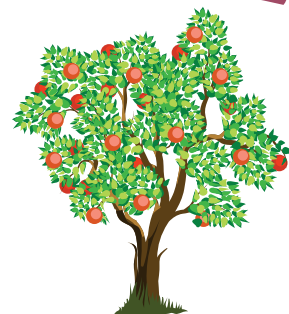


Reproduction in Plants

Learning Objectives

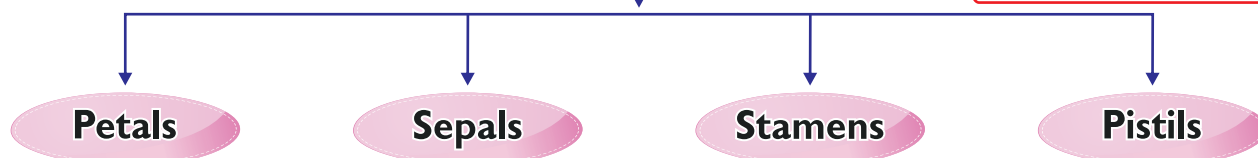
1. Plants and their various characteristics
2. Reproduction in plants by seeds
3. The structure of a flower
4. The structure of a seed and stages of seed germination
5. The features of seed dispersed by various agents
6. The various steps involved in growing crops



Let Me Answer

• Cyclic process of starting a new life, growing, and then coming back to the starting stage (reproducing) is known as what?

PARTS OF A FLOWER



PLANTS ARE OUR GREEN FRIENDS.

Plants make the world a beautiful place, where we live in their presence. They are very important to us. Do you know, why? Let us recall the characteristics common to all plants and animals.



Movement

Just like animals, plants too show movements, such as opening and closing of petals, turning face to the sun etc.

Breathing

Animals breathe in oxygen and breathe out carbon dioxide whereas plants take in carbon dioxide and give out oxygen.

Sensitivity

Animals are sensitive to external changes due to the presence of sense organs. Plants too are sensitive to light and gravity. Stems grow upwards, and roots grow downwards.



Both plants and animals grow during their lifetime.

Animals depend on others for their food, but plants make their own food using sunlight.

Animals give out waste, such as sweat, carbon dioxide, urine etc. Plants give out oxygen and water vapour.

Plants and animals reproduce more of their own kind.

You have already learnt in the earlier classes, about some of the characteristics of living things. Now you are going to learn more about growth, respiration and stimuli in living things.

In this lesson, we will be able to learn how plants reproduce. Reproduction is a process by which plants multiply to make more of their own kind. In plants, reproduction takes place by **seeds, spores** or by **vegetative propagation**.

REPRODUCTION

All flowering plants reproduce by giving rise to seeds. Seeds are produced inside **fruit**, which develops from a **flower**.

Structure of Flower

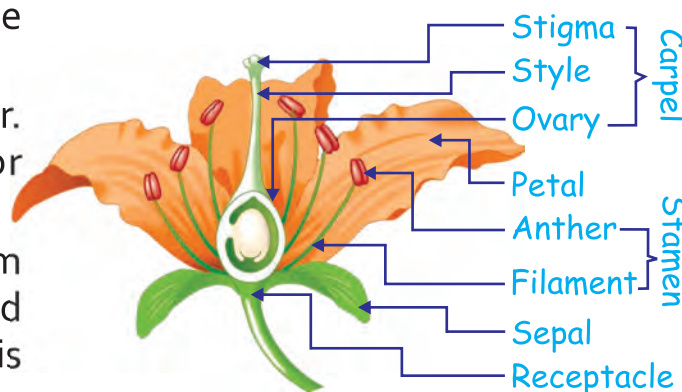
A flower has four parts – **petals, sepals, stamens** and **pistil**.

Sepals are green small, leaf like structures at the base of the flower. They protect the developing bud.

Petals are bright coloured parts of the flower. They are bright and attract insects for pollination.

Stamens are the third part of the flower from outside. A stamen has two parts : **anther** and **filament**. The anther carries **pollen grains**. It is generally yellow in colour. An anther is held up by a thread-like part called the filament.

Pistil is the innermost part of the flower. The pistil has three parts : **stigma, style** and **ovary**. The stigma is the sticky surface at the top of the pistil. It traps and holds the pollen. The style is the tube-like structure that holds up the stigma. The style leads down to the ovary that contains **ovule**. The pollen grains formed inside the anther



Structure of a Flower

move from the anther to the stigma. This process is called **pollination**.

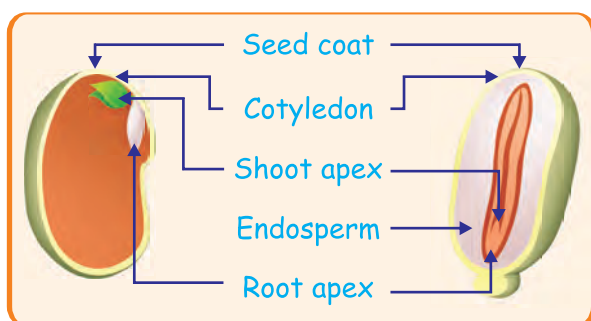
When a pollen grain lands on the stigma, a tiny tube grows from it and moves down the style into the ovary. On reaching the ovary, it fertilizes the ovule. Then the ovule becomes the seed and the ovary becomes the **fruit**.

Seeds of a plant differ from the seeds of other plants in their number, shape, size, texture and colour.

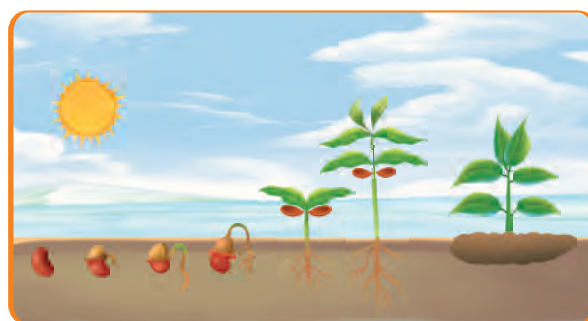
Structure of seed

Let us perform an activity to study the external and internal structure of a seed. All seeds have an external covering called the **seed coat**. It is of different colours in different seeds. Its function is to protect the seed.

There is a **scar** on one side of the seed. This is where the seed was attached to the plant. On the top of the scar, you will find a small hole. The seed absorbs water through this hole. The two parts of the seed are called **seed leaves** or **cotyledons**. They store food for the baby plant inside. The baby plant is present between the cotyledons. It develops a new root system and a shoot system, and grows into a new plant.



Structure of a Seed



Stages of seed Germination

Seeds like bean, rajma and pea have two cotyledons. They are called **dicotyledonous seeds**. Some seeds like rice, wheat and maize have a single cotyledon. 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, so it ruptures. A small root emerges from the seed. It is called the **radicle**. 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 a small shoot is called a **seedling**. 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.

Seed Dispersal

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 of these are important for plants to grow. Seeds can be dispersed in a number of different ways. They may be carried by wind, water or animals. Some plants even shoot out their seeds explosively. The size of seed is an important factor in their dispersal.

Dispersal of seeds by wind

Seeds dispersed by the wind must be light and small in order to be carried by the wind. This means that they can be carried to greater distances. They have hairs or wings to help them get carried away by the wind. The seeds of **hiptage**, **dandelion** and **cotton** have tufts of hair. **Sycamore** seeds are winged. They spin through the air like mini-helicopters.

Dispersal of seeds by water

Plants which grow in rivers, oceans and ponds or near water bodies, use water for the dispersal of seeds. The lotus fruit has a spongy part which helps it in floating.

Have you seen a coconut ? It is hollow on the inside and is covered with hairs on the outside. This makes it light and hence it can be carried by flowing water over long distances.

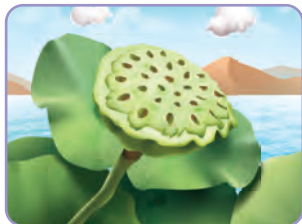
Dispersal of seeds by animals and humans

Animals and humans eat fruits and throw away their seeds. Seeds of apple, mango, orange etc., are dispersed in this way. Some seeds have hooks that stick to the fur of animals or to the clothes of humans and get dispersed. Such an example is of the **cocklebur** seeds.

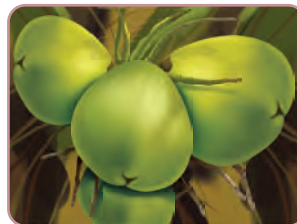
Birds swallow some seeds which come out with their droppings. Squirrels collect nuts and bury them to be used in winters. They often forget where they had buried the seeds. So when the conditions become favourable, these seeds grow into new plants. While eating fruits, some seeds get stuck on the beaks of birds. When they rub their beaks on the bark of trees, the seeds fall down and later on they grow into new plants.



Seeds of Dandelion with Tufts of Hair



The Spongy Part of a Lotus Fruit



Coconut can be dispersed by water.



Cocklebur Seeds with Hooks

Dispersal of seeds by explosive method

Some plants have pods which explode and burst open when they ripe. This scatters the seeds in all directions. Examples are **balsam**, **pea**, **lady finger** and **tamarind**.

2. New plants 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. They can be dispersed easily in various directions to give rise to new plants. Spores are found in **fungi** like **mushrooms** and **moulds**.

3. Vegetative Propagation

When plants reproduce with the help of their body parts such as roots, stems and leaves and not through seeds, it is called vegetative propagation.

4. Reproduction by roots

Carrot, **turnip**, **radish** and **sweet potato** are the roots that store food in them. They are swollen because of stored food and are called **tuberous roots**. When these roots are planted in soil, they give rise to new plants.

5. Reproduction by stems

Onion, **ginger** and **potato** are underground stems. They also have stored food in them. These stems bear buds from which new plants can grow.

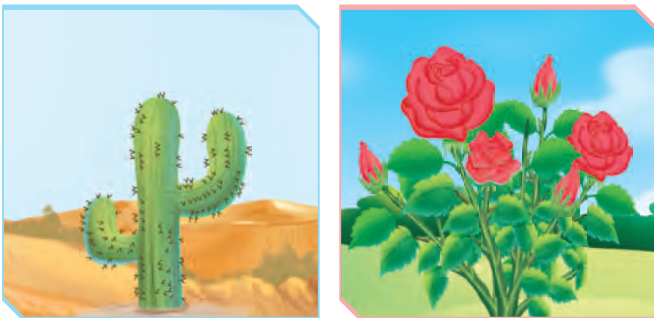
6. Reproduction by Leaves



Reproduction by leaves in
Bryophyllum and Begonia

Some plants have leaves which develop buds on their margins. These buds develop into plantlets which later separate out from the parent plant and grow into new plants. **Bryophyllum** and **begonia** plants reproduce in this manner.

7. Reproduction by stem cuttings



Cactus and Rose are grown by stem cutting.

A small piece of a mature stem with some buds on it, is cut off from the parent plant. This piece of stem is then planted into the soil and watered regularly. After a few days, it develops roots and buds and grows into a new plant. Plants grown in this way include **rose**, **sugarcane**, **bougainvillea**, **cactus** and **hibiscus**.

CROPS

Crops are the plants which are grown in the fields by farmers for food or to obtain other useful products. Growing crops in the fields by farmers is called **cultivation**.

Some crops are grown in summers. They are called **kharif crops**. They include rice, maize, jowar, bajra, peanuts, jute and cotton. Some other crops are grown in winter. They are called **rabi crops**. They include wheat and barley.

Growing crops

Healthy crops are important because they help in feeding the people of a country. A good crop adds to the wealth of the nation. There are several things that farmers keep in mind while growing crops. The following are the different stages for growing a healthy crop.

- | | | |
|------------------------|---------------------|----------------------------|
| a. Ploughing the field | b. Sowing the seeds | c. Addition of fertilizers |
| d. Irrigation | e. Crop protection | f. Harvesting |
| g. Storage | | |

Ploughing the field

Ploughing is the first preparation for growing crops. The purpose of ploughing is to turn over the upper layer of the soil and bring the fresh nutrients to the surface. It also helps in burying the weeds and the remains of previous crops, allowing them to break down. Ploughing aerates the soil and allows it to hold moisture.



A farmer ploughing the fields

Sowing the seeds

Sowing is the process of planting healthy seeds.

Addition of fertilizers

Farmers mix fertilizers in the soil to make it rich in minerals for the better growth of crops. There are two types of fertilizers.

- ♦ **Manure** is a natural fertilizer made from the remains of dead and decaying plants or from cow dung.
- ♦ **Chemical fertilizers** are man-made like urea, nitrates and phosphates.



A farmer adding fertilizer to crops

Irrigation

Crops need water to grow. Farmers water their crops at the right time with the right amount of water.



Crops being irrigated

Crop protection



A farmer spraying pesticides in the field

As the crop grows, it needs to be protected from herbivorous animals. This is done by creating a fence around the field. Besides this, pests like rats, mice and insects also harm the crops. Farmers use pesticides and insecticides to kill the pests. DDT and gammaxene are some common insecticides.

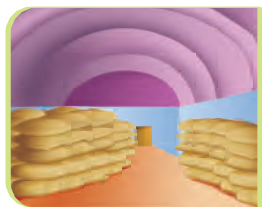
Harvesting



Harvesting of wheat crop

When the crop ripens, it is cut down. This is called harvesting. After harvesting, grains like wheat and rice are stored in godowns. This protects them from getting spoilt by moisture or eaten by rats, birds or insects.

Storage



Storage of crops

Vegetables and fruits cannot be stored for a long time at room temperature as they get spoilt very quickly. They are stored in cold storages.

Facts to know



- ⊙ The reproduction in plants can be of two types : asexual reproduction and sexual reproduction.
- ⊙ Because plants do not have the ability to move they must rely on external factors to facilitate fertilization.

LET'S RECALL

1. Plants reproduce by seeds, spores and by vegetative propagation.
2. Stamens and pistils of a flower are involved in reproduction.
3. The ovary of the flower changes into the fruit and ovules into seeds after fertilization.
4. A seed needs, air, water and warmth to germinate.
5. Wind, water, animals and humans are the agents of seed disposal.
6. Various stages and requirements are involved in growing healthy crops.





aerate	: to mix water with air
insecticide	: a chemical substance used for killing insects
margins	: the amount of space, time etc.
pesticide	: a chemical substance used for killing crop eating insects
scar	: a mark on the skin



Cross Curriculum Connect



1. Answer the following questions in short.

- What is germination of seeds ?
- What are spores ?
- Why is ploughing done before planting seeds in a field ?
- Why are cereals stored in godowns ?

2. Fill in the blanks.

plants anthers seed coat radicle crops

- Pollen grains are found in the
- A seed is protected by a
- Water, air and warmth are needed for
- The small shoot emerging from a germinating seed is called a
- Plants which are grown in the fields are called

3. Answer the following questions.

- What are the functions of sepals and petals of a flower ?
- What is the function of a cotyledon ?
- Why is seed dispersal important ?
- How do animals help in seed dispersal ?
- What are the characteristics of seeds dispersed by :
 - wind
 - water

- f. Define the following.
- (i) Manure
 - (ii) Fertilizers
 - (iii) Pollination
 - (iv) Germination

Formative Assessment

4. Tick (✓) the right and cross (✗) the wrong statements.

- a. The innermost part of the flower is pistil. ☐
- b. Seeds dispersed by the wind must be heavy. ☐
- c. Some non-flowering plants reproduce with the help of spores. ☐
- d. Coconut is dispersed by air. ☐
- e. Animals grow throughout their life time. ☐

5. Multiple choice questions

- a. Anther is a part of the
 (i) stamen ☐ (ii) filament ☐
 (iii) ovary ☐ (iv) style ☐
- b. The stigma is a part of the
 (i) stamen ☐ (ii) filament ☐
 (iii) pistil ☐ (iv) style ☐
- c. After fertilization, which of the following turns into a fruit ?
 (i) Stamen ☐ (ii) Ovules ☐
 (iii) Style ☐ (iv) Ovary ☐
- d. What is the other name for seed leaves ?
 (i) Cotyledons ☐ (ii) Scar ☐
 (iii) Seed coat ☐ (iv) Seedling ☐
- e. The small root emerging from a germinating seed is called a
 (i) plumule ☐ (ii) seed coat ☐
 (iii) cotyledon ☐ (iv) radicle ☐

6. Give one word for each one of the following.

- a. These are produced by flowering plants to produce new plants. :
- b. An agent with wings and helps to disperse seeds. :



- c. A method of growing plants from their parts other than seeds.

:

7. Match the columns.

Column A

- a. Manure
- b. Reproduction by roots
- c. Reproduction by stem
- d. Harvesting
- e. Artificial fertilizer

Column B

- (i) Cutting of crop
- (ii) Urea
- (iii) Radish
- (iv) From cow dung
- (e) Ginger



Study the structure of a flower. The teacher should show various parts of a flower to the students and ask the students to study its various parts.



1. Saffron, the world's most costliest plant product, grows in kashmir only, not in any other part of our country like Punjab, Haryana or Madhya Pradesh. Can you tell the reason ?
2. If we put some marigold petals in soil and sprinkle some water daily. After a few days, we can observe small little plants of marigold growing in the soil. How can you justify ?



1. Take an egg shell and write 'root power' on it with a marker. Place a teaspoonful of soil in the egg shell. Then place some germinated seeds in the soil. Place the egg shell in a warm place and keep the soil moist. In less than a week, the roots will come out through the egg shell. Think about the power of roots in the field.
2. Students can collect different types of seeds and draw them in their notebook. In case a seed has special features such as spines or hairs, they should try to find out how these features help in the dispersal of these seeds.
3. Visit a field and ask the farmer about the kind of crops he grows, the kind of manure and pesticides he uses and the methods of irrigation used.