Evershine

Learn & Grow Science

A book of Science

5

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Preface

Science books are prepared to take the learners from rote memory to self-learning, making each learning experience unique. It is strictly based on the latest guidelines presented by the NCERT. The series provides a direct and stimulating way for young readers to access information on science and its linkage with the environment.

The books are designed in a child-friendly manner aiming to ensure that all learners acquire knowledge and understand the topics in a better way.

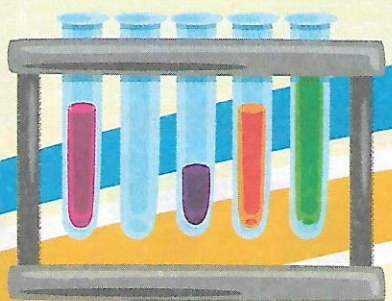
Key Features of the Series :

- Simple and lucid language to make learning easy.
- Self-explanatory illustrations for better understanding.
- Fascinating Facts to enhance knowledge.
- Oral Questions to give revision practice.
- Interactive and child-oriented approach.
- 'HOTS' to enhance higher order thinking skills.
- Life Skills to give additional knowledge.
- Recap for recapitulation.
- Guidelines for teachers for effective teaching.
- Model Test Papers to access the retention capacity of children.

It is hopeful that this series will be beneficial for both children as well as teachers.

However, there is always a scope of betterment, so any suggestions for the improvement of the series will be highly appreciated.

— Publishers



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1 Plants – Increasing the Numbers

Learning Outcomes

- ★ New plants from seeds and other parts of plants
- ★ Seed and its parts
- ★ How does a seed germinate?
- ★ Crops and vegetables

Plants give us many things like cereals, pulses, fruits, vegetables, spices, sugar, oil, etc. Plants also give us wood, fibres, rubber, gum, etc. Plants give us oxygen to breathe. They purify the air by taking in carbon dioxide. Plants prevent soil erosion by binding the soil. All living beings live and die. For life to continue, living beings produce young ones of their own kind. The process by which living things produce their own kind is called **reproduction**. Human beings and animals reproduce by giving birth to their own young ones. Plants reproduce through two ways. These are:

- ★ Reproduction through seeds
- ★ Reproduction through different parts

1. New plant from seeds

Most plants grow from seeds. The seeds are obtained from flowers and fruits. When seeds get enough water, air and sunlight, they germinate and grow into a new plant.

A plant produces a large number of seeds. All these seeds do not grow into new plants. Some seeds are eaten by birds, while some get destroyed. Many seeds are not able to develop into new plants due to lack of moisture or sunlight.

Structure of a seed :

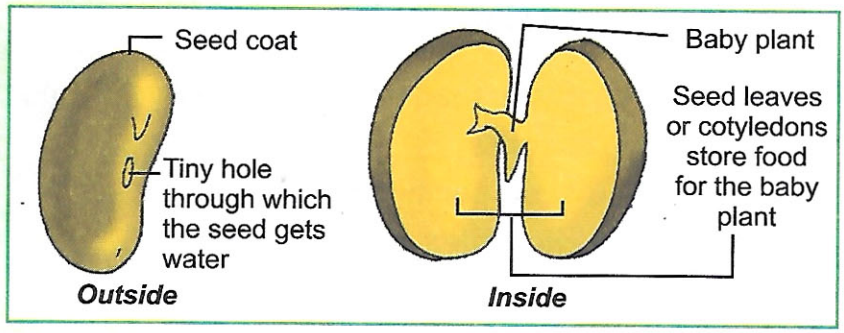
Do the following activity to understand the structure of a seed.

Activity 1

To study the structure of a seed.

Materials required : Gram seeds, glass, water.

Procedure : Take some gram seeds and soak them in water for 2-3 days. Take one of these seeds. Remove the outer covering of the seed carefully.



Seed structure

Observation : On removing the outer covering of the seed, you will find two seed leaves and a baby plant in between them.

A seed has three parts : seed coat, cotyledons and embryo. Seed coat is the outer covering of the seed. It protects the baby plant within the seed.

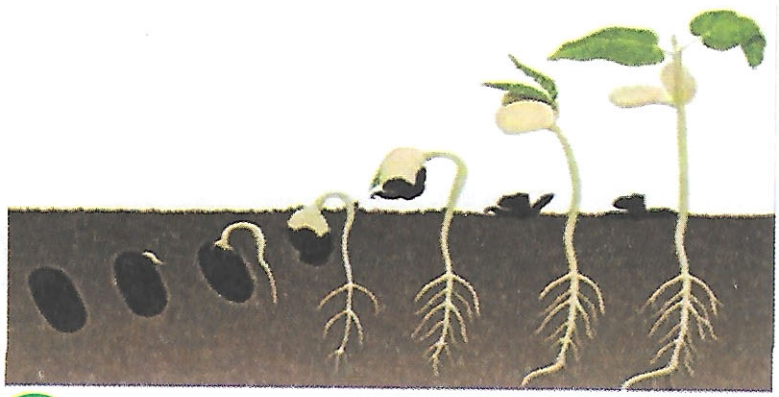
If you remove the seed coat of a gram seed, you will see two seed leaves. These are called **cotyledons**. They provide food to the growing plant. Seeds get food from the soil in the form of water and nutrients. Between the cotyledons is the baby plant, called the embryo. This baby plant has two parts, the shoot and the root. The shoot grows up to form the stem, leaves and flowers. The root grows down into the soil to form the root of the plant.

Fascinating Fact

* Seeds like bean, rajma and pea have two cotyledons. They are called dicotyledonous seeds.
* Some seeds like rice, wheat and maize have a single colytedon. They are called monocotyledonous seeds.

GERMINATION OF SEEDS

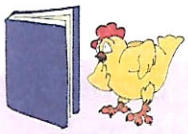
The development of a new plant from a seed is called **germination**. A seed needs the right amount of water, air and warmth to germinate.



STAGES OF SEED GERMINATION

The seed first absorbs water through its hole. This softens the seed coat and so it ruptures. A small root emerges from the seed. It is called the **radical**. It grows downwards. Then a small shoot emerges from the seed. It is called the **plumule**. It grows upwards. The seed with a small root and small shoot is called a **seeding**. The growing seedling uses the food stored in the cotyledons for growth.

After a few days, green leaves start appearing on the shoot. These leaves make food by the process of photosynthesis. The cotyledons dry up and fall off as all the food in them is used up. The seedling then develops into a new plant.



Activity 2

To study the conditions required for seed germination.

Materials required : Gram seeds, cotton, shallow dishes and water.

Procedure : Take four shallow dishes. Place cotton in each dish. Take a few gram seeds and put some seeds on each dish. Now follow the steps given below for each dish.

Dish I : Place this dish on a window sill so that it can get adequate air and sunlight. The cotton should be moist.

Dish II : Place this dish in the refrigerator and keep the cotton moist.

Dish III : Place this dish on a window sill so that it can get adequate air and sunlight. Do not wet the cotton.

Dish IV : Place this dish on a window sill so that it can get adequate sunlight. Keep the seeds and the cotton covered with water.

Observation : Observe the four dishes for a few days and write down the results.

On the basis of above results, fill up the following table.

Dish	Did the plant grow or not ?	Reason
I	_____	_____
II	_____	_____
III	_____	_____
IV	_____	_____

Oral Question

State yes or no:

1. Plants do not reproduce.
2. The outer covering of the seed is called seed coat.
3. The plumule grows into root.
4. Rice and wheat are monocotyledonous seeds.
5. Plants need air and warmth to germinate.

DISPERSAL OF SEEDS

The process of spreading seeds to different places is called **seed dispersal**. Seeds need to be dispersed because if they are not dispersed, many germinating seedlings will grow very close to the parent plant. This will result in competition among seedlings as well as with the parent plant. The competition is for light, space, water and nutrients. All these are important for plants to grow. Seeds can be dispersed in many ways. The dispersal of seeds takes place by various means such as wind, water, animals and explosion. These are called **agents of dispersal**.

Let's learn about them one by one :

1. Dispersal of wind

Seeds like madar, cotton, dandelion and maple have fine long hair around them. They are very light. So they are easily carried away by the wind.

Fascinating Fact

The seeds of sycamore are winged which spin through air like minihelicopters.

Madar seeds

Cotton seeds

Dandelion seeds

2. Dispersal of water

The seeds and fruits of plants which grow on or near flowing water are dispersed by water. The seeds of the coconut and waterlily are carried away by water from one place to another. The coconut has a fibrous outer covering and the waterlily fruit has a spongy part which make them float on water and hence these are easily carried away by water.

Coconut seeds floating on water

3. Dispersal by animals

Some seeds have hooks or spikes. They stick to the hairy skin of animals. They then get dispersed to distant places.

Human beings and animals eat certain fleshy fruits. After eating these fruits, they throw away their seeds. In this way, these seeds get dispersed.

Birds eat the fruits and the seeds are dispersed through their droppings. These germinate in places far away from the mother plant.

Tiger nail seed *Xanthium seed* *Spear grass*

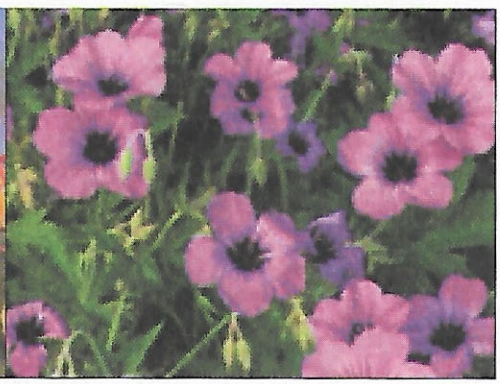
Seeds dispersal by animals

4. Dispersal of explosion

Some fruits on drying burst open or explode. Bursting of fruits helps to scatter the seeds. Pea, geranium and balsam burst open when they ripen. The seeds pop out and are scattered.

A pea pod bursting

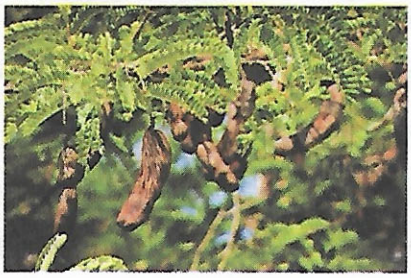
Balsam bursting



Geranium bursting

Oral Question

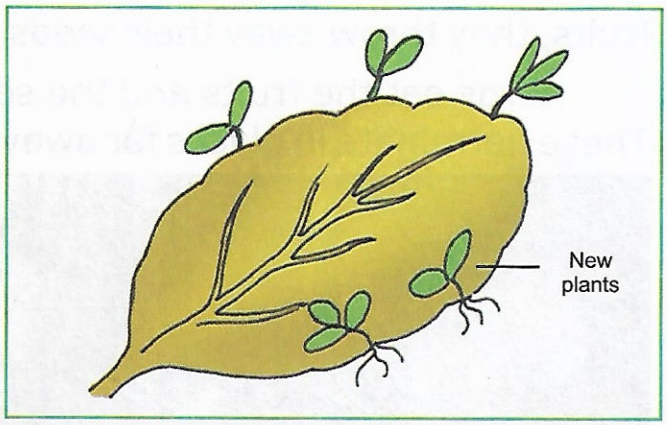
How do tamarind seeds disperse?



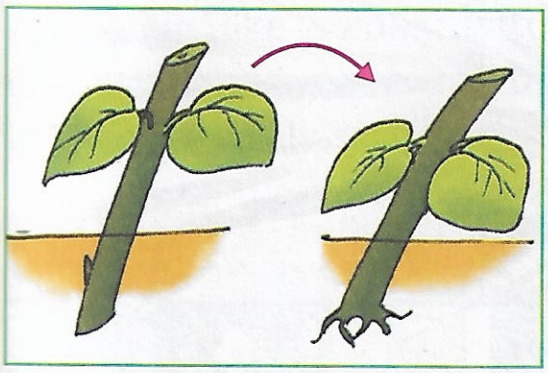
REPRODUCTION THROUGH DIFFERENT PARTS

Besides growing from seeds, new plants also grow from certain other parts such as roots, stem and leaves of the parent plant.

Reproduction from leaves : Some plants reproduce from their leaves. The leaves of a bryophyllum bear buds along their edges. New plants grow from these buds.



Bryophyllum leaf bearing buds along its margin



Stem cutting of rose sprouting leaves and branches

Reproduction from stems : New plants can be grown from stems. Some plants like rose, sugarcane, bougainvillea and hibiscus grow from the cuttings of their stems.

Farmers grow sugarcane by taking a cutting from the stem and planting it in the soil. Cuttings have buds on them which after some time grow into new plants.

Fascinating Fact

The reproduction in plants in which new plants grow from any body part of the parent plant is called vegetative reproduction.

Activity 3

To study the process of reproduction from stems.

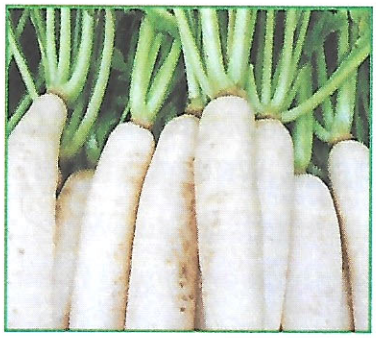
Materials required : Rose plant, flowerpot, soil and water.

Procedure : Take a flowerpot and fill it with soil. Cut the stem of a rose plant. Now, plant this cutting into the flowerpot. Keep this flowerpot in a place where it receives enough sunlight.

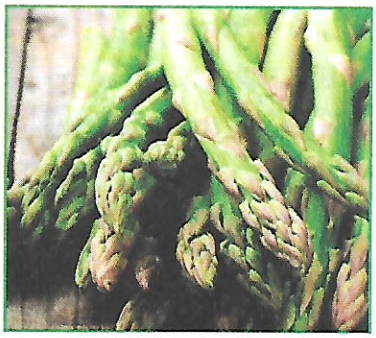
Observation : You will observe that the stem cutting gives rise to new leaves and branches.

Potato and ginger are underground stems. They have buds which are known as eyes. These buds grow into new plants.

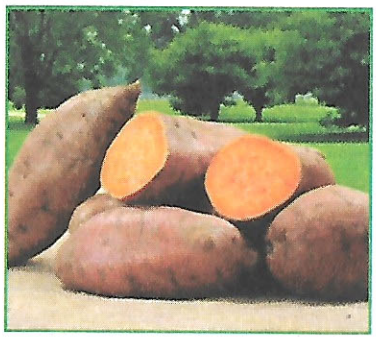
Reproduction from roots : Sweet potato, radish, carrot and asparagus are roots that have modified to store food. If these roots are replanted, they will grow into new plants.



Radish



Asparagus



Sweet potato

Reproduction From Spores

Some non-flowering plants do not produce flowers. But they too need to reproduce. So, they reproduce with the help of spores.

The spores are small, round and light and can be dispersed easily in various directions to give rise to new plants. Spores are found in fungi, like mushrooms and moulds.

CROPS AND VEGETABLES

Crops are the plants which are grown in fields by farmers for food or to obtain other useful products. Growing crops in the fields by farmers is called cultivation. Different crops are grown in different seasons. In India, crops that are grown in summer season are called **kharif crops**. They include rice, maize,

jowar, bajra, peanuts/cotton and jute.

Some other crops that are grown in winter are called **rabi crops**. Some of the rabi crops are wheat and barley.

Different plants not only grow in different climates and seasons but they also require different kinds of soil. If we know the conditions that are suitable for the germination of seeds, we can grow better crops.

Kharif Crops

Rabi Crops

Rice and jute grow in clayey soil which holds plenty of water. That is why rice is grown in and around West Bengal.

On the other hand, wheat is grown in the sandy soil. Cotton grows well in the black soil of central and western India. Tea plants need moist soil and grow on the slopes of hilly areas like Assam, the Nilgiris and Darjeeling. Coconut trees grow in coastal areas. Onion and groundnut need well-drained, sandy soil.

HEALTHY CROPS

Crops need proper care so that they can produce a better yield. Here are some tips for growing healthy crops :

- The crops to be grown should be selected after considering the kind of soil in the areas. For example, rice grows well in wet,clayey soil but groundnut needs porous, sandy soil.
- Manures and fertilizers should be added to the soil in sufficient quantities. This would make the soil fertile.
- The seeds sown should be of good quality.
- The seeds should not be planted too close to each other.
- Adequate water should be provided.
- Crops should be sprayed with insecticides and pesticides.
- Weeds should be removed.

RECALL

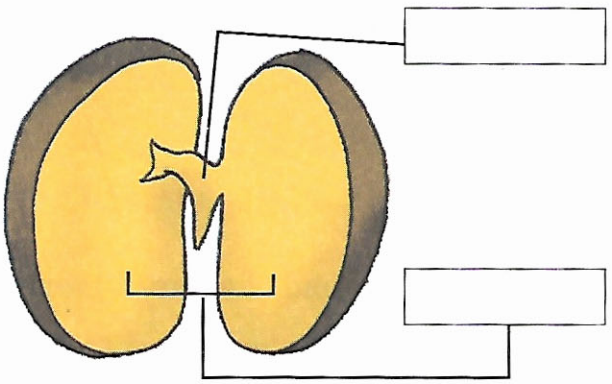
- Plants give us many things.
- Plants reproduce in two ways-reproduction through seeds and reproduction through different parts.
- A seed has three parts: seed coat, cotyledons and embryo.
- Air, water and sunlight are the conditions necessary for germination.
- The development of a new plant from seed is called germination.
- The process of spreading seeds to different places is called seed dispersal.
- Seeds are dispersed by wind, water, animals or by explosion.
- Growing crops in the fields is called cultivation.

Exercise

A. Answer the following questions:

1. What is reproduction?
2. What is germination?
3. What are the stages of seeds of germination?
4. What is dispersal of seeds?
5. What are the agents of dispersal?
6. How does sugarcane plant reproduce?
7. Differentiate between kharif and rabi crops.
8. How can we take care of our crops?

B. Label the parts and describe it :



Seed structure

C. Define the following terms:

1. Cotyledon
2. Germination
3. Seedling
4. Spores

D. Fill in the blanks:

1. ....., ... and ..... are the conditions necessary for germination.
2. The development of a new plant from seed is called .....
3. The process of spreading seeds to different places is called .....
4. Seeds are dispersed by wind, water, animals or by .....
5. Growing crops in the fields is called .....

E. Write 'true' or 'false':

1. Most plants grow from seeds. ☐
2. The shoot grows up to from the stem. ☐
3. Pea and balsam seeds disperse by water. ☐
4. Xanthium seed has hooks or spikes. ☐
5. Rice and maize are rabi crops. ☐

F. Tick (✓) the correct option:

1. Which of these reproduces from leaves?

a. Rose b. Sugarcane c. Bryophyllum d. All of these

2. Which of these reproduces from stems?

a. Bougainvillea b. Hibiscus c. Rose d. All of these

3. A seed having two seed leaves is called .....

a. Seed coat b. Cotyledon c. Monocotyledon d. Dicotyledon

4. Which of these is/are agent/agents of seed dispersal?

a. Air b. Water c. Animal d. All of these

5. Which of these is dispersed by wind?

a. Cotton b. Litchi c. Lotus d. All of these

HOTS

Arun grows vegetables in his field. He prefers to use manure instead of chemical fertilizers. Is he right in doing so?

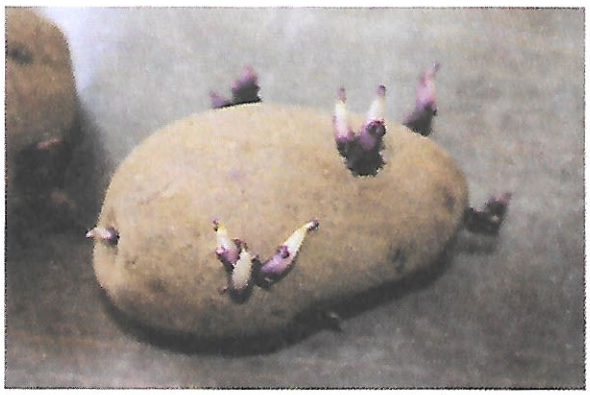
Things to do

A. Draw the stages of seed germination here:

B. Study the structure of a pea seed and a maize seed. Is there any difference between them? Find out more about seeds.

C. Collect seeds of different colours, shapes and sizes. Remember that all the pulses that we eat are also seeds. You can also collect seeds from fruits such as papaya, melon, cucumber, etc. Make a design on a chart paper. Use and paste the seeds that you have collected.

D. Take a potato and a piece of ginger. Plant them in different pots. Observe how the new plants grow from these:



A potato germinating

A ginger germinating

Write your observations here:

Life Skills

Grow seedless plant in your garden.
Take tops of vegetables like carrot, turnip and potato and keep them in a dish with soil. Add water to it. Keep it in sunlight for some days and see the little seedlings coming out.

Subject Link English (Analogy)

Complete the analogies:

1. Mango: Seed : : Pea : .....
2. Lily : Bulb : : Rose : .....
3. Bryophyllum : Leaves : : Sugarcane : .....
4. Lotus : Water : : Xanthium Seeds : .....
5. Pea : Explosion : : Geranium : .....

Teacher's Note Visit a plant nursery to let students observe the models of reproduction in plants,