

Chapter 1

Nutrients in Plants

Mode of Nutrition in Plants

The process of taking food by an organism and its utilization by the body is called nutrition.

◆ Mode of Nutrition:

The methods of obtaining food are called modes of nutrition. On the basis of mode of nutrition, organisms are divided into two main groups:

(a) Autotrophic Nutrition:

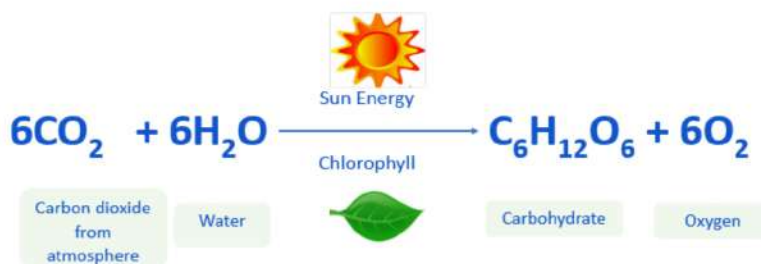
The mode of nutrition in which organisms make their food themselves are called autotrophic nutrition. The organisms which can make their food themselves are called autotrophs. For example, a plant is an autotroph.

(b) Heterotrophic Nutrition:

The mode of nutrition in which organisms depend on others for their food is called heterotrophic nutrition. The plants and animals which depend on others for their food are called heterotrophs. For example, the dog is a heterotroph.

Photosynthesis

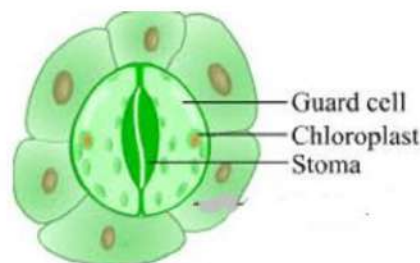
- The process by which green plants make their own food from carbon dioxide and water by using sunlight energy in the presence of chlorophyll is called photosynthesis.



- The synthesis of food in plants usually occurs in leaves. Carbon dioxide from air is taken through the tiny pores present on the surface of the leaves.
- Water and minerals present in the soil are absorbed by the roots and transported to the leaves.
- Leaves are the food factories of the plants. The leaves of plants can synthesize food (photosynthesis) because they contain green pigment chlorophyll.

◆ Stomata:

The tiny pores present on the surface of leaves are called stomata. These pores are surrounded by guard cells.



Photosynthesis by Plants other than leaves

Cactus is desert plants which have tiny, spine-like leaves to reduce the loss of water by transpiration. These leaves of cactus plant cannot do photosynthesis.

The stem and branches of a cactus plant are green which contain chlorophyll, so they carry out process of photosynthesis.



- The process of photosynthesis first produces a simple carbohydrate called glucose (carbohydrate) as food. This glucose is then converted into a complex carbohydrate called starch. This starch gets stored as food in the various parts of plants like leaves, fruits, etc.

◆ Synthesis of Plant food other than carbohydrate:

Nitrogen is required by plants to make proteins. Nitrogen is present in the environment in large amounts, but plants cannot absorb nitrogen in gaseous form. There are some bacteria that convert gaseous nitrogen into a soluble

form and release it into the soil. These soluble forms of nitrogen are absorbed by the plants along with water.

Other Modes of Nutrition in Plants

Most of the plants have chlorophyll and can make their own food. But there are some plants that do not have chlorophyll and cannot make their own food. They are called heterotrophs.

◆ Parasite:

A plant that lives on or inside another organism and derives food from it, is called a parasite. For example, Cuscuta (Amarbel) does not have chlorophyll, it cannot synthesize its own food. It takes readymade food from the plant on which it is climbing. The tree on which the Cuscuta plant climbs is called the host.



Amarbel

Insectivorous plant

The plants which eat insects are called insectivorous plants. Insectivorous plants are green and carry out photosynthesis to obtain part of food required by them.

But they do not get nitrogen from the soil in which they grow. So, they feed on insects to obtain the nitrogen needed for their growth. They are also known as carnivorous plants.

In insectivorous plants leaves are specialized to catch insects.

Insectivorous plants are called partial heterotrophs. They have chlorophyll to carry out photosynthesis and they feed insects to get nitrogen. So, they are called partial heterotrophs.



Saprophytes

- The non-green plant which obtains their food from dead and decaying organic matter are called saprophytes.
 - Example: Fungi such as mushrooms, bread moulds, and yeast are saprophytes. They derive their food from dead and decaying organic matter. Fungi such as mushrooms, bread moulds, and yeast are saprophytes.
 - They secrete digestive juices on the dead and decaying organic matter and convert it into solution and they absorb the nutrients from this solution.
 - Fungal spores are present in the air. When these spores land on a humid object in hot conditions, they grow into new fungus plants.
- * Tip: We should keep shoes, leather objects, pickles, etc. in an air tight container. Fungal spores are present in the air and grow fast in hot and humid conditions especially during the rainy season.

◆ Symbiotic relationship:

The mode of nutrition in which organisms live together and share shelter and nutrients is called a symbiotic relationship. For example, Lichens is a symbiotic relationship between algae and fungi.

Algae are autotrophic plants, they contain green coloured chlorophyll pigment. Fungi are non-green saprophytic plants. The fungus provides shelter, water and minerals to the algae and, in return, the algae provide food that is prepared by photosynthesis. In this relationship, both algae and fungi get benefit from one another, so this is a symbiosis relationship.

How Nutrients are Replenished in the Soil?

- The main nutrients required by the plants are Nitrogen, Phosphorous, and Potassium (NPK).
- These nutrients are present in the soil naturally, but when the plants are grown, they absorb the nutrients from the soil.

- Due to which the amount of nutrients in the soil goes on decreasing. So, these nutrients are added by the farmers from time to time to enrich the soil and restore its fertility.

- **The plant nutrients are replenished in the soil in two ways:**

(a) Adding fertilizers and manures- Fertilizers and manures contain plant nutrients such as nitrogen, phosphorous, and potassium. The two most common fertilizers used in the fields are NPK and Urea. NPK provides nitrogen (N), Phosphorous (P), and Potassium (K) to the soil, whereas urea provides only nitrogen.

(b) Growing leguminous crops – Out of all the nutrients, the crop plants require nitrogen in maximum amount to make proteins. Though plenty of nitrogen is present in the air plants cannot use it in gaseous form. The plants need nitrogen insoluble (water-soluble compounds such as nitrates) form. Another way to make the soil fertile is to grow leguminous crops. Leguminous crops enrich the soil with nitrogen.

Rhizobium is a bacterium that can take atmospheric nitrogen and convert it into a soluble form. But Rhizobium cannot make its own food. So, they live in the root nodules of leguminous plants like gram, peas, pulses, beans, etc. Rhizobium provides nitrogen to the plants and the plants provide food and shelter to the bacteria.