

Points to study

- 2.1 Nutrition in plants
- 2.2 Nutrients
- 2.3 Classification of plants on the basis of nutrition
 - Autotrophic plants
 - Parasitic plants
 - Insectivorous plants
 - Saprotrophic plants
 - Symbiotic plants

2.1 Nutrition in plants

You know that all organisms need food. Plants can make their food themselves but animals cannot. They depend on plants or animals for food.

Why do organisms need food?

Food is essential for the growth and development of the living beings and for the repair and maintenance of their damaged parts. Food provides energy for various activities occurring in the body of living beings.

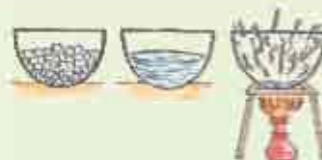
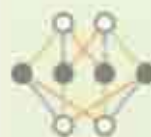
The process of intake of essential nutrients in the form of food for maintaining health, physical growth and development of an organism is called nutrition.

2.2 Nutrients

Plants are the source of nutrients for all living beings. After germination, plantlets grow by absorbing various types of nutrients from the soil. Plants get nourishment from the nutrients present in the soil. Healthy growth of the plants is not only important for the plant kingdom but also for the animal kingdom.

The nutrients essential for the normal growth of plants which are absorbed from the soil can be mainly classified into two groups, on the basis of their amount required by the plants-

- (i) Macro nutrients
 - (ii) Micro nutrients
- (i) **Macro nutrients** – Macro nutrients are those nutrients which are required by plants in large amount. In plant tissues, their quantity is from 0.2% to



4%. Like carbon, hydrogen, oxygen, nitrogen, potassium, calcium, magnesium, sulphur etc.

Macro nutrients can be further divided into two types –

(a) Primary macro nutrients: nitrogen, phosphorus and potassium

(b) Secondary macro nutrients: calcium, magnesium and sulphur

Plants get carbon, hydrogen and oxygen in the form of carbon dioxide present in water and air in the environment.

- (ii) **Micro nutrients**– Some mineral salts found in the soil are required in very low quantity for the healthy growth of plants. Such nutrients are called micro nutrients.

In plant tissues, their quantity is even less than 0.02% but still their presence is important for the plants. This means that even their small amount affects the normal growth of plants. The deficiency of any of these nutrients causes diseases in plants.

Zinc, copper, manganese, iron, boron, molybdenum, chlorine, nickel are placed in the category micro nutrients.

2.3 Classification of plants on the basis of nutrition

Different types of plants are found in different environments of the earth. They depend on other components of their nutrition. Can you tell how many types of plants are there on the basis of nutrition?

Let's know

On the basis of nutrition, plants are of following types–

- Autotrophs
- Parasite
- Insectivorous
- Saprotrophs
- Symbiotic

(a) **Autotrophs** – Those plants who prepare their own food with the help of sunlight are called Autotrophs and this mode of nutrition is called **Autotrophic nutrition**.

How does the synthesis of food take place in autotrophic plants? Let us take a glance inside the leaf.

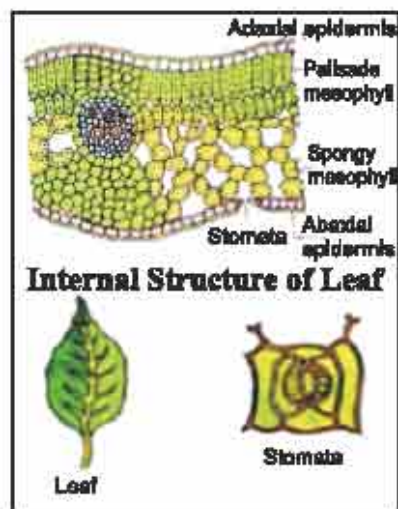


Figure 2.1 - Leaf & internal structure of leaf

The synthesis of food in plants occurs in the leaves. Many tiny pores are present on the surface of the leaves. These pores are called **Stomata**. The stomatal pores are surrounded by guard cells. Carbon dioxide present in air is taken in through the stomata. Leaves require sunlight, water, carbon dioxide and mineral salts to prepare food. The roots of the plant absorb water and minerals from the soil.

How did water and minerals absorb by the roots reach the leaves?

The stem contains tube like vessels through which water and minerals are transported to the leaves. The leaves have a green pigment called **Chlorophyll**.

It helps leaves to capture the energy of the sunlight. This energy is used to synthesize food.

The chlorophyll containing cells of green plants, in the presence of sunlight use water and carbon dioxide and make their own food. This process is called **photosynthesis**.

This process can be represented as an equation



In this process, food is prepared in the form of carbohydrates and oxygen is released. This carbohydrate ultimately gets converted into starch and is stored in the plant.

Does the process of photosynthesis and production of starch occur even in the absence of sunlight?

Let us do an experiment to know this-

Activity 1

Take two potted plants of the same genus. Keep one in the dark for 72 hours and the other in the sunlight. Take one leaf from both the pots. Now place both the leaves in a test tube and dip them in spirit. Now keep the test tube in a beaker half filled with water and boil it till the leaves lose all chlorophyll molecules. Wash the leaves with water and perform iodine test on them.

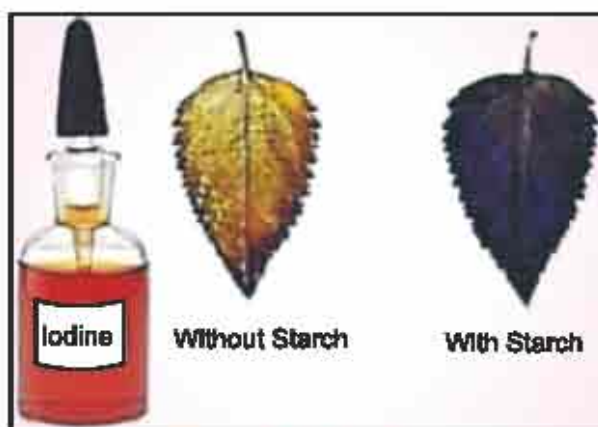


Figure 2.2 Iodine test



Do you find any colour change in both the leaves?

We will see that the colour change occurs in the leaf of the plant which is kept in sunlight, but no colour change occurs in the leaf of the plant kept in dark.

Why is there no change in colour of the leaf kept in dark?

Let us try to find out.

Photosynthesis occurs in the presence of the sunlight. Due to which, starch is made in the leaves of the plant kept in sunlight and so, the leaf turns blue-black in colour when iodine solution is dropped on it. But photosynthesis does not occur in the plant which is kept in dark, thus starch is absent in its leaves. So, there is no colour change in its leaf. Starch reacts with iodine and imparts blue-black colour. This process is called starch test.

(b) Parasite: There are some plants which do not have chlorophyll. They cannot synthesize their own food. Whom do they depend on for their food?

Let us find out

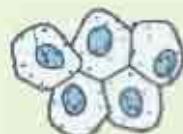


Figure 2.3 Cuscuta

Look carefully at the tree depicted in figure 2.3. You can see yellow filaments twining around the stem and the branches of the tree. These yellow filaments are of a plant known as cuscuta. It does not have chlorophyll. It takes readymade food from the plant on which it is climbing. Plants like cuscuta, who obtain their food from other trees or plants are called **Parasite** whereas the tree or the plant from which the parasite obtains food is called the **host**.

You might have seen or heard that insects, ants, butterflies and other organisms derive their food from plants. Have you ever heard about plants that in order to survive, obtain their food from insects?

In nature, there are some plants which can eat insects to survive. What type of plants are these, name them. Let us try to find out:-



(c) **Insectivorous plants**- Those plants which in order to survive, trap insects and digest them are called **Insectivorous plants**. For example- *drosera*, *dionaea*, *utricularia*, pitcher plant etc.



Figure 2.4 Leaf of a pitcher plant modified into a pitcher (pot)

Carefully look at figure 2.4. It is a pitcher plant. The pitcher-like structure is the modification of which part? What do you see above the pitcher? In this plant, the leaves are modified into pitcher. The apex of the leaf forms a lid. Inside the pitcher, there are hairs which are directed downward. The mouth of the pitcher is sticky. When an insect lands in the pitcher, it slips and gets entangled into the hair present into the neck of the pitcher. Since, the hair are directed downwards, the insects are unable to escape out. The insect is digested by the digestive juices secreted in the pitcher.



Figure 2.5 Drosera

Have you ever imagined why these plants need insects as their food? Let us try to understand -

These plants are found in swampy areas where the amount of nitrogen is insufficient. They eat insects to fulfill their nitrogen requirement.



(d) **Saprotrophs** - During rainy season, you might have seen umbrella-like or white thread like structures on the dung, pickles, vegetables, wood and other decaying matter. What do you call them in your language? In scientific language, they are called fungus. They lack chlorophyll. They cannot prepare their own food. If they do not prepare their own food, then where do they get their food from? Let us try to find out. Look at the fig. 2.6 (a).



Figure 2.6(a) Fungus on dung

Figure 2.6(b) Monotropa

Let us know

These plants secrete digestive juices on the surface of dead and decaying matter. The digestive juices convert it into a solution which is absorbed by fungus to get nutrients. The plants which take nutrients from the dead and decaying matter are called **Saprotrophs**. Most of the fungus like *mucor* and *agaricus* are saprotrophic plants. *Monotropa* depicted in figure 2.6(b) is a flowering plant which obtain its food from dead and decaying matter.

You might have seen people involved in various professions and helping each other. Like doctor, engineer, lawyer, teacher, farmer, stockman, milk seller etc. Can anyone of these, imagine to live without the help of people related to other professions? No, we can live a normal life only by mutual cooperation.

Do such cooperation and coordination exists in plants also? Let us try to find out-

(e) **Symbiotic plants** - Some organisms live together and share food, water, nutrients and shelter. This mode of living is called **Symbiosis** and the plants living together are called symbiotic plants. Lichen is an example of symbiosis.

In lichens, two types of plants, fungi and an algae live together. Algae contains chlorophyll but fungi lacks chlorophyll. The algae provides food carbohydrate to the fungi, which the algae prepares by photosynthesis and in return, the fungus provides shelter, water and other nutrients to the algae.

What have you learnt

- Those plants who prepare their own food in the presence of sunlight are called autotrophs.
- The chlorophyll containing cells of plants, in the presence of sunlight use water, minerals and carbon dioxide to synthesize their own food. This process is called photosynthesis.
- Cuscuta is a parasitic plant.
- Saprotrophic plants obtain their food from dead and decaying matter.
- In lichen, an algae and a fungus live together. It is an example of symbiosis.
- In the pitcher plant, the leaf gets modified into a pitcher-like structure.

Exercises

Choose the correct option

1. It is a saprotrophic plant-
 (a) neem (b) drosera ()
 (c) mucor (d) cuscuta
2. Those plants who depend on other plants for their food are called-
 (a) parasite (b) autotroph ()
 (c) saprotroph (d) insectivorous plant
3. Which of the following is not an insectivorous plant-?
 (a) drosera (b) dionaea ()
 (c) cuscuta (d) utricularia

Fill in the blanks

1. In lichen, _____ and _____ live together.
2. In pitcher plant, pitcher is the modified form of _____.
3. The mode of taking essential nutrients in the form of food by an organism for its health and physical growth is called _____.



Short answer type question:

1. What is photosynthesis?
2. What is symbiosis?
3. What is the difference between the host and the parasite?

Long answer type question.

1. Describe insectivorous plants with suitable example.
2. Write short notes on the following –
 - (a) symbiotic plants
 - (b) saprotrophic plants
 - (c) parasitic plant
 - (d) photosynthesis

Practical work

1. Collect leaves of plants found in your locality and prepare a scrap book.
2. Visit a greenhouse present in your locality. Look, how plants are grown there. Find out how light, water and carbon dioxide are regulated there for healthy growth of the plants.

