Vision Empower & XRCVC

Teacher Instruction KIT

Nutrition in Plants

Syllabus: NCERT
Subject: Science
Grade: 7
Textbook Name: NCERT- Science Textbook for class VII
Chapter Number & Name: 1. Nutrition in plants

1. OVERVIEW

1.1 OBJECTIVES AND PREREQUISITES

Objective

- To understand the process of photosynthesis in plants.
- To know different modes of nutrition in plants.

Prerequisite Concept

- Grade 6, Chapter 2, Components of food-Nutrients, test for starch.
- Grade 6, Chapter 7,Getting to know plants- what does leaf contain.
- Grade 5, Chapter 1, Living World-process of photosynthesis.
- Grade 6, Chapter 15, Air around us – oxygen and carbon dioxide.

Content Index

*Kindly Note: Activities marked with * are mandatory*

2. LEARN

2.1 KEY POINTS

Leaves are the food factories of plants. Therefore all the raw materials must reach the leaf. Water and minerals present in the soil are absorbed by the roots and transported to the leaves. Carbon dioxide from air is taken in through the tiny pores present on the surface of leaves. These pores are surrounded by 'guard cells'. Such pores are called stomata.

Water and minerals are transported to the leaves by the vessels which run throughout the root, the stem, the branches and the leaves. They form a continuous path or passage for the nutrients to reach the leaf.

The leaves have a green pigment called chlorophyll. It helps leaves to capture the energy of the sunlight. This energy is used to synthesize food from carbon dioxide and water. Since the synthesis of food occurs in the presence of sunlight, it is called photosynthesis.

During photosynthesis, chlorophyll containing cells of leaves in the presence of sunlight use carbon dioxide and water to synthesize carbohydrates. The process can be represented in an equation:

Carbon dioxide + water (in the presence of sunlight and chlorophyll) → Carbohydrate + oxygen.

During the process oxygen is released. The presence of starch in leaves indicates the occurrence of photosynthesis. Starch is also a carbohydrate.

There are some plants which do not have chlorophyll, they cannot synthesize food. Like humans and animals such plants depend on the food produced by other plants. They use the heterotrophic mode of nutrition.

Fertilizers and manure contain nutrients such as nitrogen, potassium, phosphorus, etc. These nutrients need to be added from time to time to enrich the soil.

Mode of nutrition in which organisms take in nutrients from dead and decaying matter is called saprotrophic nutrition. Such organisms with saprotrophic mode of nutrition are called saprotrophs.

Parasitic plant that obtains all or part of its nutrition from another plant (the host) without contributing to the benefit of the host and, in some cases, causing extreme damage to the host.

Some organisms live together and share both shelter and nutrients. This relationship is called symbiosis. For example, certain fungi live inside the roots of plants. The plants provide nutrients to the fungus and, in return, the fungus provides water and certain nutrients. In organisms called lichens, a chlorophyll-containing partner, which is an alga, and a fungus live together. The fungus provides shelter, water and minerals to the alga and, in return, the alga prepares and provides food to the fungus.

3. ENGAGE

3.1 INTEREST GENERATION ACTIVITY

Interest generation activity

Activity 1: Preparation of Food

Materials Required: None

Prerequisites: None

Activity Flow

Discuss with the students any of the following questions to prepare them for the day's lesson.

- Ask the students, what they would need to prepare some tea?
- Plants also need some ingredients to prepare their own food.
- Tell the students that this chapter would cover what plants need and how they prepare their own food.

OR

- Ask the students what all living things need to survive?
- How do animals get food to survive?
- How do humans get food to survive?

Tell the student that plants are the only organisms that can prepare their own food without having to depend on other plants and animals for their food (as humans and animals need to). However there are some plants that depend on other plants or animals or dead materials for food.

OR

- Ask the student what food they eat generally at home?
- Why does their body need that food?
- Where do they get that food from – plants, animals?
- Do they have any pets at home (animals or birds) whom they also feed?

3.2 CONCEPT INTRODUCTION ACTIVITIES

Photosynthesis

Activity 2: Process of Photosynthesis

Materials Required: Tactile diagram of the process of photosynthesis.

Prerequisites: None

Activity Flow

- The process of photosynthesis can be verbally explained to the student as per the content.
- A tactile diagram can be shown to the student to reinforce the process at its basic level.
- After explaining the process of photosynthesis, the same should be explained in the form of an equation.
- While explaining the process, ask the student do they know components of air? And the composition and use of carbon dioxide and oxygen.

Plant leaf structure

Activity 3: Plant leaf structure

Materials Required: Tactile diagram of cross section of a plant

Prerequisites: None

Activity Flow

- Present a tactile diagram of a leaf and discuss its structure and its parts while letting the student touch and understand its structure.
- Verbally discuss the function of the leaf components.

Modes of nutrition

Activity 4: Other Modes of Nutrition

Materials Required: Plastic model of tree, thread/wool, origami pitcher plant, mushroom, slice of bread, gloves

Prerequisites: None

Activity Flow

Inform the children that plants that can produce their own food are called autotrophs. Also, there are plants that cannot produce their own food and they are called heterotrophs. Introduce the other modes of nutrition as mentioned below

<u>Parasitic Plants</u>

- Verbally talk about parasitic plants discussing which plant is the host which plant is the parasite etc.
- On a plastic model of a tree you can throw some thread/wool and have the student touch and get an idea of how the cuscuta plant winds around on a host plant.
- Discuss the color of these plants in the absence of chlorophyll.

<u>Insectivorous Plants</u>

- Ask the students if they know of any plants that eat animals?
- Talk to the students about insectivores based on the information given in the book.

- Ask the students if they know what a pitcher looks like.
- Show the students the pitcher plant and allow them to explore it to see what it looks like.
- Describe the modified leaf of a pitcher plant and mention that it is called so because it looks like a pitcher. Placing a leaf on the mouth of the pitcher demonstrates to the student how the pitcher plant traps an insect in its hair like structures that are in the pitcher. Here the insect gets entangled and the plant closes its lid over it.
- An origami model of the pitcher plant can be made and shown to the students allowing them to touch and demonstrate the working of this model.

Saprotrophs

- Ask the students to sprinkle some water on a slice of bread and keep it open on a plate for 2 days.
- Present a slice of bread on which fungus is already growing and tell the students that you had sprinkled some water on this and left it overnight.
- Give the students some thin gloves to wear through which they can touch and feel the thread cotton like fungus growing on this.
- Verbally explain to the students what saprotrophs are and about symbiotic relationships.

Also present some mushrooms to the students and have them touch the mushroom and discuss with the students how mushrooms grow.

Soil Nutrition Replenishment

Activity 5: Soil Nutrition Replenishment

Materials required: roots, clay lumps or blu tack adhesive

Prerequisites: None

Activity Flow

- Ask the students where do plants get their food from?
- They may answer that plants make their own food.
- Ask the students what all plants need to make their food?
- Lead the discussion so that the students' state that plants use the water and nutrients in the soil, the chlorophyll in their leaves and sunlight to prepare their food.
- Ask the student what would happen if all the nutrients in the soil get used up and over?
- Tell the students that they are going to discuss what plants do when the nutrients from the soil get used up and need to be replenished.

- Ask them if they have heard of what all people add to the soil when growing plants in their houses or gardens or in the field in villages.

- Ask them to talk with the school gardener and ask him/her what they do to look after the plants in the school compound.
- The students may tell you all about pesticides, insecticides and fertilizers like manure etc.
- The students may also talk about adding things like used tea or coffee leaves and other such organic waste to plants.
- Lead the discussion asking the students which are the nutrients needed by plants?
- Discuss with the students how soil needs to be replenished of its nutrients so that it does not get completely used up.
- Discuss why nitrogen in the air cannot be used by plants in this form, and the role rhizobium plays.
- Also discuss the symbiotic relationship of rhizobium with the plant.
- You can uproot the roots of some plants and stick small blu tack or clay lumps to it and hand over the same to the student to show him/her how rhizobium attaches itself to the roots of plants.
- The teachers can also show real plants/roots with root nodules for example, beans , clover, cowpeas, peanut, soyabean.

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

- Plant a potted plant with guidance from a gardener while adding manure to it.

- Have the student pick out different leaves from the garden and then discuss the colour of each of the leaves and whether or not chlorophyll is present in the leaves.

4. EXERCISES & REINFORCEMENT

4.1 EXERCISE & REINFORCEMENT

Reinforcement

Activity6: Read aloud- The Sunflower Story

Materials Required: None

Prerequisites: None

Activity Flow

- Ask the children to read aloud the story and relate to what they have learned in this chapter.

The Sunflower Story

There once was a cold and lonely sunflower seed, buried just beneath the garden SOIL and PROTECTED from the cold winter AIR. The seed was a patient seed that waited for the summer SUNLIGHT. Before the summer SUNLIGHT came, spring rains

WATERED the SOIL that PROTECTED the seed. Then the SUN began to shine. As the SOIL began to warm up, the seed's TEMPERATURE began to rise, too.

Suddenly the seed burst open, sending a shoot up toward the SUNLIGHT. The roots grew deeper into the SOIL to search for FOOD. As the shoot began to reach the surface, it could feel the warm TEMPERATURE and feel the cool AIR. The seed became a sunflower plant and began to grow taller and stronger as it enjoyed the SUNLIGHT, WATER, AIR, FOOD, perfect TEMPERATURE and SOIL. The gardener did her best to PROTECT the sunflower from insects, disease and weeds.

As the sunflower plant continued to grow it began to sprout leaves. These leaves enjoyed the SUNLIGHT, WATER, fresh AIR and warm TEMPERATURE. The leaves produced chlorophyll, which converted carbon dioxide from the AIR and nutrients and WATER from the SOIL into FOOD to make the sunflower plant grow.

The plant grew and grew until one day a beautiful flower began to form. The sunflower needed FOOD, WATER, SOIL, fresh AIR, SUNLIGHT, good TEMPERATURE and PROTECTION to do its job. As the flower grew, it began to produce sunflower seeds for the gardener, the birds and the squirrels to enjoy.

As summer turned to fall, the AIR TEMPERATURE began to cool, and the days grew shorter. The leaves didn't have enough SUNLIGHT to photosynthesize FOOD. After harvesting the seeds, the gardener stopped WATERING and PROTECTING the plant. The sunflower plant began to wilt and dry until finally it collapsed on the ground, scattering the last of its seeds into the garden SOIL.

The newly-scattered seeds were patient, buried just beneath the SOIL, waiting for the spring rains to bring WATER and the summer to bring SUNLIGHT, AIR, FOOD, warmer TEMPERATURES and the gardener's PROTECTION. And the seed burst open and began to grow . . . . And there is no end to this story.

4.2 IMPORTANT GUIDELINES*

Exercise Reading

It is very important that the children practice their learnings as well as their reading. Hence have the children read out the newly learned concepts from their textbooks or other available resources.

Perform Textbook Activity

It is good practice to have the children perform the textbook activities. Your textbook activities might not be accessible hence go through this resource to learn how to make textbook content accessible

Provide Homework

To evaluate their understanding and to help the student revise and implement the new learnt concept ensure to provide them with homework. Students should perform one or two of the questions mentioned above or from the textbook exercises with the teacher in Class and the remaining may be given for homework. Also, ensure that the student knows their special skills linked to independently using their accessible books as it will be critical to doing homework independently.

References:

- Handmade Origami pitcher plant: https://www.youtube.com/watch?v=a745qGfTJ7g
- Parasitic plant : https://www.britannica.com/plant/parasitic-plant
- The sunflower story: https://www.agclassroom.org/ok/lessons/intermed/plants.pdf

End of Document