7th – Nutrition in Plants I

All Living organisms have some basic characteristics that differentiate them from non-living things .like growth, execration etc.

Food: Any substance that can be broken down by chemical processes in the body of an organism to give energy is called food.

Nutrition: The process by which food is taken in by an organism and used by body is called nutrition.

There are two mode of nutrition a) Autotrophic b) Heterotrophic

a) **Autotrophic Nutrition**: The mode of nutrition in which an organism makes its own food is called autotrophic nutrition. All green plants making own food by the process of photosynthesis. Green plants are called producers or Autotroph, as they are capable of preparing their own food with the help of some non-living factors of the environment. Green plants take carbon dioxide from the air and water and minerals from the soil through the roots. The green coloured pigment called chlorophyll present in the leaves of plants traps energy from the sunlight. This kind of nutrition in which green plants make their own food by utilizing simple substances from the environment is called autotrophic nutrition. The process by which plants make their food is called photosynthesis (photo: light; synthesis: to combine).

Conditions Necessary for Photosynthesis

Chlorophyll: Green leaves are called food factories of plants. This is because the food-making process takes place in leaves. The leaves have a green pigment called chlorophyll. The green colour of the leaves is due to the presence of this pigment. The cells of green leaves and young stems have several green structures called chloroplasts. Chloroplasts contain chlorophyll. Light energy is absorbed by the chlorophyll. CO_2 is obtained from the atmosphere through stomata mostly present on the underside of the leaves.

Light Energy from Sunlight: Sun is the ultimate source of light energy. Chlorophyll traps the light energy from the sun during the process of photosynthesis.

Water and Minerals from Soil: Plants absorb water and minerals from the soil through their roots and leaves. The root system consists of a main or primary root, rootlets, or secondary roots, and root hair. Root hair increases the surface area of roots. They are found in great numbers near the tips of the roots. Water and soluble nutrients enter the root hair, pass through the secondary roots, and travel through the main roots into the stems. They reach the leaves through pipe-like vessels present inside the roots, stem, branches and leaves. These vessels are called xylem. The xylem forms a continuous passage for the water, minerals and other nutrients to reach the leaves.

Carbon Dioxide from Air: Leaves take in carbon dioxide and release oxygen through the tiny pores called stoma (singular—stoma). The stomata are present on the underside of leaves. Each stoma is surrounded by guard cells. The guard cells regulate the opening and closing of stomata.

Some Definitions:

Xylem: Pipe-like vessels present inside the roots, stem, branches and the leaves which form a continuous passage for water, minerals and other nutrients to reach the leaves from the root

ABHYAS Academy, Behind Pragat Shiv Mandir, Near Govt. College, Nishat Cinema Road, Ambala Cantt.
Ph No. +91-171-2631595, 9416541198, e-Mail: anusethi1968@yahoo.com Website: www. abhyasonline.in

Stomata: Tiny pores present on the underside of leaves which help in the exchange of gases. Stomata is bounded by two half-moon shaped guard cells. These guard cells regulate the opening & closing of stomata when there is enough light & water. These guard cells swells up and curve away from each other & stomata open this allows CO_2 to enter the cells of the leaf.

Guard cells: These surround the stomata and regulate their opening and closing.

Photosynthesis: Term photo synthesis was coined by Charlespeid Barnes in 1883. During photosynthesis the leaves containing chlorophyll in the presence of sunlight use carbon dioxide and water to synthesize glucose or sugar (simple carbohydrates). During this process oxygen is released by plants into the atmosphere. Plants use some sugar for its growth and to repair the worn out cells. The glucose ultimately gets converted into starch (a complex carbohydrate) and is stored in different parts of plant body. The starch is carried to various parts of plants through pipe-like structures called phloem. The food stored in different parts of the plants are used by humans and animals. The chemical equation representing photosynthesis is as given below:

$$6H_20 + 6C0_2 \text{ ----> } C_6H_{12}0_6 + 60_2$$

Water + Carbon dioxide —> Sugar + Oxygen

Sunlight, chlorophyll, water and carbon dioxide are essential for the process of photosynthesis. The food we eat is actually the solar energy captured by the leaves and stored in the form of food. This is why Sun is considered the ultimate source of energy.

Sunlight
Co_2
Chlorophyll } Essential for photosynthesis.
Water

Importance of Photosynthesis

1. Plants make food by the process of photosynthesis. This food is used for its own growth and repair of worn-out cells.
2. Almost all living organisms depend on the food synthesized by plants.
3. Photosynthesis helps to maintain the balance of oxygen and carbon dioxide in the air.

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