

4

SEEDS OF LIFE

One day a wise king felt that he should test the honesty of the children of the country. The king called all the children to the palace. Everyone was given seeds. It was announced that valuable gifts will be given to those who bring this seed after germinating it into a plant after three months. Ping, a farmer boy, was also present in the group of children. He buried the seeds in the soil of the pot and watered them, but the seeds did not germinate. After three months, all the children came to the palace with flowered plants. They all made fun of Ping who came to the palace with an empty pot. The king examined each one's plants. When he reached Ping, the king was happy. The king said, 'This is the winner. Only seeds with life will germinate. The seeds I gave you were lifeless.'



Have you read the story of Ping? Only living seeds germinate, right? Isn't it the life within tiny seeds that grows into even huge trees?

Collect a variety of seeds. Display the seeds in your class and write about their characteristics.

- Name of the plant
- Colour
- Size
- Shape
- Other features

Even though the seeds have life, will all the seeds buried in the soil germinate? Why don't all the seeds germinate?

Let us germinate seeds

What factors are required for germination of the seed? Write down your guess.

- Water
-
-
-

How do you find out if your guess is correct? Let us do the necessary experiment to find it out. Take some wet soil in a glass and put some pea seeds in it. Place it in an area where it will get sunlight. Water should also be given at the required rate to maintain moisture. Observe it every day. What all factors did the seeds get?



Figure 4.1

- Soil
- Water
- Air
- Sunlight

Are all these factors necessary for germination of the seed? How to find it out?

Let us check one by one.

Is soil necessary for the seed to germinate?

How do you find out that soil is necessary for the seeds to germinate? Can't we do it by examining if seeds placed without soil will germinate? Put a wet cotton ball in a glass and place the seeds on it.



Figure 4.2

What factors do the seeds gain?

What factors do the seeds lose?

The factors that the seed gets	The factors that the seed doesn't get
Water	Soil
Air	
Sunlight	

Table 4.1



Is water necessary for the seed to germinate?

How do you find out if water is necessary for the seed to germinate?

Which factor should be kept out of the experimenting items?

Plan the experiment.



Figure 4.3

Is sunlight necessary for the seed to germinate?

How do you find out if sunlight is necessary for the seed to germinate?

What factor should be left avoided here?

What changes should be made to the experiment to make this factor left out?

- Steel glass instead of transparent glass.
-



Figure 4.4

Let us do the experiment

Let us try the experiments planned so far. Place green gram seed in a glass so that it receives soil, air, water and sunlight. Place the seeds in the other three glasses, that do not get any one of the following at a time - soil, water and sunlight.

Day	Glass 1 (Given all factors)	Glass 2 (Given all factors except soil)	Glass 3 (Given all factors except water)	Glass 4 (Given all factors except sunlight)
One				
Two				
Three				
Four				

Table 4.2

Write each day's observation in the science diary.

Which all factors were found to be necessary for germination of seeds?
Present the findings to the class.

Are there any other factors required for germination of seed?
How to find out? Plan and conduct the experiment.

For seed to germinate

Water is necessary for the germination of seeds. But the factors like soil and sunlight are not necessary. Besides water, air and suitable temperature are also necessary for seed germination. Different seeds have different germination times and suitable temperatures.

Life within the seed

Observe the germination of the green gram seed in the illustration.

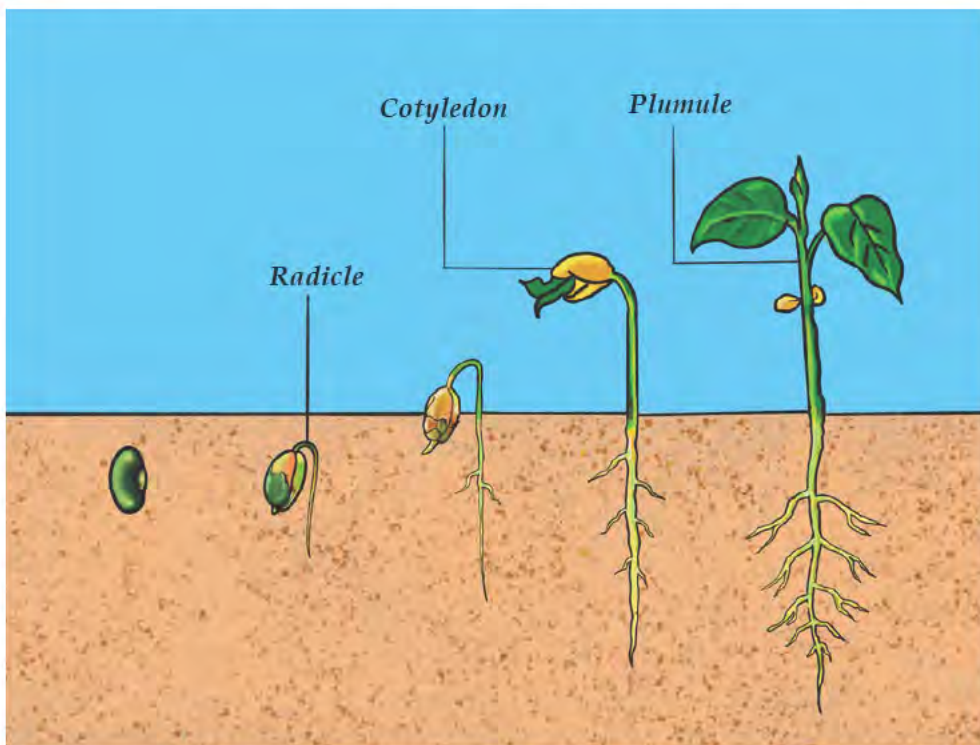


Illustration 4.1

Record the changes that occur in five days in the table.

The change in the seed	First day	Second day	Third day	Fourth day	Fifth day
Size of the seed		The seed becomes soaked and grows bigger			
Outer covering of the seed					
The part which is germinating and growing downwards from the seed (radicle)					
The part which is germinating and growing upwards from the seed (plumule)					
Primary leaf within the seed(cotyledon)					

Table 4.3

Illustrate the recordings in the science diary.

Examine the glasses from previous experiments.

Which plant grows best after germination?

Which factors did the best growing plant receive?

- Sunlight
- Air
-
-
-



Hydroponics

Hydroponics is a new method of growing plants without soil. In this method of cultivation, plants are grown in a nutrient solution instead of soil.



Figure 4.5

Plants make their food in their leaves, don't they?

The food for the plant until the seed germinates and grows a leaf is obtained from the cotyledon. How many cotyledons does a pea seed have?

Have you observed the change in the cotyledon as the plant grows?

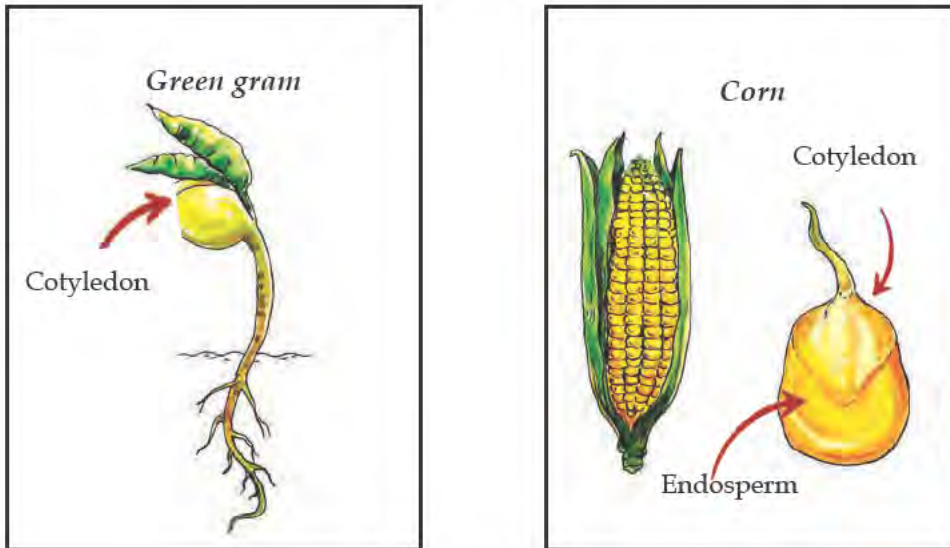


Illustration 4.2

Look at the cotyledon in a corn. Are there two cotyledons in a corn as in pea seeds? There is only one cotyledon in a corn. Endosperm is the part attached to the cotyledon. In plants with only one cotyledon, the food for the plant is obtained from the endosperm, until the seeds germinate and grow its leaves.

Changes that occur during seed germination

Germinate seeds of tamarind, jackfruit, cashew, rice and corn. Observe the changes that the seed undergoes as it germinates.



Illustration 4.3

Carefully observe the germinated seeds using a hand lens. Carefully open the seed and draw the cotyledon and endosperm in the science diary.

Seed germination

The seed becomes soaked and the outer shell bursts. First the radicle and then the plumule emerge. The radicle becomes the root of the plant. The plumule becomes the stem and leaf. The growing plant consumes the food stored in the cotyledon or endosperm until photosynthesis is fully functional.

Why do plants store food in seeds?

What seeds do we eat?

Planting without seeds

Are seeds the only planting material used?



Figure 4.6

Which parts of the plants in the picture give rise to new plants?

Visit the biodiversity garden and collect information. Grow plants other than from seed in the biodiversity garden and record the inferences.

Seeds in many places

See the conversation between the Malabar plum (Njaval) tree and the bird.



Illustration 4.4

Tree : Why are you eating my fruit?

Bird : I am not only eating your fruit and satisfying my hunger. I am also carrying the seeds to many places.

Tree : Even if you are not there, will my seed not fall down and germinate?

Bird : Do you have enough space for so many seeds to grow under you?

What creatures do you know that transport plant seeds to different places like this?

- Squirrel
-
-

What is the role of humans in delivering seeds to different places?

Do organisms alone distribute the seeds? Discuss

Seed dispersal is the process in which seeds from the mother plant reach different locations.



Why seed distribution?

- If all the seeds of a plant fall and germinate at the base of the plant, they will not get the soil, water, sunlight, and minerals they need to grow. So the seeds have to be dispersed to many places.
- This is the reason why different plants are found in one region and one plant is found in different regions.

Adaptations for seed dispersal

How does coconut adapt for flowing through water?



Figure 4.7

- Even if it remains in water for a few days, it will not rot.
- It will float in the water as the husk is filled with air.

What could be the reason behind appooppaan thadi's (milkweed pappus) flying in the wind? Look at the picture and find out.

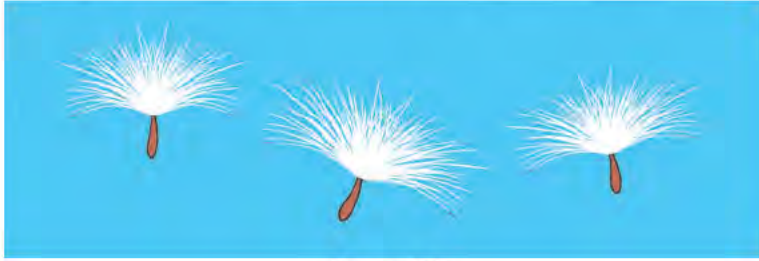


Figure 4.8

What are the fruits around you that animals and birds eat?
What are the features of these fruits for attracting birds?

- Fleshy parts
-
-

Have you noticed that some non-edible fruits have parts that help them stick to other things?



Chaff Flower



Love grass

Figure 4.9

How do these adaptations help in seed dispersal?

What plants do you know that burst and release seeds when they ripen?



Rubber



Balsam

Figure 4.10



Observe your surroundings, find out the methods of seed dispersal in different plants, and write them down.

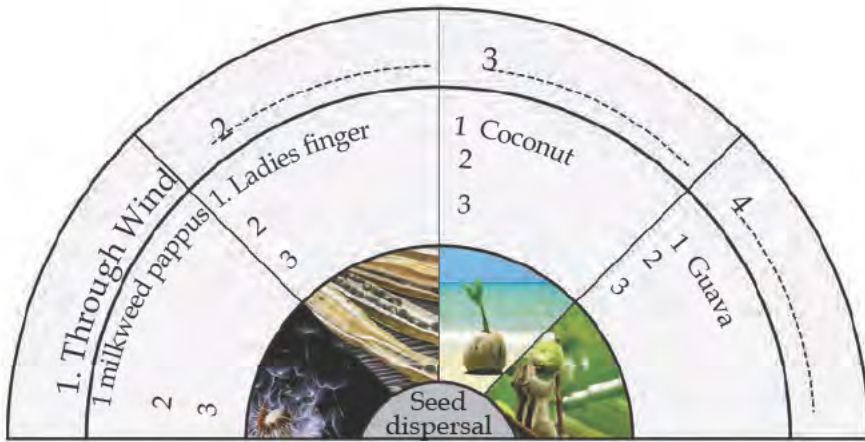


Illustration 4.5

What are the other uses of seeds?

What seedcrafts do you know?



Illustration 4.6

Make various handicrafts using seeds and display them in the class.

Variety in leaves

Observe the pictures

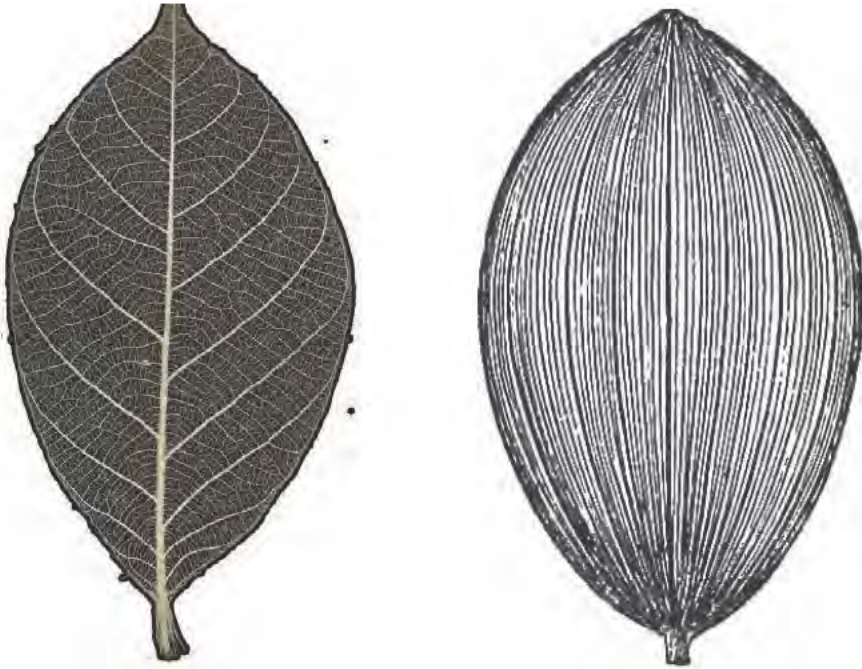


Figure 4.11

What is remaining in these leaves that have lost their green parts? It is through these parts, water is brought to the leaf and food is taken from the leaf. These are the veins of the leaves. Are the veins arranged in the same way in both the leaves? Look at the first picture, you can see in the middle of the leaf, a main vein extending from the node to the tip. Many small branches that come out from it are connected to each other like the links of a net. This is reticulate venation. In the second picture, did you see that all the veins in the leaf start from the node of the leaf and reach the tip in parallel without touching each other? This is parallel venation.

Observe the surroundings and find leaves with these two kinds of venations and write the names of the plants.

Reticulate venation



Parallel venation

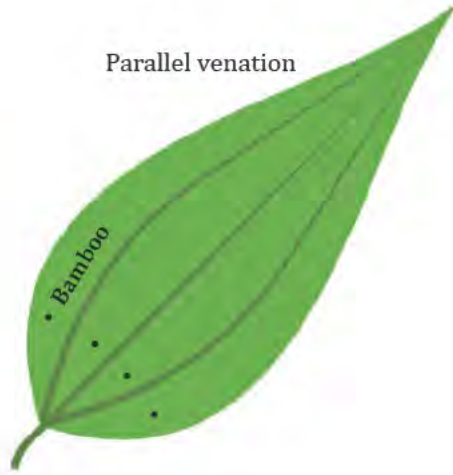


Table 4.4

Is there any relationship between the venation of leaves and the structure of their roots?

Examine and draw the pictures of the roots of a plant with reticulate venation and a plant with parallel venation.

Compare the pictures you drew with the pictures below.



Jackfruit tree



Grass plant

Illustration 4.7

Look at the pictures.

What is special about the root of the jackfruit tree?

How is the root of the grass plant different from the root of the jackfruit tree?

Don't you see a large root growing down from the stem in the root system of the jackfruit tree?

This root is the tap root. The other small roots are growing from this root, aren't they?

Is there a large main root in the root system of the grass plant?

A taproot system is a root system consisting of a taproot growing downwards from the base of the stem and branching roots growing from it. You can see the taproot system in mango trees and jackfruit trees. Fibrous root system is one in which many fibre-like roots grow from the base of the stem. Plants belonging to the grass family have a fibrous root system.

Examine the leaves of the plants in your surrounding and list the venation and the root system.

Plant	Venation	Root system
Green gram		
Grass		
Jackfruit tree		
Coconut tree		

Table 4.5

Find out the relationship between the venation and the root system.



Other types of roots

Although roots are usually grown from the radicle, some roots are formed from stems, branches, etc. They are prop root, stilt root, and clinging root. Pneumatophores are a special kind of root found in mangroves. The tips of these roots rise from the soil into the atmosphere. They are known as breathing roots as they help in the exchange of gases.



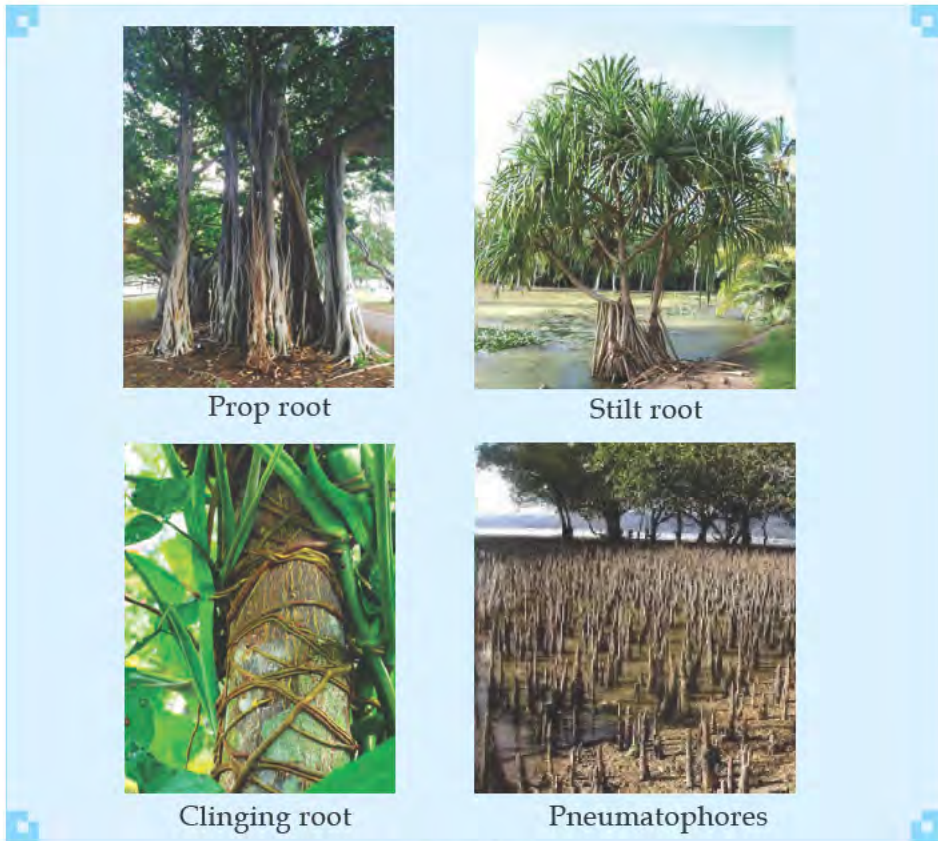


Figure 4.12

Monocot plants and dicot plants

Observe the pictures and write the differences in root, leaf, stem, and number of cotyledons in group 1 and of group 2.



Figure 4.13



Figure 4.14

Plant part	Group - 1	Group - 2
Root		
Stem		
Leaf		
Number of cotyledons		

Table 4.6

Plants shown in the figure 4.13, have only one cotyledon. Such plants are called monocot plants. What can we call plants with two cotyledons?

Fibrous roots, unbranched stem and leaves with parallel venation are the characteristics of monocot plants. Dicot plants are characterised by a taproot system, leaves with reticulate venation, along with branched stem.

We can see some plants in our surroundings which do not show any such relationship between root and leaf. Taro and yam are examples.

Find more examples.



To protect from extinction

Look at the pictures of plants, used to be present in many areas and are now decreasing in number.



Indian prickly ash(Mullilam)



Thumba

Figure 4.15

Which plants are in decline in your locality like this?

Make a list of such plants.

Extinction is the reduction in the population of an organism and their disappearance from the earth. Major reason for this is the destruction of the natural habitat of the organism. To save organisms from extinction, their natural habitats must be protected.



Let us assess

1. What is the change in the size of the cotyledon when the seeds begin to germinate? What is the reason for this?
2. Classify the different plants you see around, according to the method of germination from seed, stem, root and leaf.

3. Complete the table given below.

Method of seed dispersal	Adaptations of the seed
	Fleshy parts. Parts that help it cling to other things.
	The weight of the seed is less. Hair-like parts to fly.
Through water	
	When the fruit ripens, the outer shell splits open and the seeds are scattered outside.



Extended activities

1. Collect some seeds of different types of vegetables and germinate them. Observe and record the time difference in germination of the seeds. Plant the germinated seeds.
2. Discuss and find out what actions can be taken to protect plants that are declining in your locality.

