

Plants in the Surroundings and Environment



We see different types of plants around us. Some plants are big (trees) while others are small (shrubs and herbs). There are certain plants that have weak stems too and need support (creepers and climbers). Plants are important to maintain our environment and the balance of nature.

Learn about

- ⦿ Parts of a plant
- ⦿ Root
- ⦿ Shoot
- ⦿ Food prepared by plants
- ⦿ Plant products we use



Trees have a single, woody stem called trunk.



Climbers have weak stems and need support for climbing.



Shrubs have many thin, woody stems near the ground.



Herbs have a single, non-woody stem.



Creepers have weak stems with heavy fruits that grow along the ground.

► Parts of a Plant

The picture on the right shows the different parts of a brinjal plant. A plant has two main parts—the root and the shoot.

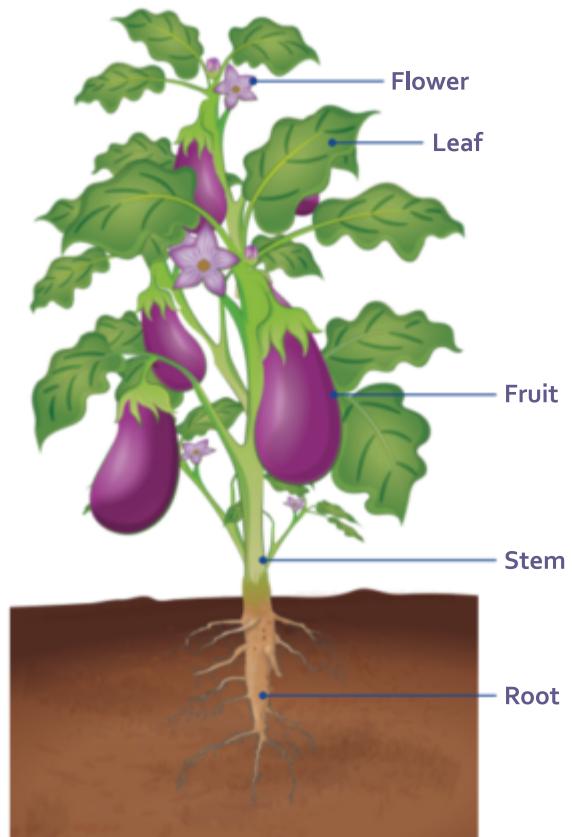
The shoot comprises the following parts:

Flower The flower forms the fruit.

Fruit Most fruits contain seeds. A fruit may have one, few, or many seeds. Mango has only one seed. Apple and orange have few seeds. Papaya and watermelon have many seeds.

Leaf Leaves differ in shape and size. They are generally green in colour. The food for the plant is prepared inside leaves in the presence of sunlight, air, and water.

Stem The stem gives support to the plant. It carries water and food to all other parts of the plant.



Brinjal plant

► Root

*The part of the plant that usually grows below the soil is called the **root**.*

Types of Roots

Roots are of two types: taproot and fibrous root.

Taproot It consists of a thick main root from which many thin roots grow. Plants such as pea, carrot, and hibiscus have taproots.

Fibrous root It consists of many thin and bushy roots instead of one main root. Plants such as wheat, rice, and grass have fibrous roots.



Taproot

Fibrous root

Activity**(Adult supervision required)****Aim:** To study the types of roots in plants**Materials required:** Common roadside plants (4–5), grass, and a hand lens
(Note: The plants should have intact roots.)**Procedure:**

1. Collect some common roadside plants and grass and wash them properly. The roots should be clean and visible (as in Fig. A).
2. Pat them dry, and keep them over a white sheet of paper (Fig. B).
3. Now observe the roots of each plant with a hand lens.
4. Also, draw neat diagrams of their roots (Fig. C).



Fig. A



Fig. B

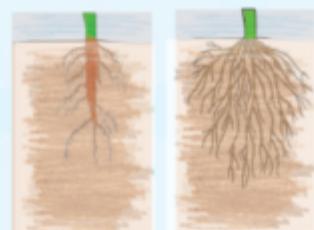


Fig. C

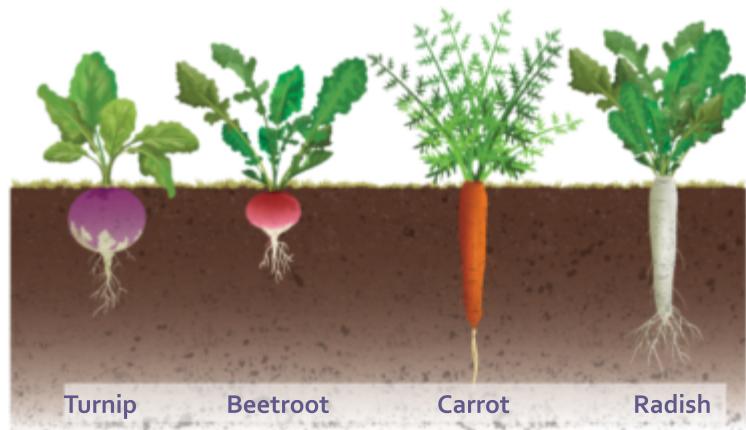
Observation: The herbs mostly have a main root with side branches.

Grass does not have a main root, and all roots originate directly from the base of the stem.

Conclusion: Herbs mostly have taproots. Grass has fibrous roots.**Functions of Roots**

The main functions of roots are as follows:

- Roots help the plant stay fixed in the soil.
- Roots absorb water and minerals from the soil. Water and minerals help the plant to prepare its food.
- Roots of plants such as carrot, turnip, radish, and beetroot are thick and fleshy because food prepared by the plants is stored in them. We eat these roots as vegetables.



Roots that store food

Activity



Aim: To study the function of roots in plants

Materials required: Two potted plants: one with intact roots and the other with roots cut out, and water

Procedure: Water both the plants regularly.

Observation: After a few days, you will see that the plant that has roots (Fig. A) has grown up, but leaves of the plant that has no roots (Fig. B) have withered, and the plant is almost dead.



Fig. A



Fig. B

Conclusion: Water could not reach various parts of the plant due to the absence of roots (Fig. B). So, the plant almost died.

Roots absorb water and minerals from the soil.



Questions

Fill in the blanks with a suitable word.

1. Plants are important to maintain the and the of nature.
2. The stem gives to the plant.
3. Rice plants have roots.
4. Roots of carrots are, as they store in them.

► Shoot

The part of a plant that usually grows above the soil is called the **shoot**. The shoot bears the stem, leaves, flowers, and fruits.



Banyan tree

Stem

The stem is the main part of the shoot on which branches, leaves, flowers, and fruits grow. *Trees such as banyan and mango have thick, woody, and strong stems called trunks.*



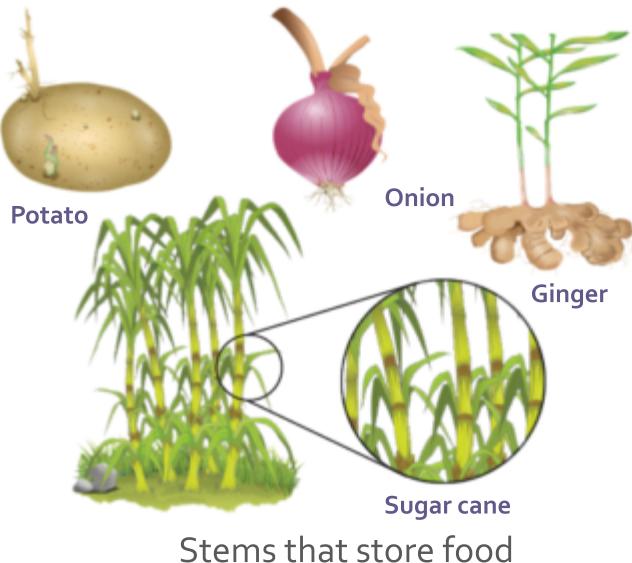
Grapevine on a support

Grapevines and bean plants have weak stems that need the support of other plants, walls, or sticks.

Functions of Stem

The main functions of a stem are as follows:

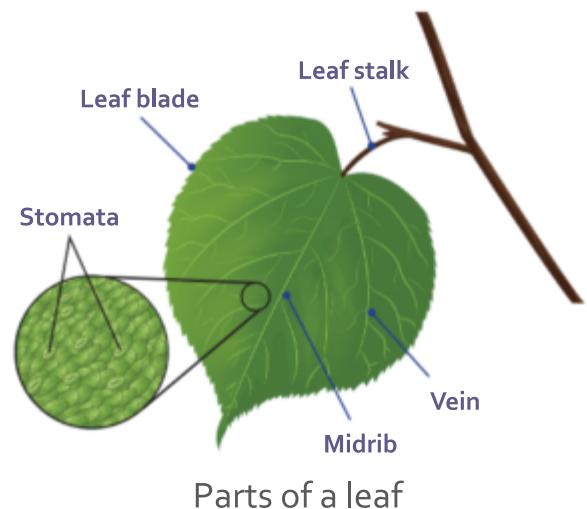
- The stem carries water and minerals from the roots to the leaves for making food.
- It transports food from the leaves to the other parts of the plant.
- Strong stems provide support to the plants to stand upright.
- Stems of some plants are swollen as they store food. Plants such as sugar cane, potato, onion, and ginger store food in their stems. These stems are eaten as food.



Parts of a Leaf

Leaves are an important part of plants as they manufacture food for the plants. Leaves appear green due to the presence of a green substance, called **chlorophyll**, which helps them to absorb sunlight.

Leaf blade The flat part of the leaf is known as the **leaf blade** or **lamina**. Some leaves have broad leaf blades, while others have narrow ones.



The leaf blade of a banana leaf is broader than the leaf blade of a mango leaf.



Banana leaf



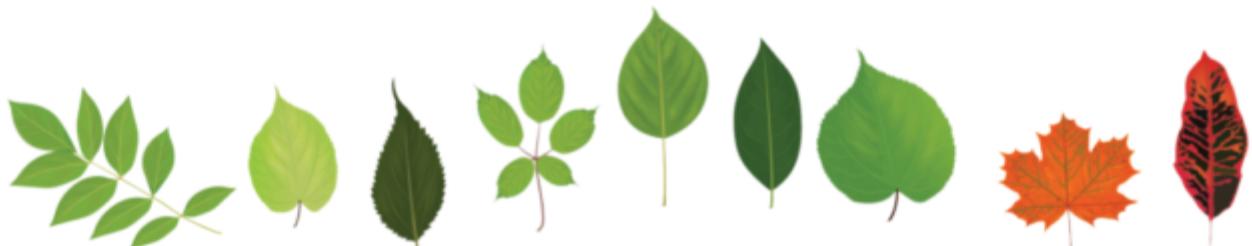
Mango leaf

Midrib A tube-like structure (**vein**) that runs down the centre of a leaf is called the **midvein** or **midrib**. It is the main vein of the leaf. Many side veins arise from the midrib. Both the midrib and the side veins help in the transportation of water, minerals, and prepared food through them.

Leaf stalk The part that attaches the leaf to a branch or a stem is called the **leaf stalk**. It is also called **petiole**.

Stomata The undersurface of most leaves, when seen through a hand lens, shows several tiny openings all over the surface. These openings are called **stomata** (singular: stoma).

Variation in Leaves Different plants have different kinds of leaves. They differ in shapes and sizes. Mostly, leaves are green, but their shades may vary. The leaves of some plants, like croton and maple, are of different colours, like yellow or red, with little patches of green.



Different shapes of leaves

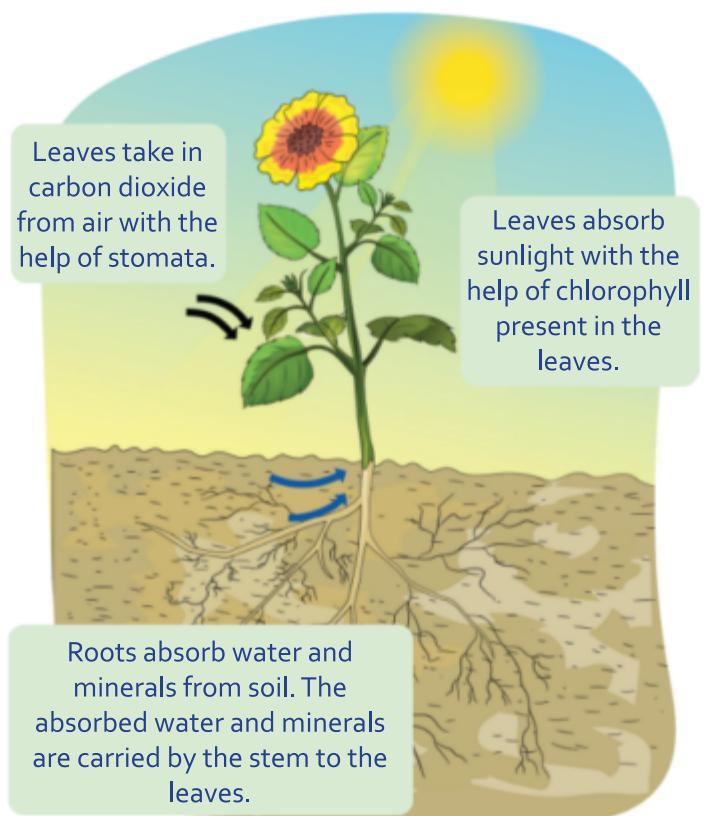
Functions of the Leaf

A leaf generally performs the following functions:

- ⦿ It prepares food using water, minerals, carbon dioxide, sunlight, and chlorophyll. *Leaf is also known as the kitchen of a plant as it is the place where the food for a plant is prepared.*
- ⦿ In some plants, it stores extra food.
- ⦿ Leaves have stomata that help a plant to take in carbon dioxide and give out oxygen during photosynthesis.

Photosynthesis

The process by which green plants prepare their own food using carbon dioxide, water, and minerals in the presence of sunlight and chlorophyll is called **photosynthesis**.



Photosynthesis

Activity

(Adult supervision required)

Aim: To demonstrate the presence of starch in a leaf

Materials required: A potted plant, beaker, tripod stand, burner, iodine solution, water, petri dish, a dropper, and methylated spirit

Procedure:

1. Keep the potted plant in a dark room for 2 or 3 days, to remove the starch from the leaves (Fig. A).
2. Now place the plant in sunlight for a day (Fig. B).
3. Remove a leaf from the plant, and dip it in boiling water for a minute (Fig. C).
4. Transfer the leaf to a test tube containing methylated spirit. Put this test tube in a beaker filled with water.
5. Place the beaker on the tripod stand over the burner. Boil the water (Fig. D).
(Note: We cannot boil the test tube directly on fire, as it is highly dangerous because methylated spirit catches fire when directly heated).
6. Remove the leaf from the test tube and place it in hot water to soften it (Fig. E).
7. Now place the leaf in the petri dish and add a few drops of iodine solution on it using a dropper (Fig. F).



Fig. A



Fig. B



Fig. C



Fig. D



Fig. E



IODINE



Fig. F



Blue-black colour of leaf

Observation: The leaf turns blue-black in colour.

Conclusion: The change in colour of the leaf confirms the presence of starch (prepared during photosynthesis).

This is known as the **iodine test for starch**.

Activity

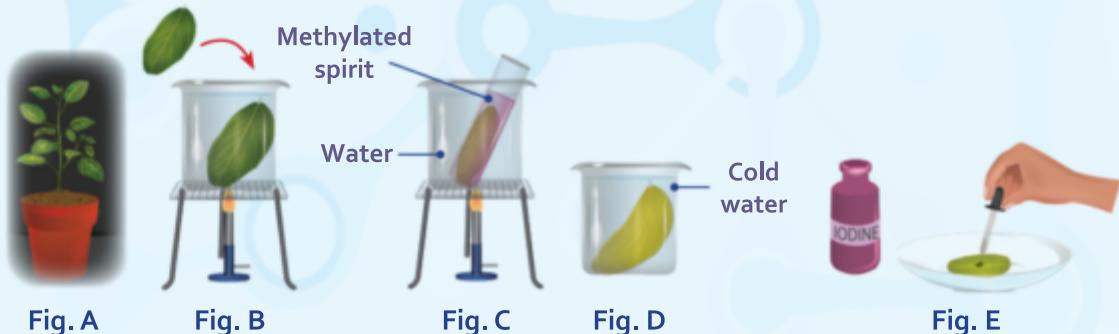
(Adult supervision required)

Aim: To show that green leaves need sunlight to prepare food

Materials required: A potted plant, beaker, tripod stand, burner, iodine solution, water, petri dish, and methylated spirit

Procedure:

- Keep a healthy potted plant inside a dark room for two or three days. Water the plant regularly (Fig. A).



- Remove a leaf from the plant, and dip it in boiling water for a minute (Fig. B).
- Transfer the leaf to a test tube containing methylated spirit. Put this test tube in a beaker filled with water.
- Place the beaker over the burner flame. Boil the water until the leaf becomes colourless (Fig. C). (*Note: We cannot boil the test tube directly on fire, as it is highly dangerous because methylated spirit catches fire when directly heated*).
- Now, take the leaf out and wash it with cold water (Fig. D). Place it in a petri dish. Add a few drops of iodine solution on the leaf using the dropper (Fig. E).

Observation: The colour of the leaf does not change.

Conclusion: When the plant was kept inside the dark room for 2 or 3 days, all its starch (food stored inside its leaves) gets used up. So, when a drop of iodine solution was added to it, the colour of the leaf did not change, as there was no starch present inside the leaf. Moreover, there was no photosynthesis as there was no sunlight.

Case Study

Hibiscus plant is a shrub. Its flowers are large, attractive, and generally red in colour. Suppose, there are two pots (A and B), both containing hibiscus plants. The plant in Pot A has its root intact while the plant in Pot B has no roots.

Based on the above information, answer the following questions:

- If we water both the pots, what will happen:
 - to the plant in Pot A
 - to the plant in Pot B
- Give reasons for your answer.

Questions

Write T for True and F for False.

1. Grapevine has a weak stem.
2. Mango leaf has a broader leaf blade as compared to banana leaf.
3. Through the stomata of leaf, carbon dioxide is taken in for photosynthesis.
4. Iodine test is used to test for the presence of carbon dioxide inside a leaf.
5. Starch turns blue-black in the presence of iodine in a leaf.

Transpiration

Transpiration is the process by which plants release water in the form of water vapour through its stomatal openings (present on the surface of the leaves).

Large amounts of water evaporate from the surface of the plant through transpiration. This has a cooling effect on plants.

Activity

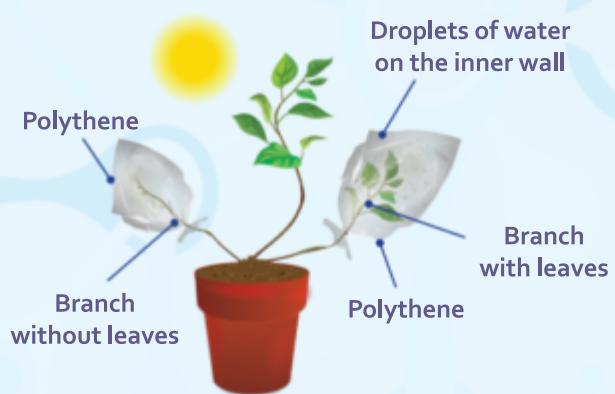


Aim: To demonstrate transpiration in plants

Materials required: A well-watered medium-sized potted plant (that should have at least two twigs), two transparent polythene bags, and two threads for tying

Procedure:

1. Remove all the leaves of one twig while leave the second twig as such.
2. Cover these twigs with separate polythene bags.
3. Tie them securely with thread at the base of the twig as shown in the picture alongside.
4. Keep the plant in sunlight for an hour or two.



Observation: Drops of water can be seen on the inside of the polythene bag that covered the twig with leaves intact. No water drops can be seen on the inside of the polythene bag that covered the twig with no leaves.

Conclusion: This shows that water vapour is released through the stomata of leaves during transpiration. These water drops are condensed water vapour.

► Food Prepared By Plants

The food prepared by plants by the process of photosynthesis is **glucose (sugar)**.

A plant uses the food prepared by it for its growth and to get energy for carrying out activities such as photosynthesis.

A plant does not use all the food that it makes. Extra food is stored in the form of starch. Some plants store extra food as starch in their roots, stems, leaves, or fruits.



Beetroot stores extra food in its roots.



Cabbage stores extra food in its leaves.



Sugar cane stores extra food in its stem.

Activity

(Adult supervision required)

Aim: To test the presence of starch in potato

Materials required: A slice of potato, a dropper, and iodine solution

Procedure:

Add a few drops of iodine solution over a slice of potato using dropper.

Observation: The slice of potato turns blue-black.

Conclusion: This shows that potato contains starch.



Iodine on potato

► Plant Products We Use

Plants are very useful to us. Many things that we use in our daily life are obtained from plants.

Many food items we eat are obtained from plants. We get cereals, pulses, vegetables, fruits, nuts, oils, and spices from plants. We also get tea, coffee, sugar, and cocoa beans from plants.

We get oil from plants such as coconut, sandalwood, and neem which is used to make soaps and shampoos.

We use plants such as tulsi, neem, ginger, and eucalyptus to make medicines.



Fruits and vegetables

Know Your SDGs

SDG 12: Responsible Consumption and Production

(Ensure sustainable consumption and production patterns)

Paper is made from the wood of trees. A large number of trees are cut down every year to make paper. This leads to environmental problems. Therefore, we should avoid wastage of paper in order to save trees. Paper can be recycled to make products like facial tissue, toilet paper, tissue paper, paper bag, and paper towel.



Tea leaves



Oil and spices



Coffee beans



Man twisting coir to make ropes



Neem leaves



Spoons made from bamboo

Plants such as cotton, jute, sun hemp, flax, and coconut give us fibre, which are used to make clothes, bags, baskets, and carpets.

Coir is obtained from the outer covering of the coconut fruit, which is mainly used to make ropes. Bamboo is used to make paper. Plants such as teak, *sal*, *sheesham*, pine, and *deodar* give us timber to build furniture, doors, and windows.

We also get other materials such as cork, rubber, and gum from plants.

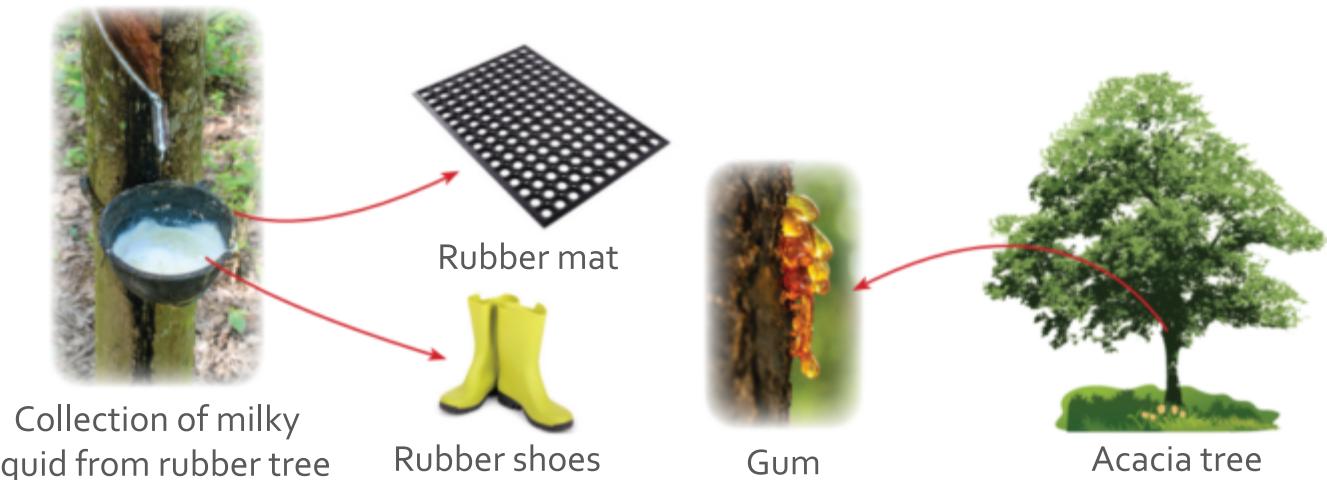
Thus, plants are very important for us. Apart from the products that we get from plants, they give us oxygen for breathing. They bind the soil and prevent it from being washed away by rain and floods. They form the habitat for many insects, birds, and other organisms. So we should take care of plants.



Teak tree

Fact File

The baobab tree found in Africa can store 1,000 to 120,000 litres of water in its swollen trunk. Around 2000 different types of plants are used by humans to make food. An average size tree can provide enough wood to make 170,100 pencils.



Think and Discuss

Divide the class into groups, and suggest measures on how we can reduce the consumption of paper. You can search the Internet and make a list before the discussion.



Questions

Write the uses of the given plants.

1. Coconut tree:
2. Cotton plant:
3. Bamboo tree:
4. Sheesham tree:
5. Tulsi plant:
6. Flax plant:



Wrap Up

- ⦿ Root is the part of the plant that grows below the soil.
- ⦿ The taproot has a thick main root from which many thin roots grow.
- ⦿ The fibrous root has many thin and bushy roots instead of one main root.
- ⦿ The stem bears leaves, flowers, and fruits.
- ⦿ The leaf manufactures food for the plant. The main parts of a leaf are leaf blade, midrib, leaf stalk, and stomata.
- ⦿ A leaf prepares food through photosynthesis.

- Photosynthesis is the process by which green plants prepare their own food. Plants use carbon dioxide, water, minerals, sunlight, and chlorophyll to prepare food.
- Transpiration is the process by which plants release water in the form of water vapour through the pores present on the surface of the leaves.
- The food prepared by plants by the process of photosynthesis is glucose (sugar).

Exercises

SECTION I

A Choose the correct option.

- absorbs water and minerals from the soil.
a. Leaf b. Stem c. Root d. Flower
- A is also known as the kitchen of a plant.
a. root b. stomata c. flower d. leaf
- Chlorophyll helps to absorb
a. oxygen b. carbon dioxide c. nutrients d. sunlight
- The flat part of a leaf is called
a. vein b. midrib c. leaf blade d. leaf stalk
- Tiny pores on leaves are called
a. veins b. leaf stalk c. stomata d. midrib
- is the food prepared by plants by the process of photosynthesis.
a. Glucose b. Oxygen c. Chlorophyll d. Minerals
- A potato plant stores extra food in its
a. stomata b. leaves c. roots d. stem



B Assertion and Reasoning questions.

- Assertion (A):** Stem helps in the transportation of water and minerals in the plant.

Reason (R): It transports water and minerals from the leaves to the other parts of the plant.

- Both A and R are True
- Both A and R are False
- A is True and R is False
- A is False and R is True



2. **Assertion (A):** Plants take in carbon dioxide through stomata during photosynthesis.

Reason (R): Plants prepare their own food through photosynthesis.

- a. Both A and R are True
- b. Both A and R are False
- c. A is True and R is False
- d. A is False and R is True

C

Choose the correct word to fill in the blank.

1. (Tap/Fibrous) roots have a thick main root.
2. A plant uses the food prepared by it for its (growth/decay).
3. Spinach stores food in its (leaf/flower).
4. The (midrib/leaf stalk) is the main vein of the leaf.
5. The (petiole/stomata) attaches the leaf to the stem.

D

Name the following.

1. Many thin, bushy roots instead of one main root
2. A green substance present in leaves, which helps them to absorb sunlight
3. Leaves take in this gas from air
4. In plants, the extra food is stored in this form
5. Stem of banyan and mango tree

SECTION II

**E**

Short answer questions.

1. Name one plant that has taproot.
2. Name one plant that has fibrous root.
3. Name one root that we eat as a vegetable.
4. What are stomata? How do they help a plant?
5. What are the functions of a leaf?
6. Name two plants that we use to make medicines.
7. What is transpiration?

F

Long answer questions.

1. Shikha went to the supermarket with her mother. There she saw carrots and radishes. She asked her mother which parts of the plant they were. Help her by writing a short note on them.
2. Raman, a village boy, wanted to know from his grandfather, a farmer, about the main function of the stem. Write what his grandfather may have answered.

3. Prateek's Science teacher gave an assignment on the topic, photosynthesis. Help him by explaining the process of photosynthesis with the help of a labelled diagram.
4. Draw the diagram of a leaf and label its parts.
5. Rohan went to the Delhi Trade Fair, where he saw different products obtained from plants. Make a note about the products he might have seen there.

Picture Study



- 1** Different plants are shown below. Observe the type of roots they have. Write 'TR' for taproot and 'FR' for fibrous root, in the boxes provided beneath them.









- 2** Look at the given picture of a leaf, and an enlarged portion of it. Label the parts of the leaf and answer the following questions.

- a. Write the function of a leaf.

.....

- b. Why does a leaf appear green?

.....

- c. How does a leaf absorb sunlight?

.....

- d. What are the two types of leaf blades?

.....

- e. What is the main vein of a leaf known as?



- f. What is the other name for leaf stalk?
-
- g. What are the tiny pores on the surface of a leaf known as? What is its role?
-

My Learning Corner



A Think about

- If there are no stomata on the leaf, write what will happen to the plant?
[Hint: What is the role of stomata?]
- If we securely tie a plastic bag around a portion of a twig having leaves, water droplets appear on the inner surface of the plastic bag. Can you explain why?
[Hint: The phenomenon is due to a process that takes place in the leaf.]

B Try out

- Perform the following activity to make your own paper bag.

Aim: To make a paper bag

Materials required: A newspaper/chart paper, gum, and a decorative thick thread (to make the handle)

Procedure:

- Take a newspaper or a chart paper and overlap the lengthwise margins of the newspaper. Paste the margins with glue (Fig. A).
- Fold the lower side (Fig. B) and paste it so that it is sealed.
- Fold the upper border towards inside (Fig. C). You can put a rectangular chart paper inside and paste the margin. It will make the bag sturdy.
- Make two holes on the upper border pass a thread through it, and tie it. Your one handle is ready. Repeat it for the other handle of the bag (Fig. D).



Fig. A



Fig. B



Fig. C



Fig. D

- e. Your bag is ready. You can now paint and decorate the bag, to make it more attractive.
- f. You can use your paper bag to carry school items that are not that heavy like your Science Scrapbook or your Project File.
2. Visit a garden and click pictures of various plants. Take a print and paste them in your Science Scrapbook. Write this activity in a tabular form as given below. Categorise plants into herbs, shrubs, and trees. Write 2–3 lines related to them. Also, draw their leaves and their uses, if any.

Picture	Herb/Shrub/Tree	Draw its leaf	Information	Use, if any
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3. Create a herbal nursery in your balcony, backyard, or garden. You can plant medicinal plants like tulsi, mint, and ginger in small pots. Likewise, plants like coriander, garlic, oregano, basil, and thyme can also be planted in them. Search the Internet and find out how these plants can be used to add flavour to our food. You have already learnt how to grow a potted plant in Class 3. Use manure, keep them preferably in sunlight, and water them as required.



Self-Assessment

Now that you have completed the chapter, score each of the following tasks from 1 to 5 to indicate how well you can do them.

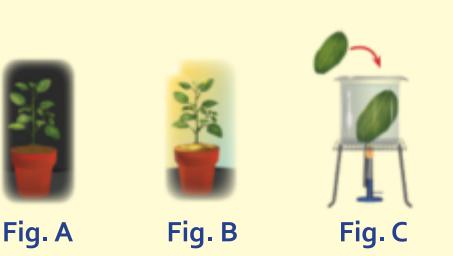
Score 5 = I can definitely do this.

Score 1 = I cannot do this yet.

I can...	My score
• draw, label, and explain the different parts of a plant.	
• identify the root and its types, and list its functions.	
• identify the stem and list its functions.	
• list the different types of food prepared by plants.	
• name and draw the different products we get from plants.	

Worksheet

Pictures of different activities related to plants are given below. Write 2-3 lines about each activity.

Activity	Details about the activity
<p>1.</p> 	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
<p>2.</p> 	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
<p>3.</p> 	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>