



CHAPTER

1

Nutrition in Living Organisms—Plants

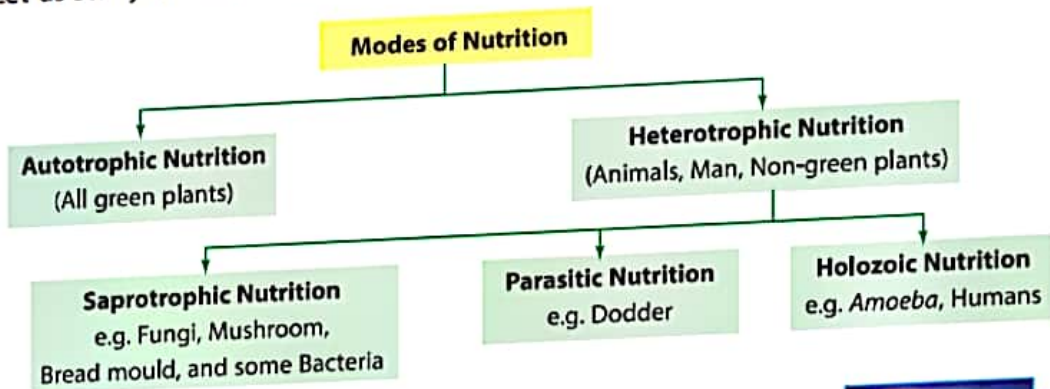


prepare my own food by using water and carbon dioxide in the presence of sunlight that is captured by chlorophyll.

I cannot prepare food on my own. I depend on plants for food.



Let us study the following flow chart.

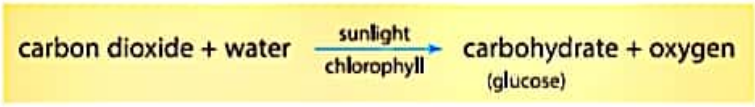


Do You Know ?

Euglena is an organism that shows both autotrophic and heterotrophic modes of nutrition. It has both plant and animal-like features.

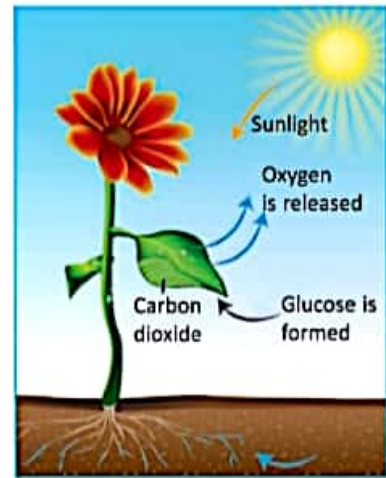


(**photo** = light, **synthesis** = to combine) as it takes place in the presence of sunlight. This process can be written in the form of the following equation:

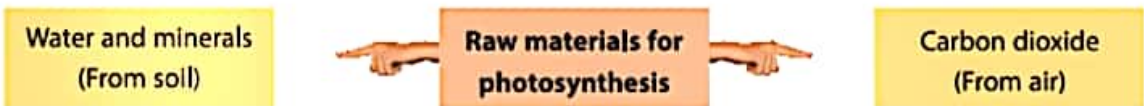


■ Raw Materials for Photosynthesis

From the above equation, it is clear that carbon dioxide and water are the raw materials for photosynthesis. For this process, chlorophyll and presence of sunlight/light are also necessary. Since food is synthesised in leaves, all the raw materials need to reach there.

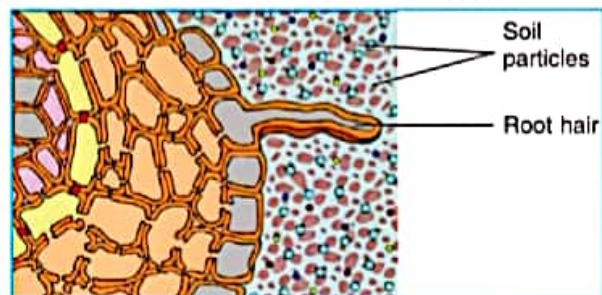


Photosynthesis



● Water and Minerals

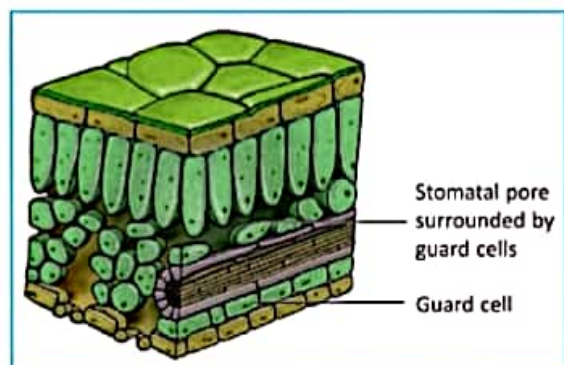
These are absorbed by the roots from the soil. From here, water and minerals are transported to other parts of the plant by the 'vessels'. **Vessels** are tubes that run throughout the root, the stem, the branches and the leaves. You will learn more about this in Chapter 8.



Roots absorb water and minerals from soil

● Carbon dioxide

Plants take carbon dioxide from the atmosphere. Carbon dioxide enters the leaves through tiny pores present on the surface of leaves. Such pores are called **stomata**. The stomata are surrounded by special cells called **guard cells**.



Enlarged portion of leaf epidermis showing stomata

Do you know?

Some plants have leaves that are not green in colour. Such leaves contain chlorophyll but the green colour is masked due to the presence of other coloured pigments. The presence of additional pigments causes other leaf colours, such as red in coleus and purple in red cabbage. However, such leaves can still perform photosynthesis.

However, some variegated leaves have yellow patches. Such yellow areas on the leaf do not contain any chlorophyll and hence, cannot perform photosynthesis.



■ Products of Photosynthesis

The initial product of photosynthesis is a carbohydrate—glucose. It next gets converted to starch whose presence, in the leaves, indicates the occurrence of photosynthesis. Carbohydrates contain carbon, hydrogen and oxygen. Some carbohydrates are also converted to proteins and fats. Besides carbon, hydrogen and oxygen, proteins also contain nitrogen. Now where does this nitrogen come from? Nitrogen is present in the air but plants cannot use this nitrogen directly. Some bacteria, present in the soil, convert gaseous nitrogen into its usable form which is soluble and is, therefore, absorbed by roots along with water. Roots are also able to absorb nitrogenous compounds, present in fertilisers, that are added to the soil.

▶ | Other Modes of Nutrition in Plants

Some plants cannot synthesise their own food because they do not contain chlorophyll. Such plants depend on food produced by other plants. Their mode of nutrition is, therefore, **heterotrophic**. One such plant is *Cuscuta* (*amarbel*, dodder). It can be observed as a yellowish thread-like structure, without leaves, growing on other plants. *Cuscuta* is a **parasite** since it derives its nutrition from some other living organism and causes harm to that organism. The plant, on which it grows, is known as 'the **host**'.



Cuscuta-Dodder growing on a bush



Pitcher plant

Have you heard of insect-eating plants? There are plants that feed on insects for their nitrogen requirements. Some parts of such plants get modified to trap insects. For example, the leaf, of the pitcher plant, gets modified to form a pitcher with a lid. The lid is able to open and close the mouth of the pitcher. The pitcher is lined with downward-pointing hairs. When an insect enters, it cannot climb back out against the hairs and ultimately falls to the bottom of the leaf, and gets digested by the juices present there. Such insect-eating plants are called **insectivorous plants**.



■ Symbiotic Relationship

Sometimes two organisms live in close association and develop a relationship that is beneficial to both. This is called **symbiotic relationship**. (In Greek, *symbion* = "to live together"). Some algae and fungi live in the roots of trees. They receive shelter and nutrition from the tree; in return, they help the trees to absorb water and minerals more efficiently.

Lichen is a living partnership between a fungus and an alga. The fungus absorbs water and provides shelter. The alga prepares food by



Rhizobium is a bacterium that lives in the roots of leguminous plants. It converts nitrogen, from the atmosphere, into a usable form that can be utilised by the plants. The plants, in turn, provide food and shelter to the bacterium.



Leguminous plant showing root nodules

▶ | How are Nutrients Replenished in the Soil?

Plants remove nutrients from the soil as they grow. These nutrients need to be reintroduced into the soil so that the soil remains productive. Farmers usually enrich the soil by adding manures and fertilisers; these are materials that contain one or more of the nutrients that plants need. In a forest, where no one goes to add fertilisers, the decomposition of dead leaves, and other plant and animal matter enriches the soil with nutrients. As we discussed just above, bacterium like *Rhizobium*, also help in making the soil rich in nitrogen.



Something To Know

A. Fill in the blanks.

1. Animals are _____ as they cannot synthesise their own food.
2. The _____, of a plant, absorb water and minerals from the soil.
3. During photosynthesis plants take in _____ and release _____.
4. _____ are the tiny pores through which leaves exchange gases.
5. Insect eating plants are called _____ plants.
6. An essential raw material needed for the process of photosynthesis, and
(a) available in the soil is _____.
(b) available in the air is _____.

B. Match the following:

- | | |
|-------------------|----------------------------|
| 1. Chlorophyll | (a) Autotrophs |
| 2. Lichens | (b) Saprotrophs |
| 3. Fungi | (c) Symbiotic relationship |
| 4. <i>Amarbel</i> | (d) Leaf |
| 5. Plants | (e) Parasite |

C. Tick (✓) the correct option.

1. Green plants, that can synthesise their own food, are known as—
 heterotrophs parasites
 autotrophs saprotrophs
2. The food factory, of the plant, is its—
 root flower
 stem leaf

3. Which of the following is an insectivorous plant?

pitcher plant

leguminous plant

green plant

amarbel

4. Mushroom is an example of a/an—

saprotroph

parasite

autotroph

insectivorous

5. An organism, that fixes nitrogen in the soil, is—

mushroom

mucor

rhizobium

cuscuta

D. Answer the following questions in brief.

1. Why is nutrition important for a living organism?

2. How do green plants synthesise their food?

3. State the role of 'vessels' present in a plant.

4. Define the following terms:

(a) Symbiotic relationship

(b) Nutrients

(c) Saprotrophic mode of nutrition

(d) Photosynthesis

5. When some wheat dough was left in the open for a few days, it started emitting a foul smell. State, why?

E. Answer the following questions.

1. Why would life not be possible on the earth in the absence of photosynthesis?

2. Give reasons for the following:

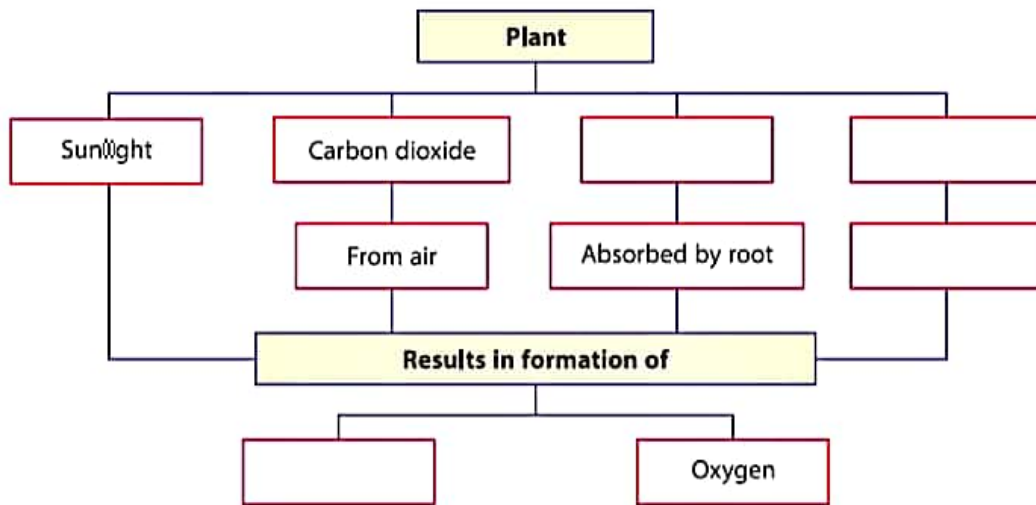
(a) Mushroom is a saprotroph.

(b) Sun is the ultimate source of energy for all living organisms.

(c) The leaf of a plant 'dies out' if its stomata are blocked.

(d) Leaf is known as the food factory of the plant.

- (e) Lichen is a 'living partnership' between a fungus and an alga and this 'partnership' is beneficial to both.
- Why do some plants feed on insects? How does a pitcher plant catch insects?
 - How do *rhizobium* bacteria and leguminous plants help each other in their survival?
 - Complete the web chart.



Value Based Question

The teacher told her students the story of the film *Dost*. She told them that, in that film, the friendship, between a visually challenged boy and a lame boy, helps them both to face, and overcome, the very many challenges of their day-to-day life. She went on to compare their friendship with the 'symbiotic relationship' between two organisms.

- Suggest any two 'values' that, according to you, must have been there in the two friends of the film *Dost*.
- In what way is the friendship, between the two boys, similar to the 'symbiotic relationship' between two organisms?
- Give one example of a 'symbiotic relationship' between two organisms.

Something To Do

- Compose a few lines/poem on the 'utility of plants'.



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Something To Do

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2. Why is it important to increase the 'forest cover'?
3. Keep a stale, moist piece of bread in a warm corner of the kitchen and observe it for 3-4 days. Can you identify the organism growing on the piece of bread? Identify its mode of nutrition.
4. Solve the crossword puzzle with the help of the clues given below.

ACROSS →

1. A plant parasite.
2. The process by which green plants prepare their food.
3. The process of obtaining, and utilising, food.
4. Green pigment present in the leaves of plants.

DOWN ↓

1. Two different organisms that live together and thereby, benefit from each other.
2. Organism feeding on dead matter.
3. An organism deriving food from another living organism.
4. Organism that cannot prepare its own food.

