

## Class 07 Chapter 01 Nutrition in Plants

**Food:** Food is fuel for all living organisms. It is because food provides energy to all living organisms to do their life activities. Food also helps them to grow and build their bodies

The chemicals present in food are called **Nutrients** like protein , vitamin, carbohydrates etc(read class 6 book)

**Green plants** can make their own food by using water and carbon dioxide. Animals cannot make their own food. They depend on plants directly or indirectly for their food.

The mode of taking food by an organism and utilizing it by the body is called **nutrition**.

**There are two modes of nutrition in organisms. They are autotrophic and heterotrophic nutrition**

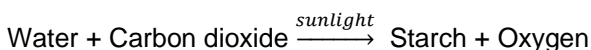
The mode of nutrition in which organisms make their own food is called Autotrophic Nutrition and such organisms are called autotrophs. eg. Green plants.

The mode of nutrition in which organisms depend on others for their food, is called **Heterotrophic Nutrition** and those organisms are called heterotrophs. eg. All animals, including human beings.

**PHOTOSYNTHESIS:** The process of preparing food with the help of water, carbon dioxide, sunlight and chlorophyll in plants is called photosynthesis. Chloroplast is the site of Photosynthesis. Chloroplast contain chlorophyll that contain green pigment that trap sunlight.

Think: The sun is the ultimate source of energy for all forms of life ?

Photosynthesis can be represented by the equation given below



### Chloroplast and the Process of Photosynthesis

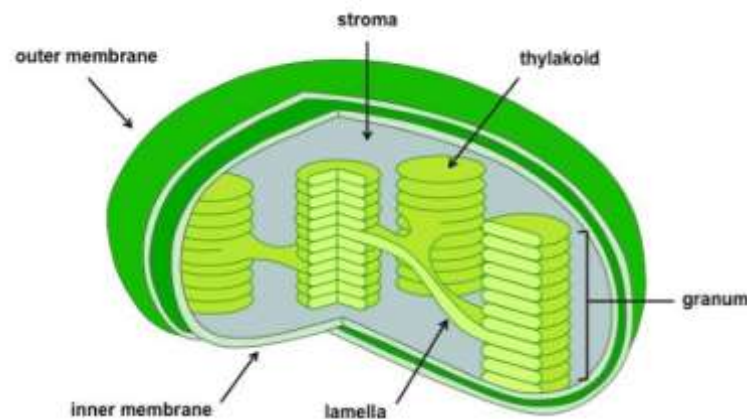


Figure 7: Structure of Chloroplast

- Chloroplasts are special cell organelles that are found only in plant cells. They are called the food producers of the plant cells.
- The chloroplasts are surrounded by two membranes called the **Inner and Outer Membrane**. The inner membrane surrounds **stroma** and **thylakoid** stacks.
- The chlorophyll molecules are present on each of the thylakoids. The chloroplasts convert the sunlight into sugars that are used by the plant cells.
- Hence, chloroplasts allow the conduction of the process of photosynthesis. The **chlorophyll** that can absorb the sunlight is present inside the chloroplasts.

- When the light of the sun hits the chloroplasts and the chlorophyll, the light energy is converted into chemical energy found in compounds such as ATP and NADPH.
- Then these energy molecules move into the stroma where carbon dioxide is attached to them. As a result of the molecular reactions, oxygen and glucose are created.

### Can leaves which are red or Brown or violet in colour conduct photosynthesis?

Yes, the chlorophyll is also present in leaves that are not green in color. They are of different colours because the other colour pigments are more than the green colour pigments in such leaves.

### Algae contain chlorophyll

Algae are green coloured organisms found in the stagnant water. They get their green color from chlorophyll. Since they have chlorophyll in them they are capable of conducting photosynthesis.)

### How do plants generate proteins and fats?

- Along with carbohydrates, plants can also produce proteins and fats which are formed with the help of Nitrogen.
- Nitrogen is present in large amounts in the air but plants cannot consume the nitrogen directly from the atmosphere.
- The soil often contains some bacteria that are capable of converting the nitrogen into nitrates which can be used by the plants.
- Also, fertilizers used by farmers and gardeners contain a high amount of Nitrogen which mixes into the soil and is used by the plants.

Self Assignment: 01

1. Define food?
2. why is food essential for us?
3. What is nutrients?
4. Define : Nutrition and its types
5. Define stomata? Write its function.
6. write chemical equation for photo synthesis?
7. Reason: Leaves of plants show different colours other than green ?

### OTHER MODES OF NUTRITION IN NON GREEN PLANTS

**Parasitic Nutrition:** The mode of nutrition in which non green plants gets nutrition from other green plants is called Parasitic Nutrition for example cuscuta . It cannot synthesize food. As it lacks chlorophyll, The plant which provides food is called host and the plants which consumes it is called parasite.

**Saprotrophic nutrition:** The mode of nutrition in which organism get nutrition from dead and decaying matter is called Saprotrophic nutrition and those plants are called saprotrophs. eg: mushroom, bread mould.

**Saprophytes like fungi grow on dead organic matter.** They produce digestive enzymes on the dead matter and change it into simple soluble form and absorb the nutrients and utilize it.

**Insectivorous Plants :** Some plants eat insects because their soil does not have certain nutrients like nitrogen for them to grow. They are called Insectivorous Plants like venus fly trap, pitcher plant.

**Symbiosis:** The mode of nutrition in which two different organisms live together help each other for nutrition is called symbiosis. The organisms are called symbionts. For example Lichens are organisms that consist of a fungus and alga. The algae gives food to the fungus and the fungus absorbs water and minerals and gives to algae.

### Replenishing the Soil with Nutrients

- Plants get their nutrients from the soil mainly hence there is a need to replenish the soil again with nutrients so that the plants can survive on it.

- Fertilizers and manure are often used to replenish the soil with the nutrients. They contain potassium, phosphorus and nitrogen all of which are important for the plants.
- A bacterium called Rhizobium is present in the soil which can convert nitrogen present in it in the form that can be consumed by the plants.
- The rhizobium generally lives in the roots of the plants such as peas, beans, grams and legumes and provides nitrogen to these plants. This again is an example of a symbiotic relationship. The farmers often do not need to use fertilizers while growing such crops

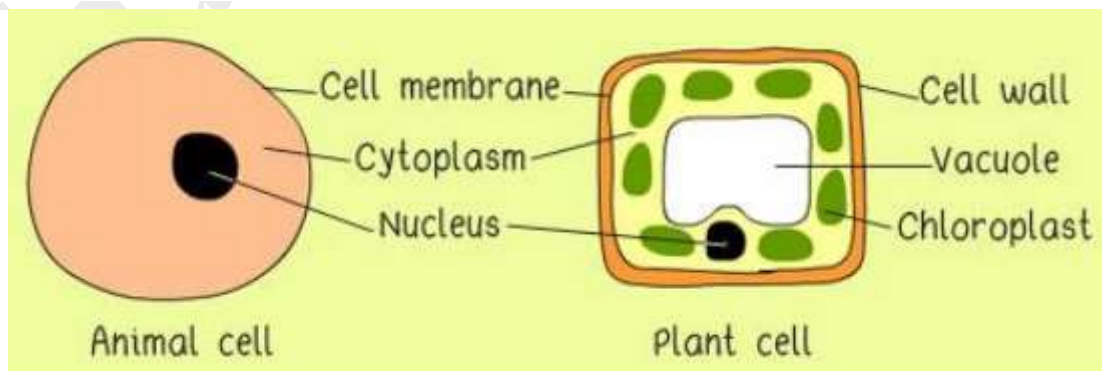
## Self Assignment - 02

1. What are the living organisms that cannot make their own food called?
2. What are the structures in cells that contain chlorophyll called?
3. What does 'photo' in photosynthesis refer to?
4. Which bacteria in the soil can convert atmospheric nitrogen into soluble compounds?
5. What type of plant is Cuscuta?
6. What do you call a mutually beneficial relationship between two living organisms?
7. Which organism gets its food from dead and decaying matter?
8. To which colour does starch turn to when iodine is added to it?
9. What is the ultimate source of all the energy needs of our body?
10. Why is nitrogenous fertilizer not added in soil in which leguminous plants are grown?

## Cells in Living Organisms

All living organisms are made up of tiny structures called cells. Some organisms (microscopic) contains only one cell while others plants and animals contain many cells of different kinds. Parts of a cell:

- **The Nucleus** - Every cell has a nucleus present in the centre that performs various functions of the cell.
- **The Cell Membrane** - Every cell has an outer boundary which protects the cell called the **Cell Membrane**.
- **The cytoplasm** - Every cell has a gel-like structure present in it called the **Cytoplasm**.
- **Cell organelles:** These are membrane bound structures found within a cell in the cytoplasm. The cell organelles have special function associated with them. Different cell organelles found in the cell are:
  - **Mitochondria** – Produces energy for the cell
  - **Endoplasmic Reticulum** – Produces lipids and proteins in cell
  - **Golgi apparatus** – Helps in exporting materials out of cell
  - **Lysosomes** – Help in digestion in the cell



Structure of Cell in Animals and Plants

## Solved assignment: Chapter Nutrition in Plants

A. (Tick) the correct options:

1. Rhizobium bacteria live in the root nodules of plant

- (a) wheat                      (b) rice                                      (c) barley                                      (d) pea $\checkmark$

2. Plants store food as

- (a) cellulose (b) sugar (c) glucose (d) starch $\checkmark$

3. Which of the following is an insectivorous plant?

- (a) Cucuta                      (b) Drosera $\checkmark$                                       (c) mistletoe                                      (d) lichen

4. The mode of nutrition shown by Cuscuta is

- (a) parasitic $\checkmark$                       (b) symbiotic                                      (c) saprophyte                                      (d) autotrophic

5. On adding iodine solution, starch

- (a) turns blue black $\checkmark$  (b) turns green                      (C) remains colourless                      (d) turns red

6. We keep healthy potted plant in a dark room for some days to the leaves

- (a) decolourise                      (b) defragment                      (c) destarch $\checkmark$                       (d) deprotein

7. The portion of leaf that is not exposed to sunlight, will not make

- (a) fats                      (b) protein                      (c) glucose  $\checkmark$                       (d) starch

**B. Fill in the blanks:**

1. Rhizobium bacteria provide -----to the leguminous plants.

2. Green plants make their food by the process of -----

3. Stomata are surrounded by -----cells.

4. Cuscuta is a ----- parasite.

5. The roots of saprophytes contain organisms called -----

Ans: 1. Nitrogen 2. photosynthesis. 3. Guard 4. Total 5. symbionts

**C. Very Short Answer Questions:**

1. Name any two heterotrophs.

Ans: Animals, Mushroom

2. Name any two insectivorous plants.

Ans: Venus flytrap, pitcher plants, butterworts, sundews

3. Name the pores through which leaves exchange gases.

Ans: Stomata

4. Name one plant in which photosynthesis occurs in plant part other than leaves. Name the plant part.

Ans: cactus in it's stem

5. What are the two main modes of nutrition in plants?

Ans: Autotropic and heterotrophic

6. Name the green pigment present in the leaves.

Ans: Chlorophyll

**D. Short Answer Type-I Questions:**

1. What are autotrophs?

Ans: Organism prepare own food like green plants

2. Why is Cuscuta called parasite?

Ans: Cuscuta is called parasite as it draw nutrition from host.

3. In which form, do plants need nitrogen?

Ans: Plants absorb nitrogen from the soil in the form of nitrate ( $\text{NO}_3^-$ ) and ammonium ( $\text{NH}_4^+$ )

4. Why are leaves of a plant green in colour?

Ans: leaves of a plant are green in colour due to presence of chlorophyll.

5. Why do some plants feed on insects?

Ans: some plants feed on insects to get nitrogenous compound from which they make protein

6. Define photosynthesis.

Ans: Photosynthesis is the food making process of green plant using  $\text{CO}_2$  and water in the presence of sunlight

### E. Short Answer Type-II Questions:

1. How can we decolorized a leaf? What will you conclude when white patches do not turn blue black adding iodine solution?

Ans: Leaf of green plant heated in a test tube containing alcohol in water bath to decolorize. if white patches do not turn blue black adding iodine solution showing absence of starch

2. What is saprotrophic mode of nutrition? Give one example.

Ans: The mode of nutrition in which organism derive nutrients from dead and decaying organic matter. Eg. Mushroom.

Saprophytes breakdown organic matter by secreting digestive juice into it. Then they absorb what they need from the digested matter.

3. How does the pitcher plant catch its food?

Ans : Pitcher plants have leaves that look like pitchers. The lid of the pitcher closes when an insect lands on the pitcher. The trapped insect slides down the wall of the pitcher and is digested inside it.

4. Algae and fungi live together in lichens.

(a) What is this association called? (b) What value can we learn from this association in nature?

Ans: The fungus provides minerals and water to the alga. The alga supplies the fungus with food that it manufactures. (a) Symbiotic relationship (b) We live with other in mutual benefit take help and give help.

5. Discuss the importance of photosynthesis.

Ans: Photosynthesis helps green plant to prepare glucose. Photosynthesis use  $\text{CO}_2$  and release  $\text{O}_2$  and thus balance the oxygen and carbon dioxide level in atmosphere. Water vapor released during photosynthesis also help in formation of cloud and bring rain.

### F. HOTS (Higher Order Thinking Skills) Questions:

1. What will happen if plant leaves are devoid of stomata?

Ans: if plant leaves are devoid of stomata there is no exchange of gases like  $\text{O}_2$  and  $\text{CO}_2$  . Plants cannot perform photosynthesis

2. What will happen if all the plants disappear from the earth?

Ans: Food chain unbalance and no life exist.

3. How do Rhizobium bacteria and leguminous plants help each other in survival?

Ans: Plant provide shelter to Rhizobium bacteria and Rhizobium bacteria provide nitrogenous compound that plants required to make plants protein.



## Class 07 Chapter 01 Nutrition in Animals

Food contains not only energy but also the raw materials needed for body's growth, maintenance and repair. Mostly animals take in solid food. This mode of nutrition is called **holozoic nutrition**.

Nutrition includes five steps

1. Ingestion : The process of taking food into the body is called ingestion.
2. Digestion: The process of breaking down of complex food into simple soluble form with the help of enzymes is called digestion.
3. Absorption : The process by which the digested food passes into the blood vessels of the wall of the intestine is called absorption.
4. Assimilation: The process in which the absorbed food is utilized in cells is called assimilation.
5. Egestion : The removal of undigested food through anus is called egestion

### **NUTRITION IN AMOEBIA**

Amoeba is a unicellular organism. It feeds on microscopic organisms. It takes in solid food through its body surface. So the mode of nutrition is holozoic.

Whenever the food touches the body surface of amoeba, it engulfs the food with the help of pseudopodia (false feet) and forms the food vacuole. The food is digested with the help of enzymes inside the food vacuole.

The digested food reaches the entire cell by diffusion. Amoeba uses the food for getting energy, making proteins for growth, etc.

The undigested food is thrown out of the body through its body surfaces.

### **NUTRITION IN HUMANS**

Human digestive system consists of mouth, oesophagus, stomach, small intestine, large intestine and anus.

We **ingest the food** into mouth cavity through mouth. Mouth cavity contains teeth, tongue and salivary glands.

Teeth help us to cut the food into small pieces, chew and grind it.

**Salivary Glands:** There are three pairs of salivary glands in our mouth. These glands secrete a watery fluid called saliva. It makes the food wet so that we can easily swallow it.

**Saliva** contains an enzyme called **amylase which helps in the digestion of starch into sugar**. Hence Digestion of food begins in the mouth.

**Tongue:** The tongue is an organ of taste. It helps to mix the food with saliva and make it wet. Mixing of digested food with saliva is called mastication. It also helps in rolling and pushing the food while swallowing.

**Oesophagus :** It is a tube which connects mouth and stomach. It is also known as food pipe. It helps to pass the food from the mouth to the stomach by rhythmic contraction and relaxation called peristalsis.

**Stomach:** Stomach is a bag-like structure where the food is further digested. The wall of stomach secretes digestive juice called gastric juice which contain enzyme pepsin and rennin as well as hydrochloric acid, and mucus . Mucus prevent action of HCl on stomach wall. HCl kill bacteria present in food and makes the food acidic which help further digestion of protein by pepsin and rennin. Pepsin and rennin help to digest protein. The semi digested food is called chyme.

**Small Intestine:** It is a very long tube and is about 7 metre in length. The small intestine is divided into the duodenum, jejunum, and ileum. Much of the small intestine is covered in projections called villi that increase the surface area of the tissue available to absorb nutrients from the gut contents.

**The small intestine** is much longer than the large intestine. So why is it called “small”? If you compare small and large intestines, you will see **the small intestine is smaller in width than the large intestine.**

**In small intestine the food is mixed with bile juice, pancreatic juice and intestinal juice.**

**Liver** secretes bile juice that is stored in gall bladder. Bile juice contain bile salt which make food alkaline. These break down large fat globules into smaller globules so that the pancreatic enzymes can easily act on them. This process is known as emulsification of fats.

**Pancreas:** Pancreas release pancreatic juice into small intestine. Pancreatic juice contain **amylase**, trypsin, lipase

Proteins is digested into amino acids by pancreatic trypsin and fats is digested into fatty acids and glycerol by Pancreatic lipase. Pancreatic amylase breaks down some carbohydrates (starch) into glucose.

The small intestine are covered with tiny projections **called villi**. Villi contain very tiny blood vessels. Nutrients are absorbed into the blood through these tiny vessels.

**Large Intestine:** It is about 1.5 metre in length and helps in absorbing water and remove undigested food.

**Anus:** The undigested food (faecal matter) is eliminated through anus and this process is called egestion.

**RUMINANTS:** Ruminants are grass eating animals : The stomach of a ruminant is divided into four chambers. As soon as the ruminant swallows the food, it enters the first chamber called rumen where it gets partially digested (converted to cud). From here, the food enters the second chamber reticulum from where it again reaches the mouth for chewing. The process of chewing the cud is called rumination. The food is again swallowed, and now it enters the third and the fourth chamber called omasum and abomasum for complete digestion. From here, it enters the small intestine for the absorption of nutrient.

Grass is rich in cellulose which is a kind of carbohydrate. Herbivorous animals can digest it. The other animals and humans cannot digest cellulose. There is a sac-like structure called caecum between the small and large intestine in ruminants. This sac contains some bacteria which produce an enzyme called cellulase which digest the cellulose.

### **Feeding and Digestion in Amoeba**

The Amoeba is a microscopic organism which is made up of only one cell

- The Amoeba has a cell membrane, cytoplasm, a nucleus which is round and dense and small vacuoles which are like bubbles present all over it.
- The Amoeba is capable of changing its shape and position on its own.
- Whenever it wants to intake the food the pseudopodia or finger-like projections come out of its body. The pseudopodia engulf the food in and the food gets stored in the food vacuoles.
- Then it secretes some digestive juices inside the vacuoles that help in its digestion of the food.
- The Amoeba then absorbs the digested food and uses it for fulfilling different life processes such as multiplication and growth.
- The Amoeba also secretes out waste products or undigested food out of its body.