



**PUBLIC SCHOOL DARBHANGA**  
**SESSION (2020-21)**  
**CLASS-7**  
**SCIENCE**  
**NUTRITION IN PLANTS**

**Introduction**

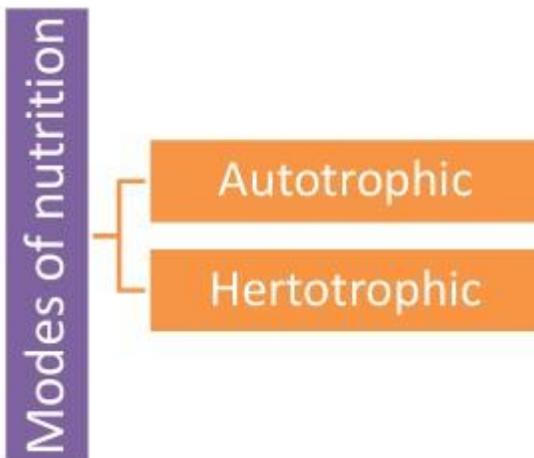
- All living organisms such as plants and animals require food. So food is essential for all living organisms.



- Plants are capable of making their food themselves but humans and animals cannot.
- Carbohydrates, proteins, fats, vitamins and minerals are essential components of food, these components are called **nutrients**.

**Mode of nutrition in plants** • Plants prepare their food by using raw materials like water, carbon dioxide and minerals.

- The process of utilization of food by a living organism to obtain energy is called **nutrition**.
- There are two modes of nutrition as shown below in the figure



1. **Autotrophs or Autotrophic:** - Plants that have chlorophyll trap the energy from the sun and prepare their own food. Such nutrition wherein the food is prepared by the organisms itself is called autotrophic nutrition. The organisms capable of preparing their own food are called autotrophs. All green plants are Autotrophs (Auto means self and trophos means nourishment). They prepare their own food by a process called photosynthesis.
2. **Heterotrophs or heterophobic:** - Heterotrophic organisms are those who obtain food from other organisms. Since these organisms depend on other organisms for their food, they are called consumers. All animals and non-green plants like fungi come under this category. Organisms that follow the heterotrophic mode of nutrition are called heterotrophs.

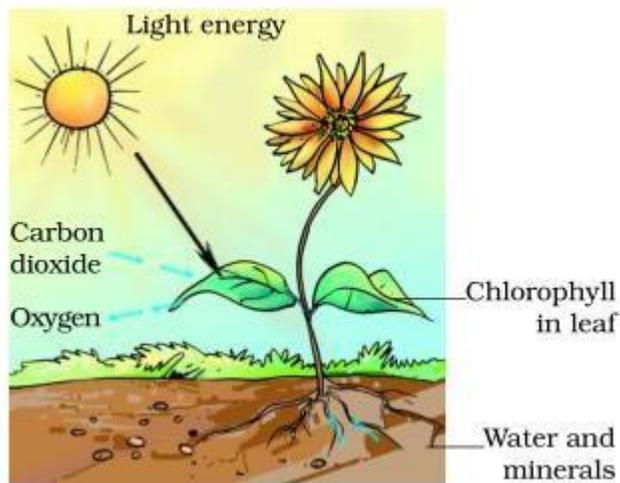
### Photosynthesis

- Photosynthesis is food making process in plants from simple substances like carbon dioxide and water in the presence of sunlight.

The process by which green plants make their own food (like gulucose) from water and carbon dioxide in presence of sun light and chlorophyll is called **photosynthesis**.

- Oxygen is released during photosynthesis.

**The process of photosynthesis can be represented as:**



- The process of photosynthesis takes place in the green leaves of a plant.
- The food is prepared by the green leaves of a plant in the form of a simple sugar called glucose.
- The extra glucose is changed into another food called starch. This starch is stored in the leaves of the plant.
- The green plants convert sunlight energy into chemical energy by making carbohydrates.

**The photosynthesis takes place in the following three steps:**

1. Absorption of sunlight energy by chlorophyll.
2. Conversion of light energy into chemical energy, and splitting of water into hydrogen and oxygen by light energy.
3. Reduction of carbon dioxide by hydrogen to form carbohydrate like glucose by utilizing the chemical energy.

**Conditions necessary for photosynthesis:**

The conditions necessary for photosynthesis to take place are:

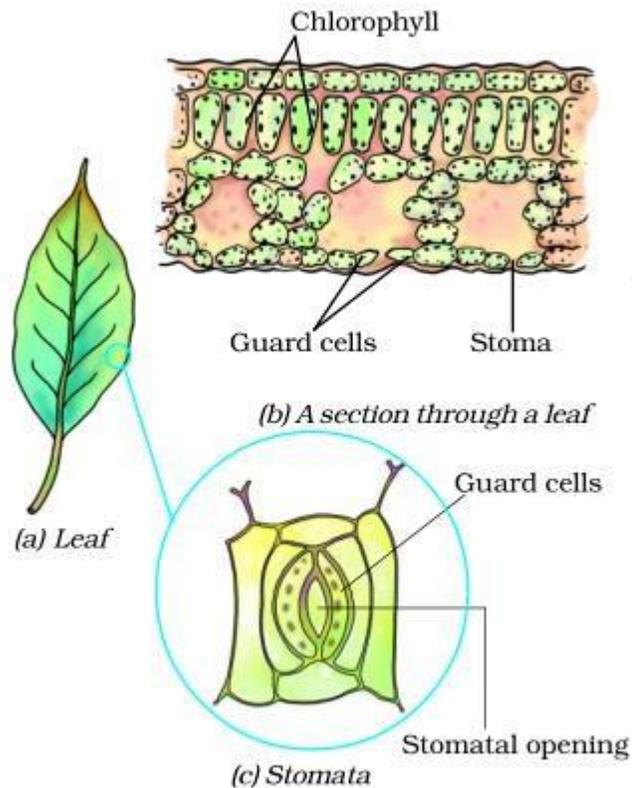
1. Sunlight
2. Chlorophyll
3. Carbon dioxide
4. Water

**Raw materials for photosynthesis:**

The raw materials for photosynthesis are:

1. Carbon dioxide
2. Water

**How the plants obtain carbon dioxide?**



- There are a large number of tiny pores called stomata on the surface of the leaves of plants.
- The carbon dioxide gas enters the leaves of the plant through the stomata present on their surface.
- Each stomatal pore is surrounded by a pair of guard cells. The opening and closing of stomatal pores is controlled by the guard cells.

#### **How the plants obtain water for photosynthesis:**

- The water required by the plants for photosynthesis is absorbed by the root of the plants from the soil through the process of osmosis.
  - The water absorbed by the roots of the plants is transported upward through the xylem vessels to the leaves where it reaches the photosynthetic cells.
1. The plants also need other raw materials such as nitrogen, phosphorus, iron and magnesium, etc., for building their body.
  2. The plants take these materials from the soil.
  3. Nitrogen is essential element used by the plants to make proteins and other compound.

#### **Site of photosynthesis: Chloroplasts**

- Photosynthesis takes place in the leaves of the plants.
- Leaves have green pigment called **chlorophyll**

- It helps leaves capture the energy of the sunlight which is then used to prepare food from carbon di oxide and water.
- Here, you see that solar energy is captured by the leaves and is stored in the plant in the form of food.
- So, we can say that **Sun is ultimate source of energy for all living organisms.**

### **Other facts on photosynthesis**

- Photosynthesis in plants can also takes place in other green parts like green stems, green branches.
- **Glucose (simple carbohydrates)** is the simplest food synthesized by plants. This glucose made by plants is converted into complex carbohydrates which are known as starch.
- These simple carbohydrates are used to synthesise other components of food such as proteins and fats.
- Proteins are nitrogenous substances. Plants prepare proteins with the help of nitrogen which is obtained from the soil.
- Plants use the minerals dissolved in water to convert Glucose (simple carbohydrates) into carbohydrates, proteins and fats.
- Photosynthesis is important because
  1. It provides food to animals including human beings
  2. It puts oxygen gas into the air which is essential for breathing and respiration in animals including human beings

### **Other modes of nutrition in plants(Heterotrophic nutrition)**

- Most of the plants have green pigment called chlorophyll and can make their own food.
- Some plants do not have chlorophyll and cannot synthesize their own food and are known as Heterotrophic plants
- This type of nutrition can be categorized into
  1. parasitic mode of nutrition
  2. Insectivorous mode
  3. saprophytic mode of nutrition
  4. Symbiotic mode of nutrition
- Let us now explain these modes in detail

### **Parasites**

- In parasitic mode of nutrition, plants depend on other plants or animals for their nourishment.
- Such dependent plants are called as **parasites** and the ones on which parasites depend are called as **hosts**.
- A parasite plant climbs on the host plant from which they get all the food.
- The host does not get any benefit from the parasite.
- Some examples of parasites are Cuscuta (akash-bel), Cassytha (amar-bel), hookworms, • tapeworms, leeches, etc.

**Cuscuta (dodder)** is a plant that does not have chlorophyll; it sucks food from the host plant through adventitious roots called haustoria, Cuscuta is therefore a complete parasite.

**Mistletoe plant** has green leaves and so can carry out photosynthesis. This plant mainly absorbs water and minerals from the host plant. Therefore, Mistletoe is called a partial parasitic plant.

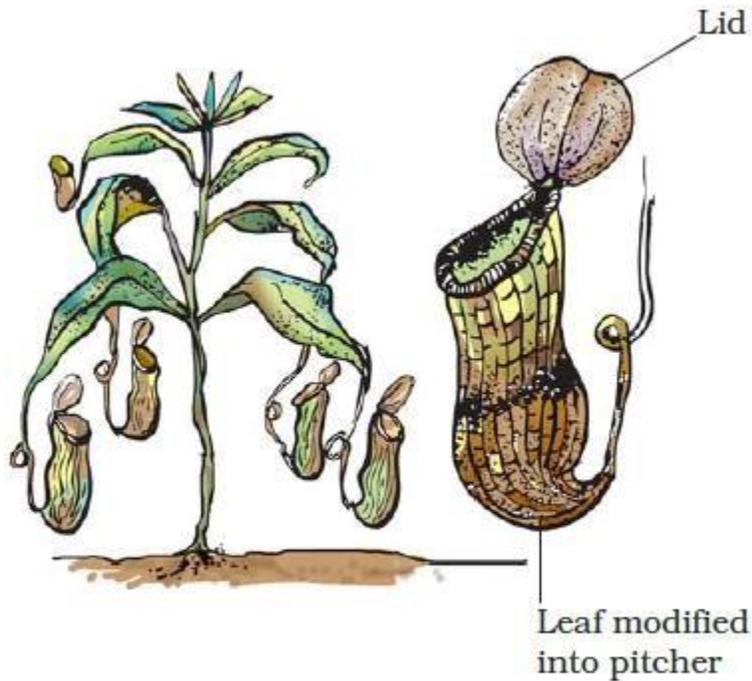
**Rafflesia** is a parasite of the Tetrastigma plant. It is completely dependent on its host plant for food.

### **Insectivorous Plants**

- The insectivorous mode of nutrition is observed in plants like pitcher plant and the Venus fly trap.
- These types of plants purely depend on other insects and small animals for their nutrition.
- Pitcher plants trap small insects inside the pitcher and insects are digested by the digestive juices secreted in the pitcher.
- Insectivorous plants grow in those soils which do not contain sufficient nitrogen mineral.
- These types of plants are green and carry out photosynthesis to obtain a part of food.

#### More Notes

- The leaves of the **Venus flytrap** have stiff hair like projections on their edges and the entire leaf is divided into two parts, with the middle acting as a hinge. When an insect sits on the leaf, it shuts tightly, trapping the insect inside it.
- The **Pitcher plant** has a pitcher- shaped structure filled with liquid. it has a flap -like structure on its mouth. The edge of the opening of the pitcher is slippery. The insect that sits on it slips and falls into the pitcher, getting trapped inside with the closing of the lid.
- The **sundew** plant has long needle like structures called tentacles covered with sticky substance called mucous. Once an insect sits on it, it gets caught in the mucous and the tentacles fold inward, trapping the insect.



*Pitcher plant showing lid and pitcher*

### **Saprotrophs**

- Mode of nutrition in which organisms or plants that obtain their nutrition from dead and decaying organic matter is called Saprophytic mode
- The plants which exhibit saprotrophic mode of nutrition are called as saprotrophs
- Saprotrophs secrete digestive juices onto dead and decaying matter to dissolve it and then absorb nutrients from it.
- Examples of saprotrophs are moulds, mushrooms, yeasts and some bacteria.

### **Symbiotic plants**

- In this mode of nutrition there is a close association between two different plants of different categories.
- In such type of association both the plants get benefited.
- For example certain fungi live in the roots of the trees. In this case tree provides nutrients to fungi and in return receives help from it to take up water and nutrients from the soil.

### **How nutrients are replenished in the soil •**

We know that plants continuously take

nutrients from the soil in order to synthesize food.

As a result of this amount of nutrients in the soil decreases.

- Nutrients in the soil are replenished by adding fertilisers and manures.

- Fertilisers and manures contain plants nutrients and minerals like nitrogen, phosphorus and potassium.
- Another way to replenish soil is to grow leguminous crops (for example gram, peas, pulses etc.) in the soil.
- The bacterium called Rhizobium can take atmospheric nitrogen and convert it into a soluble form.
- But Rhizobium cannot make its own food. So it lives in the roots of gram, peas, moong, beans and other legumes and provides them with nitrogen. In return plants provide food and shelter to the bacteria.
- Thus plants and bacteria have a **symbiotic relationship** here.

S. No.	Parasitic relationship	Symbiotic relationship
1.	The organisms involved are called host and parasites.	The organisms involved are called Symbionts.
2.	The parasite is benefited; the host is harmed.	The organisms involved are mutually benefited.
3.	Parasites have modified roots called haustoria to suck the nutrients from the host plant.	No special structure are used
4.	Some parasites may make their hos completely devoid of nutrients.	Amongst symbionts, one of the organisms provides nutrients while the other provides protection or other benefits.