

Reproduction in Plants

BEFORE WE START, LET'S CHECK

What you already know

Fill in the blanks choosing correct alternatives.

1. Most of the plants grow from _____. (leaves / seeds)
2. Seeds are found inside _____. (fruit / flower)
3. _____ is the process through which new individual is produced by living beings. (Conservation / Reproduction)
4. A potato that we eat is an underground _____. (root / stem)

What you will know

How does a small seed convert into a big tree?



How does the offspring of a plant grow far from it?



Can plants also grow from other parts besides seeds?



Can plants be artificial?



All of us know how important plants are for life on earth. All living things need to reproduce to survive their kind. The **reproduction** of plants is important not only to them but also to the whole world as no life can exist without plants.

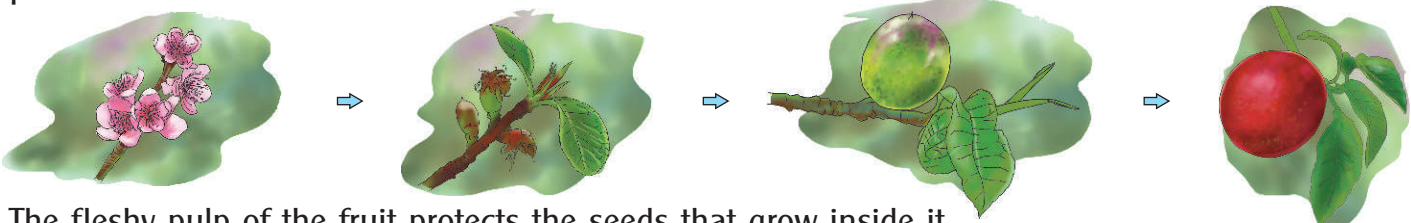
In the absence of reproduction, some plants may become extinct. So scientists are working hard to make sure that no plant species becomes extinct in the future.

Reproduction in plants happens in two ways— natural reproduction and artificial reproduction.

Most of the plants reproduce naturally from seeds. But some plants also use other parts for reproduction. Let us know in detail about the various ways of reproduction in plants.

SEED: THE MAIN AGENT OF REPRODUCTION

The process of reproduction in flowering plants starts with the formation of fruits. Flowers have pollen. When a bee sits on a flower, the pollen sticks to its body. When the bee goes to another flower of the same kind, that pollen enters the stigma of that flower. Fertilisation takes place and a fruit is formed.



The fleshy pulp of the fruit protects the seeds that grow inside it.

Structure of a seed

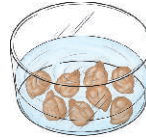
To understand how a tiny seed converts into a big plant, we should first understand the structure of a seed. For this, let's perform an activity.



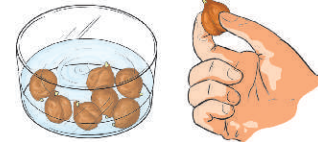
Fun and Learn



1. Take some seeds of Bengal gram.



2. Soak them in water for 10 to 12 hours overnight.



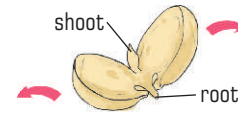
3. In the morning, take one seed. It has swollen up.



4. You will see an outer covering on it. It is called the **seed coat**.



5. Now, remove the seed coat. You will see two seed leaves. They are called **cotyledons**.



6. Now, open the cotyledons. You will see a baby plant inside. The lower part of the plant is the root and the upper part is the shoot.

GERMINATION OF SEEDS

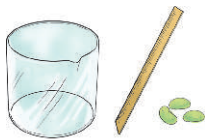
Germination is the process by which a seed produces a seedling or a baby plant. A seed needs the right amount of air, water and warmth to germinate.

Requirements for germination of seeds

1. Air and water: The availability of right amount of water and air are important for the germination of seeds. Let's perform an activity.



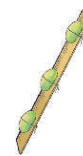
Fun and Learn



1. Take a beaker, a ruler and three bean seeds.



2. Fill the beaker with water.



3. Tie bean seeds to the ruler at equal distances.



4. Place the ruler diagonally in the beaker as shown here. The first seed should be completely submerged. The middle seed should be half in water and half in the air. The third seed should be completely outside the water. After some days, you will see that only the middle seed is germinating. That is because it is the only seed that is getting both air and moisture in the right quantity.

2. Temperature: Seeds need an optimum temperature to germinate. The temperature should be neither very high nor very less. It should be in the range of 25°C to 35°C.

Let's perform an activity to check it.



Fun and Learn



1. Take 3 large jars and 3 small jars.



2. Place moist cotton wool at the bottom of each small jar.



3. Place a bean seed each on the moist cotton wool as shown.



4. Place each smaller jar inside a bigger jar.



5. Fill ice in the first bigger jar and boiled water in the second bigger jar as shown.

Leave the third bigger jar as it is.

6. Cover each jar with a piece of cloth.



7. Keep filling the two jars with ice and boiling water, respectively.

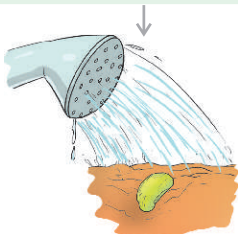
After a few days, you will see that only the seed in the third jar germinates.

3. Sunlight and soil: Sunlight and soil are not very essential for germination. A seed can germinate without soil and sunlight too. But once seeds are germinated, a right type of soil and sufficient sunlight is required by them.

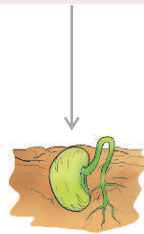
Stages in germination of seeds

The germination of seeds takes place at various stages.

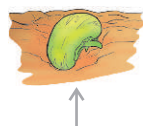
1. A seed is sown into the soil and watered.



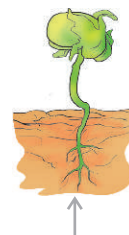
3. The roots grow downwards into the soil.



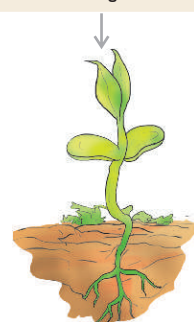
2. The seed takes in water rapidly. Its inner layer swells. The seed coat splits and the root emerges.



4. The shoot grows upwards raising the seed leaves above the ground.



5. The shoot develops leaves and branches. Used up seed leaves fall off. The plant starts making its own food.



DISPERSAL OF SEEDS

You know that farmers sow seeds in fields and gardeners in various pots and gardens. But there are many plants that grow on their own. How does it happen? Who sows their seeds? Amazing, isn't it? Actually, it happens naturally.

Most plants produce many seeds. If all seeds simply fell and grew close to the parent plant, there would not be enough space for the new plants to grow. So seeds are spread out over a large area where they get the right conditions to grow.

Plants cannot move from one place to another on their own. So nature has some agents to scatter their seeds.

The process of scattering of seeds away from the parent plant is called **dispersal**.

Let us learn about the agents that help in dispersal of seeds.

Dispersal by wind

Some seeds are very light. They get carried away to far away places by the wind. The seeds of the dandelion have tiny hairs, which act as wings. They help the seeds to float in the air. Cotton seeds have long fibres that trap air and become light. Sycamore seeds have two wings that help them to keep moving in the air.



dispersal by wind

Dispersal by water

Water acts as an agent of dispersal for plants which grow in or near water. For example, coconut trees grow along coastal regions.

Sometimes, a ripe coconut falls into the sea and is carried far away. The thick coat of coconut fibre holds air and the coconut can float for thousands of miles into the sea.

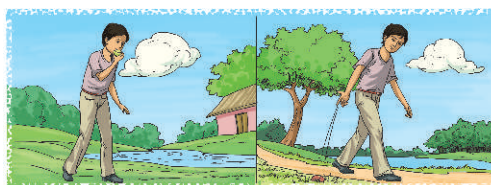


dispersal by water

Dispersal by animals

Animals and human beings also help in seed dispersal. They like to eat some fruits. They take away the fruits to different places. Then they eat them and throw away the seeds. The seeds of mangoes, cherries, apples, etc. get dispersed in this way.

Some seeds present in fleshy fruits like berries are eaten by some birds. The birds fly away to different places, where these seeds are passed out in their droppings unharmed.



dispersal by humans



dispersal by bird

Squirrels collect nuts like acorns and bury them for later use. But they often forget where they buried them. Later, the seeds grow into new trees.

The fruits of some plants like the xanthium and sandbur have hooks or spikes on them. These fruits stick to the furry coats of **wandering** animals, claws of birds or even to our clothes. This way, these fruits are carried away over long distances.



dispersal by animal

Later, new plants grow from the seeds of these fruits.

Dispersal by explosion

Some plants like the pea, geranium, balsam and mustard have seeds in their **Pods**. When the pods dry up, they burst open suddenly. The force of this explosion scatters the seeds in all directions.

These factors, that is, wind, water, animals, humans and explosion are known as agents of dispersal.



dispersal by explosion

VEGETATIVE PROPAGATION

Some plants do not grow flowers. Such plants do not reproduce from seeds. They reproduce from other parts like roots, stems and leaves. Reproduction of plants from parts other than seeds is called **vegetative propagation**.

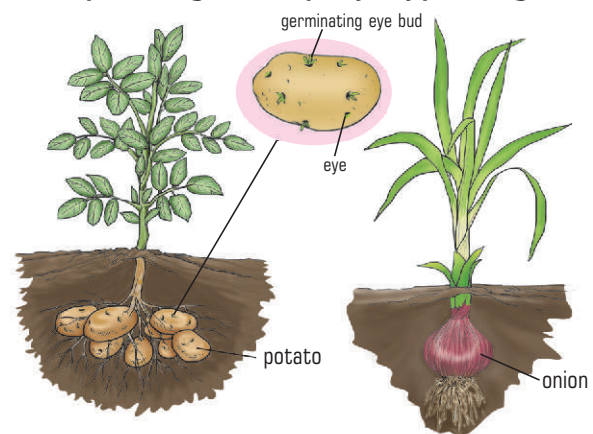
Vegetative propagation can be either natural or artificial.

Natural vegetative propagation

Some plants naturally reproduce through parts other than seeds. There is an advantage of natural vegetative propagation. Through this process, new plants grow rapidly bypassing the maturing of the seedling phase.

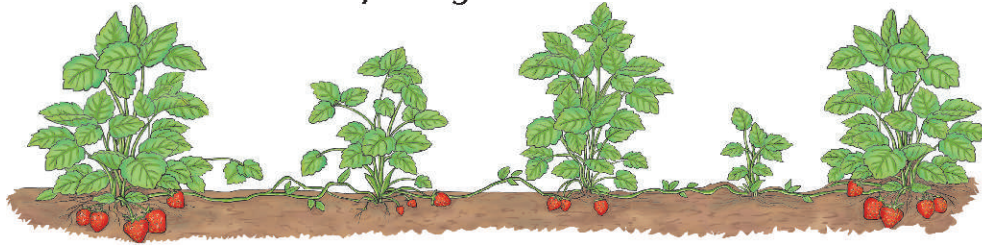
1. From underground stems: The potato, ginger, etc. are underground stems. They have buds, called eyes, on them. The eyes produce shoots that grow into new plants.

2. From bulbs: A **bulb** is an underground stem with fleshy leaves. Onions, daffodils and tulips are examples of bulbs. These bulbs reproduce from the tiny bulblets that form on the parent bulb.



potato and onion plants

3. From runners: The stems of plants like the strawberry and peppermint grow horizontally along the ground. Such stems are called **runners**. Runners are very weak. Tiny roots form on the runners where they touch the ground. Soon, the connection with the parent plant breaks and a new plant grows.



strawberry plant

4. From leaves: Some plants grow new plants from the edges of their leaves. The sprout-leaf plant bryophyllum and the elephant-ear plant begonia grow buds on their leaves. These buds grow into new plants when the leaves bearing them fall to the ground. The new plants have their own leaves and roots.

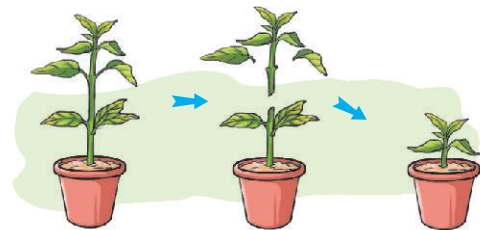


bryophyllum

Artificial vegetative propagation

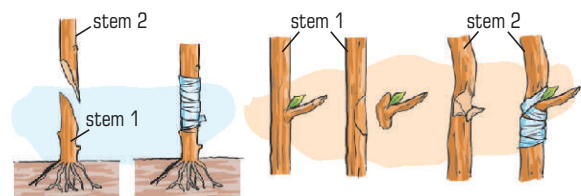
Gardeners use many methods of artificial vegetative propagation to grow new plants. Through this, they can replicate a good quality plant into many new plants having similar qualities and consistency. Let us study the common methods of artificial vegetative propagation.

1. Cuttings: It is used for growing the rose, the sugar cane, grapes, croton, etc. A **cutting** is a piece of mature stem having a bud that has been cut off a parent plant. The cutting is planted in such a way that the bud remains above the ground. Soon, it grows into a new plant.



cuttings

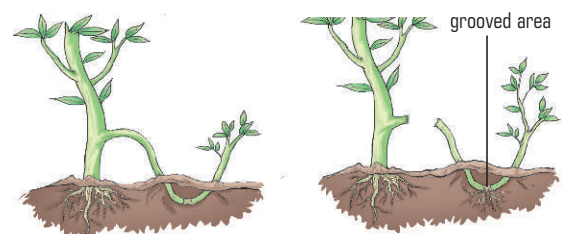
2. Grafting and budding: In these, a stem piece (in **grafting**) or a single bud (in budding) is joined onto the stem of a plant that has roots. It is commonly used to produce fruit trees.



grafting

budding

3. Simple layer: It is used for shrubs where cuttings and graftings are not possible. In this method, first a lower stem is selected. Then using a sharp object, a groove is made in it by removing bark. This portion of the stem is buried in moist soil. With time, roots grow on the grooved area. Now, the rooted stem is separated from the parent plant.



simple layer

Words to Remember

reproduction	– the process through which a living being produces offsprings
seed coat	– the outer covering of a seed
cotyledons	– the first pair of leaves developed in a seed
germination	– the process of a seed producing a seedling
dispersal	– the scattering of seeds away from the parent plant
wandering	– walking here and there aimlessly
pod	– an elongated two-valved seed vessel
vegetative propagation	– reproduction of plants from any other part of a plant other than seeds
bulb	– an underground stem with fleshy leaves
runners	– thin horizontal long stems of some plants
cutting	– a piece of stem with a bud used for vegetative propagation
grafting	– the process of joining a stem piece with the stem of another plant having roots

Points to Recall

- * The reproduction of plants is very essential as no life can exist without plants.
- * The reproduction of plants starts with fertilisation and forming of fruits.
- * All flowering plants reproduce naturally from seeds.
- * A seed has a baby plant in it with a root and a shoot.
- * The right amount of air, water and warmth is needed for germination.
- * Seeds can germinate without soil and sunlight.
- * The dispersal of seeds takes place to provide them with enough space and other things to grow.
- * Wind, water, animals and human beings are common agents of dispersal.
- * Non-flowering plants grow from roots, stems, leaves, etc.
- * Many plants are grown by gardeners through artificial vegetative propagation.

Exercises

A. Tick (✓) the correct option.

1. Which of the following reproduce?

- (a) animals ☐ (b) plants ☐ (c) humans ☐ (d) all of these ☐

2. Most of the plants naturally reproduce from

- (a) roots ☐ (b) seeds ☐ (c) leaves ☐ (d) stems ☐

3. The germination of seeds requires an appropriate amount of

- (a) air ☐ (b) water ☐ (c) warmth ☐ (d) all of these ☐

4. Which plant's seeds are dispersed by explosion?

- (a) acorn ☐ (b) dandelion ☐ (c) geranium ☐ (d) sycamore ☐

5. A strawberry plant reproduces using its

- (a) bulbs ☐ (b) runners ☐ (c) leaves ☐ (d) none of these ☐

B. Fill in each blank choosing the right word.

1. Fertilisation takes place when pollen enters the _____ (*stigma* / *stem*).
2. Sunlight and soil are _____ (*very* / *not*) essential for germination.
3. A Sycamore seed has two _____ (*hairs* / *wings*) that help it to move in the air.
4. A _____ (*pea* / *acorn*) plant has seeds in pods.
5. The _____ (*ginger* / *onion*) is an example of a bulb.

C. Answer in one or two words only.

1. What kind of plants reproduce from seeds? _____
2. What is the outer covering of a seed called? _____
3. Name a fruit whose seed is dispersed by water. _____
4. What are the buds on a potato called? _____
5. Name a plant that reproduces through leaves. _____

D. Answer in one sentence only.

1. What is there inside a seed?
2. What range of temperature is required for the germination of seeds?
3. How does the dispersal of pea seeds take place?
4. What do you understand by vegetative propagation?
5. What is the advantage of vegetative propagation over reproduction using seeds?

E. Answer in a few sentences.

1. Explain the stages of the germination of seeds.
2. Why does the dispersal of seeds take place?
3. How do birds help in the dispersal of seeds?
4. Why do gardeners use the methods of artificial vegetative propagation?
5. Explain the simple layer method of artificial vegetative propagation.

Creative Skills



BRAINSTORM



A mango has only one seed while a watermelon has many seeds. So, the number of ripe watermelons in this world should be much much more than the number of mangoes.

But in reality, it is not so. Can you tell why?





TELL YOUR TEACHER



Pawan was in the habit of plucking flower buds from the mango tree in his garden and crushing them under his shoe. His mother stopped him from doing this. She told him that if he continued to do so, no mangoes would grow on the tree. Pawan could not understand this. He was plucking flower buds, not mangoes. Then why did his mother say so?

Do you know the reason? Tell your teacher.

FIND OUT



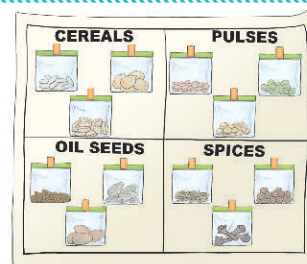
Tissue culture is another method of artificial vegetative propagation. Find out more about it.



Ferns, mosses, mushrooms, etc. are non-flowering plants. They reproduce through spores. Find out more about spores.

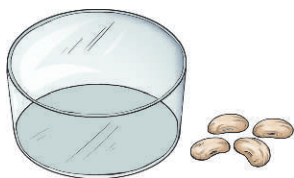
Project

Collect the following seeds: peas, cumin, peanut, rice, pepper, corn, grams, sunflower, wheat, fenugreek, lentils and mustard. Take small transparent pouches and fill small samples of each seed in them. Then take a sheet of chart paper. Draw on it a box having two columns and two rows as shown. Write 'cereals', 'pulses', 'oil seeds' and 'spices' on top of each smaller box. Paste the pouches in their respective places. Submit it to your teacher.



Experiment

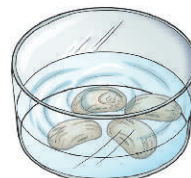
To observe the germination of seeds



1. Take a jar and some bean seeds.



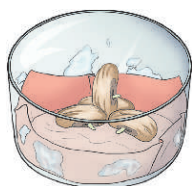
2. Fill water in the jar and put the seeds in them.



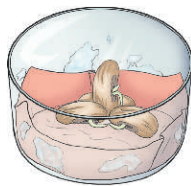
3. After a few hours, the seeds swell up.



4. Throw the water. Place a wet sheet of paper in the jar and put soaked seeds on it.



5. On the second day, the root comes out.



6. On the third day, the root forms a curved neck and the shoot grows up.



7. On day four, the seed pops out.



8. On the fifth day, the first leaf appears.

Virtual Tour

For more information visit:

- <http://easyscienceforkids.com/all-about-germination/>
- http://www2.bgfl.org/bgfl2/custom/resources_fbp/client_fbp/ks2/science/plants_pt2/dispersal.htm