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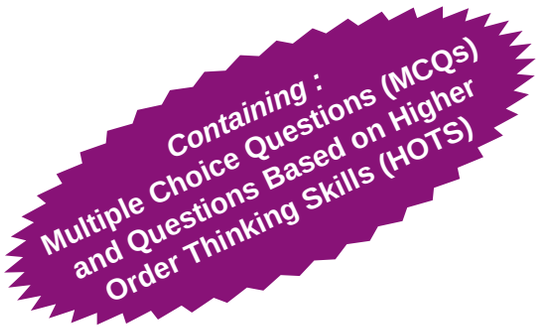

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LAKHMIR SINGH did his M.Sc. from Delhi University in 1969. Since then he has been teaching in Dyal Singh College of Delhi University, Delhi. He started writing books in 1980. Lakhmir Singh believes that book writing is just like classroom teaching. Though a book can never replace a teacher but it should make the student feel the presence of a teacher. Keeping this in view, he writes books in such a style that students never get bored reading his books. Lakhmir Singh has written more than 15 books so far on all the science subjects: Physics, Chemistry and Biology. He believes in writing quality books. He does not believe in quantity.

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It is the team-work of Lakhmir Singh and Manjit Kaur which has given some of the most popular books in the history of science education in India. Lakhmir Singh and Manjit Kaur both write exclusively for the most reputed, respected and largest publishing house of India : S. Chand and Company Pvt. Ltd.

An Open Letter

Dear Friend,

We would like to talk to you for a few minutes, just to give you an idea of some of the special features of this book. Before we go further, let us tell you that this book conforms to the NCERT guidelines prescribed by the Central Board of Secondary Education (CBSE). Just like our earlier books, we have written this book in such a simple style that even the weak students will be able to understand science very easily. Believe us, while writing this book, we have considered ourselves to be the students of the concerned class and tried to make things as simple as possible.

The most important feature of this book is that we have included a large variety of different types of questions for assessing the learning abilities of the students. This book contains:

(*i*) Objective type questions,

(*ii*) Subjective type questions,

(*iii*) Multiple Choice Questions (MCQs),

(*iv*) Questions based on Higher Order Thinking Skills (HOTS), and

(*v*) Activities.

Please note that answers have also been given for the various types of questions, wherever required. All these features will make this book even more useful to the students as well as the teachers. “A picture can say a thousand words”. Keeping this in mind, a large number of coloured pictures and sketches of various scientific processes, procedures, appliances, manufacturing plants and everyday situations involving principles of science have been given in this book. This will help the students to understand the various concepts of science clearly. It will also tell them how science is applied in the real situations in homes, transport and industry.

We are sure you will agree with us that the facts and formulae of science are just the same in all the books, the difference lies in the method of presenting these

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facts to the students. In this book, the various topics of science have been explained in such a simple way that while reading this book, a student will feel as if a teacher is sitting by his side and explaining the various things to him. We are sure that after reading this book, the students will develop a special interest in science and they would like to study science in higher classes as well.

We think that the real judges of a book are the teachers concerned and the students for whom it is meant. So, we request our teacher friends as well as the students to point out our mistakes, if any, and send their comments and suggestions for the further improvement of this book.

Wishing you a great success,

Yours sincerely,

Lakhmir Singh
Manjit Kaur

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CONTENTS

CHAPTER

1

PLANT REPRODUCTION

Learning Objectives:

- Reproduction in plants
- Growing plants from seeds
- Growing plants from stems, roots and leaves
- Seed dispersal

Reproduction is defined as a process by which an organism, whether a plant or an animal, produces new individuals. In most of the plants, they make new plants through their seeds. In this chapter, we will also explore the ways of producing new plants from different parts of plant.

REPRODUCTION IN PLANTS

Most of the plants bear flowers. These flowers develop into seeds. These seeds can give rise to a new plant of the same type as the parent plant.

A. Once the flowers bloom, their petals dry and fall off, and the flowers turn into small fruits.

B. These fruits grow big in size. They may have a seed or many seeds inside them.

C. These seeds give rise to the new plants.

Life stages of plant life

Seeds are important source of food. All the grains that we eat are seeds. For example, rice, wheat, gram, kidney beans, peas, are all examples of seeds. Coriander, mustard and cumin are also seeds. Seeds are of different shapes and sizes. Some seeds like castor, datura, mango, are big in size while the seeds of mustard, cardamom, cumin are very small in size.

Different shapes and sizes of seeds

Some seeds like that of cardamom have a pleasant smell

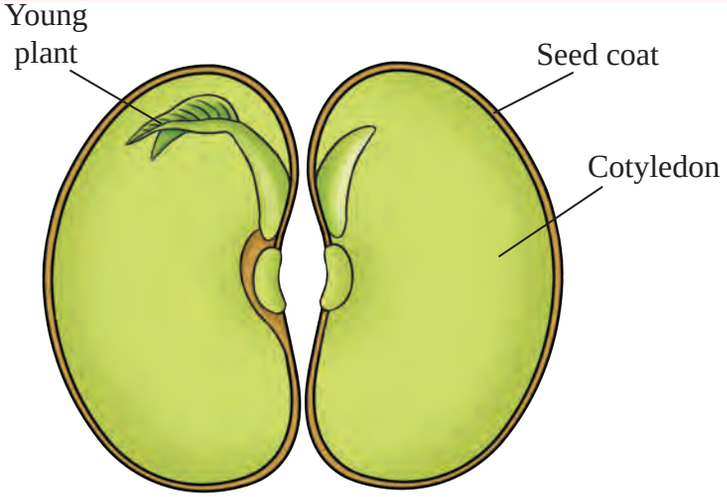
GROWING PLANTS FROM SEEDS

Plants produce many seeds. But not all the seeds grow into new plants. Seeds require favourable conditions to grow into new plants. Only those seeds which get the right conditions grow into plants. These right conditions are:

- Seeds should be healthy. Damaged seeds do not grow into new plants.
- Seeds should get right type of soil and minerals from it.
- Seeds should get right amount of water, air, light and warmth.

Structure of a Seed

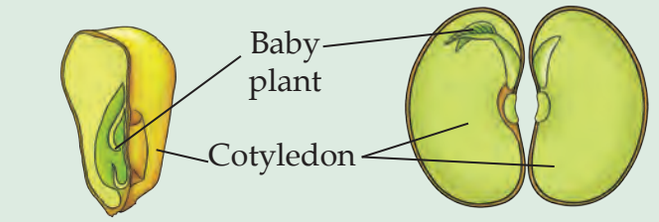
A seed is covered by a **seed coat.** Seed coat protects the seed. Inside the seed coats, seeds have fleshy seed leaves. These are also called **cotyledons**. They store food for the baby plant. The baby plant uses this food till it grows its own roots and leaves. After the food from the cotyledons is used, young plants continue making their own food through photosynthesis.



Structure of a dicot seed

Know more

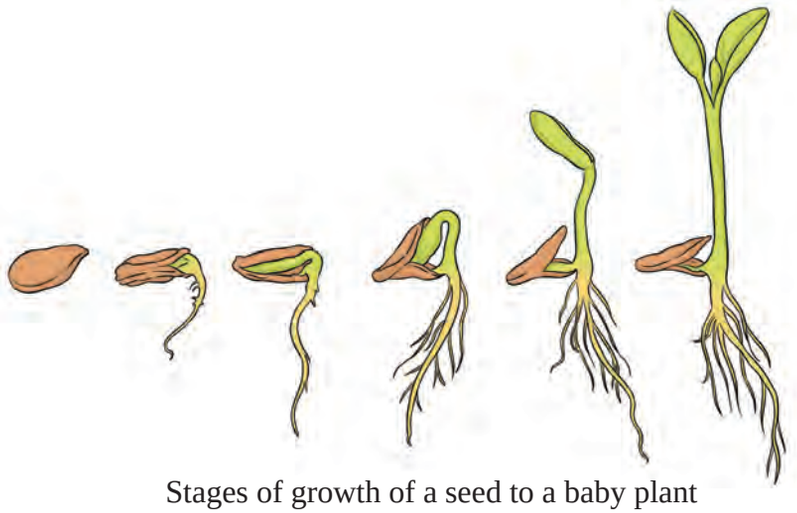
Some seeds have only one "seed leaf". They are called **monocotyledons.** Seeds having two seed leaves are called **dicotyledons.**



Monocot seed Dicot seed

Germination

When a seed gets all the favourable conditions, it grows into a baby plant, which is called a **seedling.** This process of a seed turning into a seedling is called **germination.** During germination, when seed receives adequate water, it swells leading to the bursting of its seed coat and gives rise to the baby plant. Inside the seed, the developing embryo gets its food from cotyledons. The baby plant first develops its root and then a tiny green shoot emerges from the other end.



Stages of growth of a seed to a baby plant

As the baby plant grows, it starts developing small green leaves inside the seed. The growing hook-shaped shoot straightens out and pushes the cotyledons above the ground. Gradually, the shoot elongates to form a proper stem and its leaves unfold eventually falling off the cotyledons. Finally, a mature plant does not show the cotyledons because they shrink and disappear with the growth of the baby plant.

ACTIVITY

Soak some moong seeds or green gram in water for 6 – 7 hours. Drain the water and tie *moong* in a clean piece of muslin cloth. Sprinkle some water on the cloth to keep it wet. Observe it after a day. You will see small white root-like structures coming out of the *moong* seeds. Take one seed in your hand. Remove the green coloured seed coat of the *moong* carefully and observe the other parts of the seed.

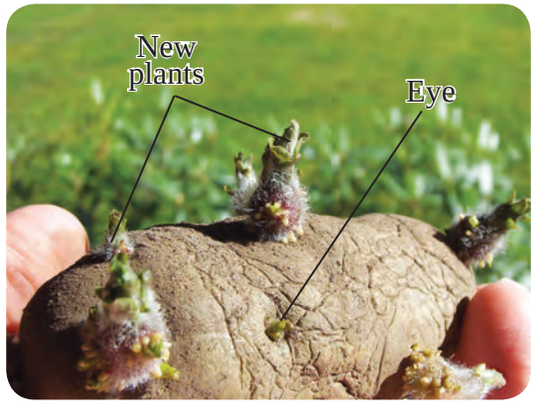
GROWING PLANTS FROM STEM, ROOTS AND LEAVES

Not all flowering plants depend on their seeds to reproduce new plants. Sometimes, new plants can grow from stems, roots or leaves of the parent plants.

Plants from Stem

The stems of rose, hibiscus and money plant can be used to grow new plants. Potatoes, ginger and onions are examples of underground stems. These can also be used to grow new plants. Potatoes and ginger have "eyes" on them. If we cut a piece of potato having an eye on it and put this piece in soil, a new potato plant will grow out of this piece.

Stem cutting gives rise to a new plant



New plants arising from the eye of the potato

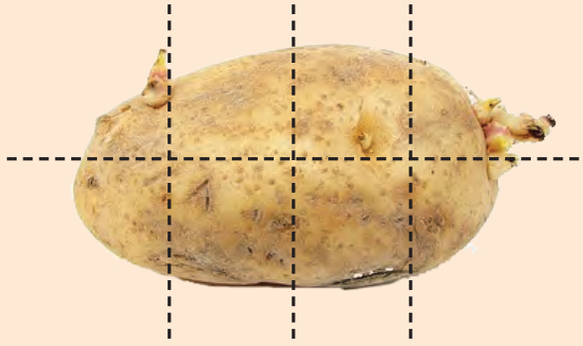
ACTIVITY

Objective: To grow a new plant from the stem

Materials needed: A potato, bottle, toothpick, knife, water, soil

Steps:

- Take a potato. Soak it in a bottle filled with water with the help of toothpicks.
- Keep the lower half of the potato immersed in water.
- After a few days, cut the potato into many parts such that each part has a bud.
- Take one part of this potato with bud and sow it in damp soil and water it every day.



Observation: After a few days, the sown piece of potato grows into a new plant.

Plants from Roots

Some roots, like those of sweet potato, dahlia, carrot and radish can give rise to new plants.

If we cut the top portion of a carrot and plant it in the ground, new plant will grow from it.

Carrot tops planted in the soil

Buds on bryophyllum leaf

Plants from Leaves

Sometimes new plants can grow from leaves. Bryophyllum is a common example of a plant which produces new plants from its leaves. Tiny buds grow in the margin of the parent leaf. After sometime, they fall off on the ground and grow into new plants. Each bud can give rise to a new baby plant.

SEED DISPERSAL

Fruits contain seeds and seeds give rise to new plants. If all the seeds of a plant fall just beneath it in the same place, they will not get enough nutrients, space and warmth to grow. Therefore, it is important that these seeds are distributed over a wide area where they stand a better chance of finding the right conditions to grow. The process by which seeds are carried to the new places away from the parent plant is known as **seed dispersal.** Dispersal means the scattering or distribution of something.

Different Ways of Seed Dispersal

Depending on the type of the seed and many other factors in nature, there are many ways of dispersal of seeds. We can divide it into four types: **wind dispersal, water dispersal, animal dispersal** and **explosion** or **bursting.**

Wind Dispersal

Some seeds are carried to a new place by the wind. These seeds are very light like the seeds of the orchid are almost as fine as dust.

Many seeds like that of dandelion, have hairy growths which act as parachutes and carry the seeds far away in the wind. The fruits of sycamore have winged seeds and are dispersed by the wind.

a. Orchid seeds

b. Dandelion seeds

c. Sycamore seeds

Animal Dispersal

Some plants have juicy fruits that animals like to eat. Only the juicy, fleshy part of the fruits is digested inside these animal's bodies. The stones and pips are excreted and produce new plants. This can take place far away from the parent plant as animals keep roaming about. Blackberry, cherry, apples, etc., are dispersed in this way. Birds also help to disperse the seeds through their droppings. Some fruits like that of the burdock plant and *datura* have seeds with hook-like structures. These seeds catch on to the fur of animals and are carried away with the animal.

a. Dispersal of seeds through bird

b. Dispersal of seeds by rat

Human beings also eat fruits like orange, mango, pear and plums. The fleshy part of the fruit is eaten and the seeds are thrown away. When the seeds get the right conditions they germinate.

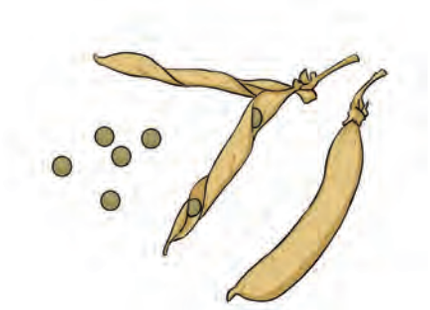
Water Dispersal

This method works for seeds which can float in water. Coconut seeds can travel thousands of kilometres across seas and oceans. Seeds of lotus and lily are also dispersed by water.

Dispersal of coconut seed by water

Dispersal by Explosion

Some plants have pods which explode or burst open when ripe. This mode of dispersal of seeds is called **explosion**. It causes the scattering of the seeds away from the parent plant. Examples of such plants are ladyfinger, peas, beans and balsam.



Dispersal of pea seeds by explosion

SUMMARY

- Reproduction is the process by which an organism produces new individuals.
- Most plants reproduce through seeds.
- The process of a seed developing into a new plant is called germination.
- A plant needs air, water, nutrients from soil, light and warmth to grow.
- New plants can also grow from other plant parts like stem, roots and leaves.
- The process by which seeds are carried to a new place away from parent plant is known as seed dispersal.
- Wind, water, animals are some main agents of dispersal.
- Seeds of some plants are also dispersed when they explode once they are ripe.

GLOSSARY

- **Seed coat:** outer covering of the seed which protects it against germs, injury and harsh weather conditions
- **Cotyledons:** fleshy part of the seed which stores food for the baby plant
- **Germination:** process of growth of a plant from seed into a new plant or seedling
- **Dispersal:** process of scattering of seeds away from the parent plant
- **Explosion:** dispersal of seeds with pressure on bursting of the dried seed pod

Objective Type Questions

1. Give one word for the following.

(*a*) Outer covering of a seed .....

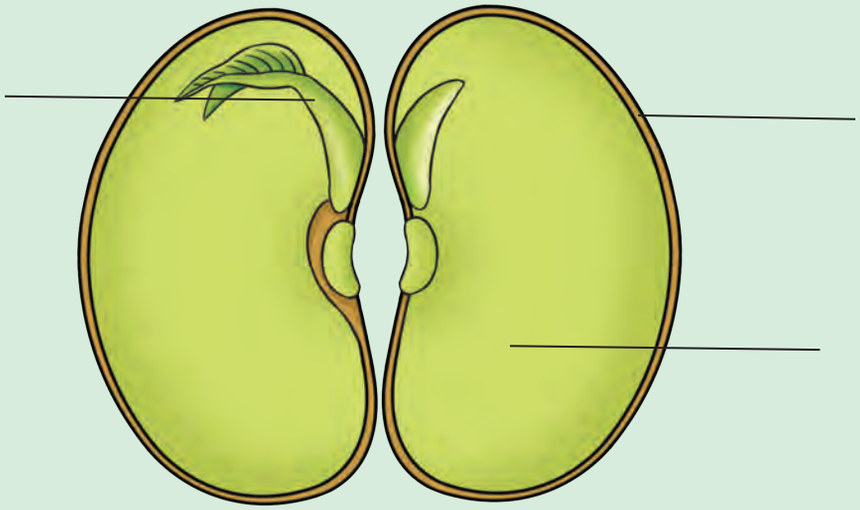
(*b*) The part of a seed that contains stored food for the baby plant .....

(*c*) A fruit that bursts with great force scattering the seeds .....

(*d*) A baby plant formed after germination .....

(*e*) A plant that gives rise to many new plants if its leaf falls on moist soil .....

2. Name the parts in the picture given below.



3. Draw lines to match each type of seed to its agent of dispersal.

(*a*) Coconut

(*b*) Guava

(*c*) Dandelion

(*d*) Lotus

(*e*) Burdock

(*f*) Balsam

(*g*) Sycamore

Wind

Water

Animals

Explosion

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