Rahi loves mangoes very much. One day she sowed a mango seed in her orchard. She also put water and manure in the soil. After some time, a small baby mango plant emerged from the seed. Rahi happily takes care of the plant and sees it growing everyday.

Have you ever wondered:
1. From where do seeds come?
2. How does a seed give rise to a baby plant?
3. Do all plants come from seeds?
4. How do farmers grow crops in the fields?

Nature has gifted us many beautiful and precious gifts. Among such gifts are plants and trees. They provide us with oxygen and food. We can only exist if plant life exists and flourishes.

So, let’s understand the life of a plant in detail.
LIFE CYCLE OF A PLANT
We have learnt earlier that all living things have a limited life span. So, they produce their own kind to maintain existence. The process by which a living being produces a new individual of its own kind is called reproduction. Living things reproduce so that their species may not die out.

Every young sapling gradually grows into a mature plant. A plant is said to be mature, when it bears flowers. Flowers play the most important role in forming a new plant. Flowers produce fruits which contain seeds.

When we visit a garden, we enjoy the sight of fascinating shapes and brilliant colours of beautiful flowers. Some of them also have a pleasant fragrance.

Have you ever wondered why flowers have bright colours and pleasant fragrance?

The beautiful colours and the fragrance of the flower attract the animals and insects to it. When these move from one flower to the other they transfer tiny particles called pollen. Pollen help in fruit formation. Fruits store food for the plant and bear seeds.

Seeds contain the baby plant. When a seed germinates, it grows out in the form of a young sapling. The process by which a seed produces a seedling or a baby plant is called germination. When the seed gets right amount of water, air and warmth, it produces a baby plant or seedling. As soon as the first leaves appear, the plant starts using sunlight to grow. Plants also produce flowers and use them to make seeds of their own.

Definition:
Reproduction is the process by which a living organism produces a new individual of its own kind.
SEEDS

What is a seed?
A seed is a tiny life support package, which gives rise to a new plant. If you cut an apple or an orange, you will find seeds inside. A seed can be a pip (like in apple), a nut (in walnut) or a bean (pea, pulses). A pine cone also has seeds inside. New plants grow from these seeds.

Parts of a seed: To study the parts of a seed, soak a bean seed for a few hours. It will swell up and will be easy to open. The outer hard cover of the seed that had swollen up is called seed coat.

The seed coat protects the seed until the conditions are favourable for its germination. A seed may remain inactive for weeks, months or even years. Remove the seed coat and you will find two seed leaves or cotyledons. The seed carries an embryo (baby plant) inside that contains the basic parts, i.e., small shoot (plumule) and root (radicle), from which the seedling develops. The food required to keep the embryo alive is in cotyledons.

Dicot and monocot seeds: Seeds like grams, peas and beans have two cotyledons. These seeds are known as dicot seeds. Seeds like maize, rice and wheat have one cotyledon and are known as monocot seeds.

Germination of a seed
Germination means development of a seed into a seedling or a young plant. A seed can only germinate under certain conditions. Warmth is required for seed cells to become active. Water is necessary for germination as it makes the seed coat soft. This helps the embryo or baby plant to break the seed open and come out. Germinating seeds also need air (oxygen) for breathing. Now perform Activity – 2.
You will see in the activity that the seed germinates only in jar D. Why? Jar D had water, air and warmth or sunlight required for the seeds to germinate.

In jar A, the seed did not get water while in jar B there was no air for the seed. Jar C did not have warmth or sunlight. Hence, we can conclude that water, air and warmth or sunlight are the essential conditions for the seeds to germinate.

Soak some gram or moong dal seeds overnight. Transfer these to a thin cotton cloth, like a handkerchief. Tie the seeds in this cloth and keep them wet by sprinkling water on them. After 2–3 days you will see sprouted seeds. These sprouts are nutritious and can be consumed with chopped onions and tomatoes.

**Stages of germination**

1. During germination, the seed absorbs water and warmth; the cells of the embryo start dividing and the embryo increases in size.

2. Eventually, the moist and soft seed coat breaks open and a small root from radicle comes out. The root grows downwards because of gravity.

3. Next the foliage leaves (first leaves) appear which form the shoot, which eventually produces stem and leaves. The shoot grows upwards towards sunlight.

4. The seedling grows green leaves and the cotyledons dry up. The green leaves start preparing food by photosynthesis.
Dispersal of seeds

Plants produce many seeds and these seeds contain tiny plants. But plants are fixed to the ground. What will happen if all the seedlings grow together at the same place? None of the seedlings will get enough food, water, sunlight and space to grow and hence, they will not survive. Therefore, it is important to scatter the seeds of a plant so that the young plants have sufficient food, water, sunlight and space to grow. Nature has different ways to scatter the seeds away from their parent plant. This process of scattering the seeds is called dispersal of seeds.

- **Agents of seed dispersal**
  Seed dispersal is carried out by many agents, like wind, water, animals and by explosion of fruits. Special structures of some seeds and fruits also help in dispersal.

1. **Wind:** Some seeds are very light and have hair or wings. They are easily carried away by the wind and gentle breeze to distant places. For example, drumstick seeds have wings. They spin along with the wind and are carried away. Seeds of cotton plant have a fluff around them and seeds of madar tree have hair. When the flower of a dandelion (football lily) dies, its flower head becomes a mass of seeds, each with a tiny parachute.

2. **Water:** Sometimes seeds are also carried and planted by flowing water. These seeds are usually light in weight and are able to float in water. The coconut tree, which grows near water, has a thick fibrous covering around its seeds that helps them to float. Water plants like lotus, water lily and hydrlia use water to scatter their seeds. The lotus fruit containing seeds is spongy and floats on water.
3. **Animals**: Many fruits and seeds are spread by animals, birds and humans. For example, cocklebur seeds have hooked spines. They get attached to the fur and hair of animals and also to human clothing. Animals, birds and insects eat fruits and sometimes the seeds come out in their droppings undigested. Squirrels collect nuts and bury them at different places or keep them in heaps for later use. Sometimes these buried nuts grow into new plants. Humans also eat various fruits, like mangoes and cherries and throw away their seeds.

4. **Explosion of fruits**: Pods of some fruits like, peas, beans and balsam burst open or explode when dry, thus scattering their seeds.

**NEW PLANTS FROM OTHER PARTS OF A PLANT**

Besides seeds, new plants can also be grown from other plant parts, like roots, stem, leaves and spores.

**Vegetative reproduction**

Some plants reproduce from body parts of the parent plant. Some parts of these plants can grow roots, which eventually form new plants. This is known as vegetative reproduction.

(i) **From roots** – Carrot, sweet potato and radish are the plants whose roots can grow into new plants.

(ii) **From stems** – A rose plant grows from its stem cuttings. A small piece of stem containing bud is cut from the plant and placed in moist soil. Roots start developing after some time and later a new plant grows. Money plant, hibiscus and sugarcane plants also grow in the same way. Potato is a stem that grows underground and has buds called eyes. Any part of the potato that has buds on it can grow into a new plant. Ginger and onions also grow in this way.

(iii) **From leaves** – The leaves of some plants like Bryophyllum grow plantlets on their edges. These plantlets or leaf buds have roots. They fall off and grow into new plants.
Spores
Some plants do not flower and thus, do not produce seeds. Such plants develop with the help of spores. Spores are small and round structures. These disperse and grow into a new plant. Ferns and mosses are some plants that reproduce through spores.

CROPS
Plants that are grown in a large area to obtain food or other useful products are called crops. The process of growing crops is known as cultivation. Different crops require different climate, soil and amount of water to grow well. Different crops grow in different seasons. The crops that grow in summer season (June to October) are called kharif crops, like rice, maize, jute, cotton, peanuts, bajra and pulses. The crops that grow in winter season (November to April) are called rabi crops, like wheat, barley, gram and mustard.

Crop production
Farmers work hard all year to grow good quality crops. Different stages of growing a crop are:

1. Ploughing: Before sowing seeds in the field, first the soil is prepared. It is loosened over the entire field. This is called ploughing.

2. Sowing: After ploughing, good quality and healthy seeds are sown.

3. Adding fertilisers: Seeds require nutrients for proper growth. Nutrient rich soil increases productivity. Fertilisers are added to the soil to make it rich in nutrients. Two types of fertilisers are used, namely manures and chemical fertilisers.

   Manures are natural fertilisers made from cow dung, and dead and decaying plants and animals. On the other hand, chemical fertilisers are man-made fertilisers. Urea is a chemical fertiliser. Excess of fertilisers may harm the soil and the crop.

4. Irrigation: Irrigation means watering the crop. After seed germination and growth of young plants, the field is irrigated properly.
5. **Protection:** As young saplings start growing into bigger plants, grazing animals can enter the field and destroy the crop. Putting a fence around the field can protect the crop. A crop also needs protection from pests, like rats and moles, and insects, like locusts and grasshoppers. Therefore, pesticides and insecticides are sprayed over the crop to protect from these pests.

6. **Harvesting, storing and transportation:** When the crops ripen, the farmer cuts it. This is called **harvesting.** The harvested crop is then stored safely in godowns and sold later. Usually, grains like cereals and pulses, which are non-perishable (do not rot quickly), are stored. The stored crop needs to be protected from moisture, rats, birds and insects.

   If the harvested crop is perishable like fruits and vegetables, then it is transported quickly. The stored crop is also transported to different places from where it reaches our kitchens.

**Recap:**

1. Plants, like all living things, reproduce.
2. Flowering plants reproduce from seeds.
3. The development of a seed into the sapling is called germination.
4. Air, water and warmth are required for germination.
5. The embryo develops into radicle that forms roots and plumule that forms shoot of the plant.
6. Dispersal or scattering of seeds can be carried out by wind, water, animals and by explosion of fruits.
7. Plants can also be grown from plant parts other than flower.
8. Growth of new plants from some other parts of plants other than seeds is known as vegetative reproduction.
9. Some plants grow from the spores of the parent plant.
10. The stages of crop production are: ploughing, sowing, adding fertilisers, irrigation, protection, and harvesting-storing-transportation.

**Exercises**

1. **Tick (✓) the correct option:**

   (a) Which one of the following does not act as an agent for dispersal?
   
   (i) Wind  (ii) Water  (iii) Sunlight  (iv) Humans

   (b) Which of these plants can be grown without seeds?

   (i) Rice  (ii) Mango  (iii) Carrot  (iv) Lemon
2. Fill in the blanks:
(a) Plants mainly reproduce from ____________.
(b) The two parts of a young seedling are __________ and __________.
(c) Crops are provided nourishment by addition of __________ and __________.
(d) Wind, water, __________ and __________ are the agents of seed dispersal.
(e) __________ and __________ are sprayed over crops to prevent them from pests and insects.

3. Name the following:
(a) A seed dispersed by water __________________________
(b) The process of development of a seed into seedling __________________________
(c) A plant that reproduces from its leaves __________________________
(d) A rabi crop __________________________
(e) A kharif crop __________________________

4. How do the following reproduce?
(a) Potato __________________________
(b) Mango __________________________
(c) Radish __________________________
(d) Cherry __________________________
(e) Bryophyllum __________________________
(f) Ferns __________________________

5. Answer the following questions:
(a) Define reproduction.
(b) What is germination?
(c) Name different types of seeds with examples.
(d) What is the importance of cotyledons?
(e) What is the role of seed in formation of a new plant?
(f) What are the conditions required for a seed to germinate?
(g) Why do we grow crops?
(h) What is vegetative reproduction? Give an example.
(i) What are spores? Name some plants that reproduce through spores.
(j) Name different stages of crop production.

6. HOTS and PSA:
(a) What would happen if seeds are not dispersed?
(b) Why should the harvested seeds be stored in airtight sealed containers?
### Activity-1:
Grow plants from the following:
- Carrot top by putting it in a saucer with some moist soil in it.
- Money plant by keeping it in a water container.

### Activity-2: Sweating plants
**Materials required:** Potted plant, clear plastic bag, water, pitcher, large rubber band/thread.

**Steps**
1. Water the potted plant so that the roots are well watered.
2. Cover the plant and the pot with the plastic bag. Secure the bag to the pot with the rubber band/thread so that no air can escape.
3. Leave the plant overnight. The next day you will notice water in the bag.
4. We see that water vapour is given off by the plants.

### Fun Time
Collect and press different flowers in an old thick book. You can also put them between newspaper sheets and keep them under bed mattress. Use these dried and pressed flowers to make collages, book markers, wall hangings, greetings, etc.