts of the open flower. These are the petals of the flower. Different flowers have petals of different colours.

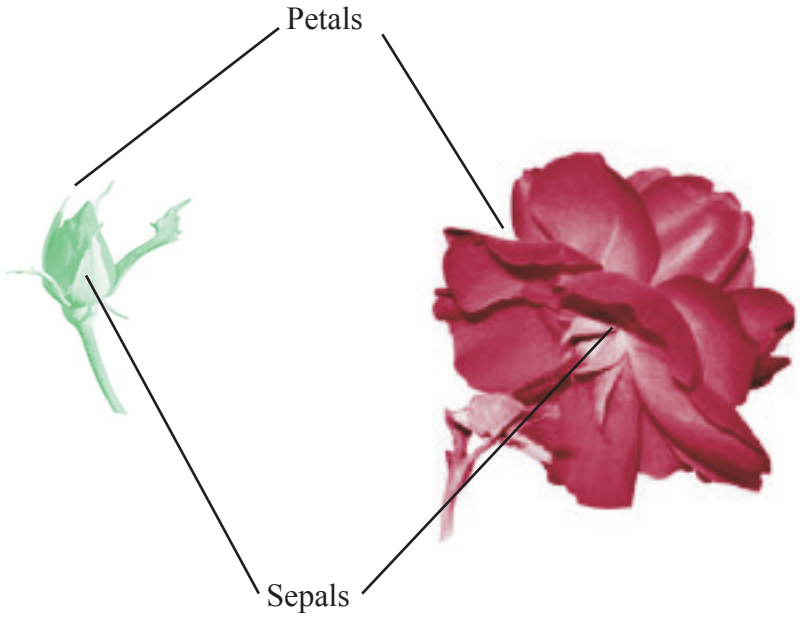


Fig 7.20 *Bud and Flower*

Where do you think the petals are in a closed bud? Which is the most prominent part in a bud? Did you see that this part is made of small leaf-like structures? They are called sepals. Take a flower and observe its petals and sepals. Now, answer the following questions:

How many sepals does it have?

Are they joined together?

What are the colours of the petals and the sepals?

How many petals does your flower have?

Are they joined to one another or are they separate?

Do the flowers with joined sepals have petals that are separate or are they joined together?

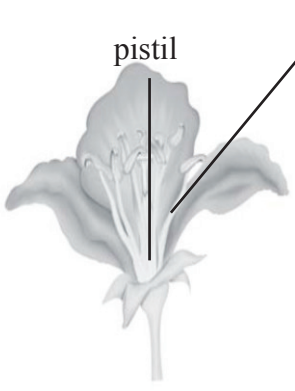
Make a table based on the observations of the whole class (Table 7.3). Add observations to this table, from a field trip to a locality where there are plants with flowers. Fill the last two columns after you have gone through the entire section.

Table 7.3 Observations of flowers

Name of Flower	Number and colour of petals	Number and colour of sepals	Are the sepals joined together or separate?	Are Stamens free or joined to petals?	Petal Present/ Absent
Rose	Many (colour)	5 (colour)?	Separate	Free	Present

To see the inner parts of the flower clearly, you have to cut it open, if its petals are joined. For example, in datura and other bell shape flowers, the petals have to be cut lengthwise and spread out so that the inner parts can be seen clearly (Fig. 7.21).

Remove the sepals and petals to see the rest of the parts. Study the Fig. 7.22 carefully, compare your flower with the illustration and identify the stamens and pistil in your flower.



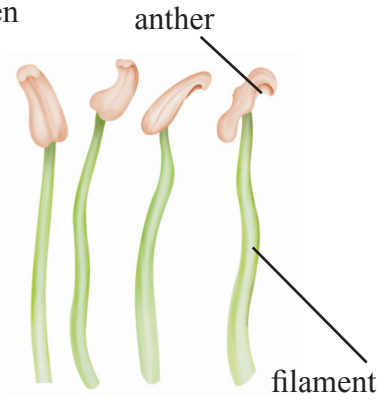


Fig 7.21 *A bell shaped flower* **Fig 7.22** *Parts of a flower* **Fig 7.23** *Parts of a stamen*

Look at Fig 7.23 carefully. It shows the different kinds of stamens present in different flowers. Can you recognise both the parts of the stamens in your flower? How many stamens are there in your flower? Draw one stamen and label its parts.

The innermost part of a flower is called the pistil. If you cannot see it completely, remove the remaining stamens. Identify the parts of the pistil with the help of Fig. 7.24.

Draw a neat, labelled diagram of the pistil of your flower.

Activity 11

Let us now study the structure of the ovary of a flower (Fig. 7.24). It is the lowermost and swollen part of the pistil. We will cut this part to study how it looks inside! Look at Fig. 7.25 (a)

and (b) carefully to understand how to cut the ovary of a flower.

Take two ovaries from different flowers. Cut them in two different ways as shown in Fig. 7.25. To prevent them from drying, put a drop of water on each of the two pieces of the ovary, you have cut.

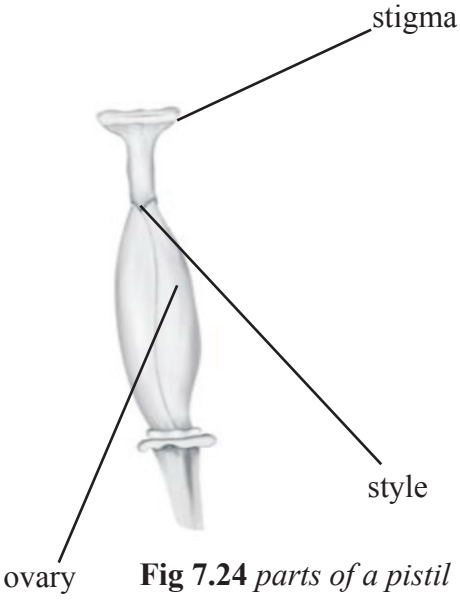


Fig 7.24 *parts of a pistil*

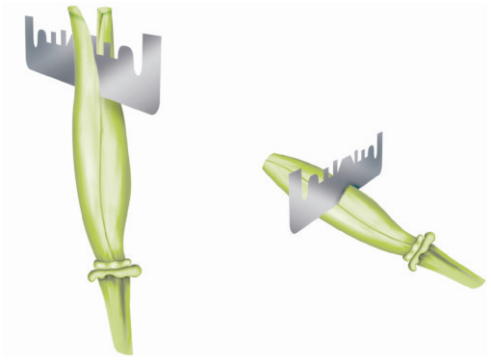


Fig 7.25 *cutting an ovary (a)Longitudinal cut and (b) transverse cut*

Observe the inner parts of the ovary using a lens (Fig. 7.26). Do you see some small bead like structures inside the ovary? They are called ovules. Draw and label the inner parts of the ovary in your notebook.

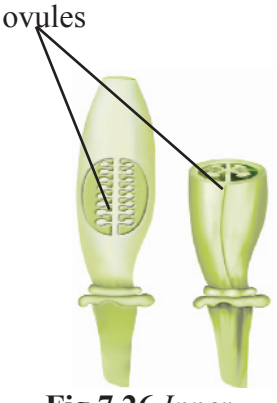


Fig 7.26 *Inner structure of an ovary (a) Longitudional cut (b) transverse cut*

On your field trip, try to find out the names of as many flowers as you can by asking the gardener or any other person. Remember, not to pluck more flowers than you need. Based on what you have filled in Table 7.3, answer the following questions.

Do all flowers have sepals, petals, stamens and pistils? Are there flowers that do not have any of these? Are there flowers which have parts other than these?

Did you find any flowers which have sepals and petals that look similar?

Did you find any flowers in which the number of sepals is different from the number of petals?

Do you now agree that the structure of the flower is not always the same? The number of sepals, petals, stamens and pistils may also be different in different flowers. Sometimes, some of these parts may even be absent!

We have studied some features and functions of leaves, stems and roots. We studied the

structure of different flowers. We will learn about the function of flowers in higher classes. We will also learn about fruits in higher classes.

Plants are usually grouped into herbs, shrubs, trees, and climbers based on their height, stems and branches.

More to Know

- **The largest flower-Rafflesia grows in Indonesia, nearly 1 meter in diameter.**
- **The smallest flower-Wolffia-only about 0.5mm in diameter.**

What You have Learnt

- The stem bears leaves, flowers and fruits.
- A leaf usually has a petiole and a lamina.
- The pattern of veins on the leaf is called venation. It can be reticulate or parallel.
- Leaves give out water vapour through the process of transpiration.
- Green leaves make their food by the process of photosynthesis using carbon dioxide and water in the presence of sunlight.
- Roots absorb water and minerals from the soil and anchor the plant firmly in the soil.
- Roots are mainly of two types: tap root and fibrous roots.
- Plants having leaves with reticulate venation have tap roots while plants having leaves with parallel venation have fibrous roots.
- The stem conducts water from roots to the leaves (and other parts) and food from leaves to other parts of the plant.
- The parts of a flower are sepals, petals, stamens and pistil.

Exercises

1. Correct the following statements and rewrite them in your notebook.

   (a) Stem absorbs water and minerals from the soil.

   (b) Leaves hold the plant upright.

(c) Roots conduct water to the leaves.

(d) The number of petals and sepals in a flower is always equal.

(e) If the sepals of a flower are joined together, its petals are also joined together.

(f) If the petals of a flower are joined together, then the pistil is joined to the petal.

2. Draw (a) a leaf, (b) a taproot and (c) a flower, you have studied for Table 7.3.
3. Can you find a plant in your house or in your neighborhood, which has a long but a weak stem? Write its name. In which category would you classify it?
4. What is the function of a stem in a plant?
5. Which of the following leaves have reticulate venation?

   Wheat, tulsi, maize, grass, coriander (dhania), China rose
6. If a plant has fibrous root, what type of venation do its leaves likely to have?
7. If a plant has leaves with reticulate venation, what kind of roots will it have?
8. Is it possible for you to recognize the leaves without seeing them? How?
9. Write the names of the parts of a flower.
10. Which of the following plants have you seen? Of those that you have seen, which one have flowers?

    Grass, maize, wheat, chilli, tomato, tulsi, pipal, shisham, banyan, mango, jamun, guava, pomegranate, papaya, banana, lemon, sugarcane, potato, groundnut
11. Name the part of the plant which produces its food. Name this process.
12. In which part of a flower, you are likely to find the ovary?
13. Name two flowers, each with joined and separated sepals.
14.

    a. Give the technical names of I. Baby root, II. Baby shoot.

    b. Name two roots modified for storage of food.

    c. Sweat potato is _____ and potato is a _____.

    d. What is a hermaphrodite flower?
15. Multiple choice Questions:

    a. Which of the following has a taproot?

       i. Maize

       ii. Wheat

       iii. Pea

       iv. Rice

b. Which of the following is a modified stem?
   i. Radish
   ii. Onion
   iii. Sweet potato
   iv. maize

c. Pollen grains are produced in
   i. Flowers
   ii. Ovary
   iii. Anther
   iv. fruit

SUGGESTED PROJECT AND ACTIVITIES

1. BECOME A LEAF EXPERT

Do this activity with a number of leaves over a period of a few weeks. For every leaf that you wish to study, pluck it and wrap it in a wet cloth and take it home. Now, put your leaf in a newspaper and place a heavy book on it. You can also put it under your mattress or a trunk! Take out the leaf after a week. Paste it on a paper and write a poem or story about it. With your leaf collection pasted in a book (a Herbarium), you can become quite an expert about leaves!

2. Names of plant parts are hidden in this grid. Search for them by going up, down, or even diagonally forward as well as backward. Have fun!

O	V	U	L	E	L	Y	T	S	T	E	M
V	E	I	N	W	Q	H	E	R	B	P	I
A	N	I	M	A	L	Z	E	X	R	N	D
R	F	I	L	A	M	E	N	T	M	U	R
Y	A	R	A	B	L	C	O	D	B	E	I
L	E	E	U	O	F	O	L	G	H	I	B
A	L	H	I	I	R	J	A	L	K	U	R
T	M	T	N	O	T	P	P	Q	R	R	A
E	E	N	S	T	U	F	E	H	V	W	N
P	Y	A	M	G	I	T	S	Z	Z	N	C
F	L	O	W	E	R	E	H	T	N	A	H
S	T	A	M	E	N	N	S	E	P	A	L