

INDIAN SCHOOL MUSCAT

CLASS X

BIOLOGY- NUTRITION IN PLANTS- REFERENCE MATIERIALS

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Nutrition in plants:

Green plants are autotrophic and synthesize their own food by the process of 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.

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:

Absorption of sunlight energy by chlorophyll.

Conversion of light energy into chemical energy, and splitting of water into hydrogen and oxygen by light energy.

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:

Sunlight

Chlorophyll

Carbon dioxide

water

green leaves make starch as food. Starch gives a blue black color with iodine solution.

Raw materials for photosynthesis:

The raw materials for photosynthesis are:

Carbon dioxide

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.

When water flows into the guard cells, they swell, become curved and cause the pore to open.

On the other hand, when guard cells lose water, they shrink, become straight and close the stomatal pores.

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.

The plants also need other raw materials such as nitrogen, phosphorus, iron and magnesium, etc., for building their body.

The plants take these materials from the soil.

Nitrogen is essential element used by the plants to make proteins and other compound.

Site of photosynthesis: Chloroplasts

The site of photosynthesis in a cell of the leaf are chloroplasts which contain chlorophyll.

Chloroplasts are present in the photosynthetic cells (mesophyll cells) of green plants. These cells contain more chlorophyll than other plant cells.

Experiments:

The experiments on photosynthesis depend on the fact that green leaves make starch as food and the starch gives a blue –black colour with iodine solution.

Experiment to show that Sunlight is necessary for photosynthesis:

Take a potted plant with green leaves and place it in a dark place for about three days to destarch its leaves.

Take a thin strip of aluminium foil and wrap it in the centre of one leaf on the both sides so that sunlight may not fall on this covered part of the leaf.

The remaining part of the leaf remains uncovered and exposed to sunlight.

Now keep the plant in sunshine for about six hours.

Pluck the partially covered leaf from the plant and remove its aluminium foil.

Remove its green color chlorophyll by boiling the leaf in alcohol with the help of water bath.

Wash the decolorized leaf with water to remove any chlorophyll which may be sticking in it.

Pour iodine solution over the colorless leaf and observe the change in colour of the leaf.

Observation:

On adding iodine solution, Covered part of the leaf does not turn blue-black showing that no starch is present in this middle part of the leaf.

The uncovered part of the leaf which received light turns blue-black showing that starch is present in this part of the leaf.

Inference: Since the part of the leaf which was covered and hidden from sunlight does not contain starch and the part of the leaf which was exposed to sunlight contains starch. Therefore, sunlight is necessary for photosynthesis.