Vision Empower & XRCVC

Teacher Instruction KIT

Reproduction in Plants

Syllabus: NCERT
Subject: Science
Grade: 7
Textbook Name: NCERT- Science Textbook for class VII
Chapter Number & Name: 12.Reproduction in Plants

1. OVERVIEW

1.1 OBJECTIVES AND PREREQUISITES

Objective

- To understand different modes of reproduction in plants.

Prerequisite Concept

- Parts of a plant – Grade 6, chapter 7. Getting to know plants
- Parts of a flower – Grade 6, chapter 7. Getting to know plants
- Formation of spores – Grade 7, chapter 1. Nutrition in Plants

Content Index

*Kindly Note: Activities marked with * are mandatory*

2. LEARN

2.1 KEY POINTS

Reproduction -The production of new individuals from their parents. It is the characteristic of living things.
Plants have two kinds of parts:
Vegetative parts- roots, stems, leaves and buds.
Reproductive part- flower. They give rise to juicy fruits with seeds. These seeds germinate and give rise to new plants.

Modes of reproduction
Asexual reproduction- The new plants are obtained without the production of seeds.
Sexual reproduction- The new plants are obtained from seeds.

Types of asexual reproduction

A) Vegetative propagation -New plants are produced from the vegetative parts like roots, stems, leave and buds.
Propagation by stem cuttings-A piece or part of a stem is called stem cutting. A new plant will arise from the bud at the axil (the point of attachment of leaf at the node) like Rose, champa.
Propagation by stem -A bud on the underground stem gives rise to new plants. For example: Potato, ginger, turmeric (The scars on the potato are called as eyes)
Propagation by leaves -Buds on the margin of the leaves of Bryophyllum plant, can give rise to new plants, when it comes in contact with moist soil.
Propagation by roots- plants like sweet potato and Dahlia give rise to new plants through roots.
Plants like cacti produce new plants from a part detached from the main body
Advantages of vegetative propagation
Plants take less time to grow and bear fruits and flowers than those produced by seeds.
New plants are exact copies as they are produced from a single parent.

B) Budding- Single celled organisms like yeast grow and multiply quickly under favorable conditions. A bulb-like projection called bud grows and gets detached from the parent cell. This process is repeated and new yeast cells are formed. Sometimes a chain of buds is formed.
C) Fragmentation -Alga like spirogyra reproduce through fragmentation. They break into two or more parts which grow into new individuals.
D) Spore formation – Plants like moss and ferns reproduce through spores. Fungus also produces spores. The spores germinate under favorable conditions. The spores have a protective covering to withstand conditions like high temperature and low humidity.

Sexual reproduction in plants:
The flower, which is the reproductive organ has two parts-male reproductive part called **Stamen** and female reproductive part called **Pistil**.
In some flowers like hibiscus, rose, mustard both stamen and pistil are present. Such flowers are called **bisexual flowers.**
In some flowers like corn, papaya and cucumber, either only pistil or only stamen is present. Such flowers are called **unisexual flowers.**
The stamen consists of anther that has **pollen grains**. These pollen grains produce **male gametes.**
The **pistil** has **stigma**, **style** and **ovary**. The ovary has one or two ovules which produce **female gametes** or **eggs.**
A male gamete and female gamete fuse together to form a **zygote**.
Pollination is the process of transfer of pollen grains from anther to the stigma of a flower. Pollens are carried by wind, water or insects**.**

Self-pollination – Pollens land on the stigma of the same flower or another flower of the same plant. **Cross pollination –**Pollens of a flower land on the stigma of a flower of a different plant of the same kind.
Fertilization- The fusion of male and female gametes to produce zygote.
Changes taking place-a) zygote develops into **embryo**.
b) Ovules into **seed** which contains the embryo
c) Ovary into **fruit**
Seed dispersal – It helps plants to invade new habitats and prevents the competition for sunlight, water, minerals and space among the plants.
Dispersal by **wind**-winged seeds and light seeds (maple, drumstick, grass)
Dispersal by **water** -spongy or fibrous outer coat (coconut)
Dispersal by **animals**-spiny seeds with hooks (Xanthium, Urena)
Dispersal by **bursting of pods**-Castor, balsam

2.2 LEARN MORE
None

3. ENGAGE

3.1 INTEREST GENERATION ACTIVITY

Interest generation activity

Activity 1: Reproduction- a characteristics of living things
Materials Required: Tactile diagram /model of a cat and kitten, dog and pup (optional)
Prerequisites: None

Activity Flow

- Ask them what are the young ones of a cat, a dog and a hen called?
- Do all living things produce new individuals? Do plants produce new individuals?
- Lead the discussion to emphasise that the production of new individuals from their parents is the characteristic of living things. Inform them that in this lesson, they will learn the different modes of reproduction -asexual and sexual.

3.2 CONCEPT INTRODUCTION ACTIVITIES

Asexual Reproduction

Activity 2: Vegetative and reproductive parts of plant
Materials Required: A potted plant with flowers and fruits /a model of a typical plant
Prerequisites: parts of a plant

Activity Flow

- Ask the students to gently touch the plant/model and identify the parts.
- Tell them that they are going to play a game. The teacher will name the food item and the students should identify the plant part.
- For e.g., Potato is a root, cauliflower is a flower, Palak is leaf, apple is a fruit.
- The stem, root, leaves are vegetative parts of a plant.
- Ask them if they love to eat mangoes/fruits? Ask them do they know from which part; the mangoes are formed? What do they do with the seed in the fruits?
- Lead the discussion to explain that the flowers are produced in the plants after some period of time.
- These flowers give rise to the juicy mangoes with seeds in it. New plants grow from the seeds. Hence flowers are the reproductive part of the plants.
- The reproduction of plants through seeds is called sexual reproduction.
- Some plants reproduce without the seeds. This mode of reproduction is called asexual reproduction.
- Asexual reproduction is carried out by vegetative propagation (new plants arise from the vegetative parts), budding, fragmentation and spore formation.

Activity 3: Reproduction from stem cutting

Materials Required: rose stem/ champa stem /money plant stem with a model / tactile diagram showing the node in the stem.

Prerequisites: None

Activity Flow

- Ask the students to take a stem of rose / champa with a node. Explain the term node with the help of tactile diagram or the specimen.
- Ask them to bury it in the soil.
- Tell them to water it regularly and after a few days they will be able to feel the new leaves and comprehend that a new plant has grown.
- Ask them to place the money plant stem in a jar of water and to record the development of the roots. They can remove the stem from the jar or if the container has a broad neck they can put their hands inside the container.
- Explain that the part of the stem/branch used for reproduction is called the cutting.

Activity 4: Reproduction from underground stem

Materials Required: Potato with scars (eyes) and/ a tactile diagram showing the buds and eyes on a potato.

Prerequisites: None

Activity Flow

- Ask the students to feel the potato. Tell them to feel the scars and buds rising from there. These scars are also called the eyes.

- Cut the potato into small portions with eyes on each. Ask the students to bury these pieces in soil and water them daily.
- Let them record the growth of the plant from these buds.
- Tell them that ginger and turmeric can be grown in a similar way.

Activity 5: Reproduction from leaves and roots
Materials Required: Bryophyllum specimen or tactile model showing the plants growing from the leaf bud, specimen of sweet potato, dahlia and cactus.
Prerequisites: None

Activity Flow
- On the tactile model, let the students feel the buds on the margin of the leaf.
- Explain that when the leaf touches the moist soil, each bud can give rise to a new plant.
- With the help of specimens explain that the roots of plants like sweet potato and dahlia give rise to new plants. Also, that the new plant of cactus can grow from a detached part of the cactus.
- Ask the students whether the new plants would be exact copies of the parent plant? It is because they are produced from a single parent.
- Lead the discussion to emphasise the other advantage of vegetative propagation that they grow in less time and bear fruits and flowers faster than those produced through seeds.

Activity 6: Budding
Materials Required: Tactile diagram showing the budding in yeast, modelling clay or dough
Prerequisites: None

Activity Flow
- Tell the student to take some modelling clay. Ask them to give it an oval shape. Tell them that it represents a yeast cell.
- Ask them to pull the clay at the tip and give it a small round shape or ask them to attach two small round pieces one above the other on the tip of the yeast model. These represent the buds.
- Tell them that similarly a chain of buds can be formed in a yeast cell.
- Ask them to break one bud from the yeast. This is the daughter cell. Add more clay till you get the original size. This represents the growing of a new cell into a matured cell. It will further develop buds as seen in the first cell.
- In this way, reproduction in yeast takes place by budding.
- The teacher can show the formation of new yeast by adding the pinch of yeast in water along with a spoonful of sugar kept in warm water.

Activity 7: Fragmentation

Materials Required: Long strips of green chart paper of about 10 to 12 cm
Prerequisites: None

Activity Flow

- Ask the students to imagine the long strips as algae. Algae are microscopic green plants.
- Ask them to make it into 2 or 3 parts. Explain that these pieces are fragments and they can grow into new individuals.
- When water and nutrients are available, alga grow and multiply rapidly by fragmentation.

Activity 8: Spore formation

Materials Required: Piece of bread, balloon with tiny paper balls/bits, tactile diagram of fungus and a leaf of fern
Prerequisites: Formation of spores

Activity Flow

- Take a piece of bread and moisten it with water. Leave it in a moist warm place for 2-3 days or until fluffy patches appear on them. Let the students feel the fungus with gloves on hand. How did the fungus grow on the bread?
- Ask the students to blow up a balloon with tiny paper balls/bits in it.
- Prick the balloon. What happens to the paper balls? They get scattered.
- Ask the students to touch the fungus model, and explain that the fungi on a bread piece grow from the spores which are present in the air. Explain that the sporangium consists of spores as in the balloon. These spores are light and keep floating in air.
- These spores are covered by a hard covering but under favourable conditions they germinate and grow.
- Let the students feel the spores under the leaf of the fern. Moss also reproduces through spores.

Sexual Reproduction

Activity 9: Sexual reproduction

Materials Required: china rose /mustard /petunia flower or detachable model and tactile diagram of stamen and pistil
Prerequisites: parts of a flower

Activity Flow

- Let the students separate the sepals, petals of the flower with hands over activity.
- With the help of tactile model, explain the parts of stamen (male reproductive part)-anther and filament and parts of pistil (female reproductive part)-ovary with ovules, style and stigma.
- The anther contains the pollen grains which produce the male gametes.
- The ovary contains one or two ovules. The ovules produce female gametes.
- The male and the female gametes fuse to produce zygote.
- Separate the stamen and pistil from the flower and let the students examine.
- Explain flowers that have only either stamen or pistil are called unisexual flowers while flowers containing both are called bisexual flowers. Give them the examples like corn for unisexual and rose for bisexual. Ask the students if the china rose flower/ mustard flower they examined was unisexual or bisexual and why?
- Lead the discussion to bring out the difference between unisexual and bisexual flowers.

Activity 10: Pollination

Materials Required: Glitter powder/dry talcum powder /flour
Prerequisites: None

Activity Flow

- Can you guess how the pollen from the anther reaches the stigma of the flower?
- Ask the students to place little powder on the tip of one finger. Now ask them to touch with a finger of the other hand. Is powder transferred to the second finger.
- Repeat the process of placing powder on the fingertip. Ask them to blow. Will the powder be carried away by the wind?
- Now pour water onto the finger. What will the students observe? Little powder /glitter is again washed away with water.
- Similarly, the pollens are transferred from the stamen of one flower to stigma of another flower through agents like insects, wind and water. This process is called pollination.
- If the pollen lands on the stigma of the same flower or another flower of the same plant, it is called self-pollination.
- If the pollen lands on the stigma of the flower of another plant of the same kind, it is called cross pollination.
- The male gamete fuses with the female gamete to form a cell called zygote. This process is called fertilisation. The zygote later develops into an embryo.

Fruit and seed formation

Activity 11: Fruit and seed formation
Materials Required: Tactile diagram of the fertilisation in ovary
Prerequisites: None

Activity Flow

- With the help of a tactile diagram explain the changes taking place in a flower after fertilisation.
- The ovary changes into a fruit and the ovule becomes the seed. The ripened ovary is the fruit.
- The seed contains the embryo covered with the seed coat.

Seed dispersal

Activity 12: Seed dispersal
Materials Required: 2 small pots with mud / container with wet cotton, mustard seeds
Prerequisites: None

Activity Flow

- Label the pots or containers as A and B. It can be labelled in braille or with different textures.
- Ask the students to place a few mustard seeds scattered in pot A and all seeds in one place in pot B.
- The seeds will start germinating. Which of the pots will have healthier plants after some time?
- Lead the discussion to emphasize that the plants in pot A will be healthier because they get enough sunlight, water, nutrients and space. In pot B there is a competition for these essential factors hence all the plants will not be healthy or may not grow at all.
- That is why farmers too scatter the seeds of the crops.
- In nature too, dispersal of seeds to different places are essential. How do seeds disperse in nature?
- What do you do with the seed after eating an apple? Similarly fruits and seeds are carried away by animals. Some seeds have hook like structure which helps to cling on to the bodies of animals and are thus carried to a different location when the animal moves.
- With the help of seed specimens or models explain how various types of seeds are dispersed. For e.g., winged seed of drumstick and maple, hairy seed of aak (madar) etc are carried by wind. Coconut has a fibrous outer coat which helps it to float on water, hence it is dispersed through water. Hence you will find coconut trees on the banks of the rivers or coastal regions.

- In case of balsam and castor the fruit bursts and the seeds are scattered.

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE*

- Name some fruit bearing trees. Discuss how the seeds may be dispersed and the part of the seed which helps for dispersal.
- Also discuss the methods of sowing seeds by farmers which help to prevent overcrowding of crops. For e.g.: Transplantation of paddy crops.

4. EXERCISES & REINFORCEMENT

4.1 EXERCISES & REINFORCEMENT

Reinforcement

Activity 13: Difference between the seeds from unripe and ripe fruits

Materials Required: unripe and ripe fruits

Prerequisites: None

Activity Flow

- Present some unripe and ripe fruits. Have the student cut open the fruits and observe the seeds. Ask the student to point out the difference between the seeds from the unripe and ripe fruit – let them find out the difference in texture, colour, hardness, etc.
- Ask the student if he/she thinks the seed from the unripe fruit can germinate?

Activity 14: Process of budding in yeast

Materials Required: parchment paper, rubber mat, pins, stylus, tactile diagram showing the budding in yeast.

Prerequisites: None

Activity Flow

- Have the student draw and represent the process of budding in yeast on parchment paper and a rubber mat.
- Before expecting them to draw it, let them first touch and observe a tactile drawing of the same.

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

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