

5

Adaptation in Plants

We'll cover the following key points:

- Adaptation and its types in Plants
- Adaptation in Terrestrial Plants
- Adaptation in Aquatic Plants
- Some Other Adaptations in Plants



Hi, I'm EeeBee

Do you Remember:

Fundamental concept in previous class.

In class 3rd we learnt

- Plants and Their Types

Still curious?

Talk to me by scanning the QR code.



Learning Outcomes

By the end of this chapter, students will be able to:

- Understand the concept of adaptation and its importance in the survival of plants in different environments.
- Explain the types of adaptations in plants, including structural, physiological, and behavioral adaptations.
- Describe the adaptations of terrestrial plants to survive in dry or extreme conditions.
- Recognize other specialized adaptations in plants that help them survive in specific habitats.

Guidelines for Teachers

The teacher can begin the chapter by discussing the concept of adaptation and its role in helping plants survive in various environments. Use diagrams or models to illustrate the different types of adaptations in plants. Explain the structural, physiological, and behavioral adaptations, with examples like cactus spines or floating leaves in aquatic plants. Highlight the differences between terrestrial and aquatic plants, and explore specific adaptations such as water storage in desert plants or root structures in aquatic plants. Encourage students to observe local plants or do simple experiments to better understand how different adaptations function in real-life situations.



Warm Up

Experiential Learning

Can you make out what these different plants are ?

- (i) My sharp spines are really leaves that help me to survive
- (ii) They call me a plant but I cannot make my own food
- (iii) When any insect lands on my leaf, I catch it and eat it

Fun Fact



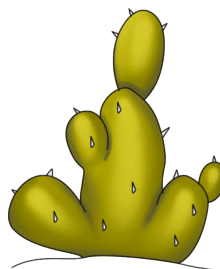
Cacti have adapted to survive in the desert by storing water in their thick stems. They also have spines instead of leaves, which reduce water loss and protect them from thirsty animals. These adaptations make them some of the toughest plants on Earth, thriving where most others would wither.

Adaptation and its types in Plants

Plants adapt or adjust to their surroundings. This helps them to live and grow. A particular place or a specific habitat calls for specific conditions and adapting to such conditions helps the plants to survive. This is the reason why certain plants are found in certain areas. A tree that lives in the rainforest would die in a desert area. A cactus that lives in the deserts would not survive in water. Thus plants adapt to their surroundings and climates. If the habitat changes drastically the plant species must adapt, otherwise they would not survive.

Plants growing in different habitats have certain features that are suited to their natural surroundings. Features that help plants to adjust themselves to their natural habitat are called **adaptation**.

Plants can be broadly divided into terrestrial plants and aquatic plants based on habitats.



Different Types of Plants



Adaptation in Terrestrial Plants

Terrestrial Plants

Plants that grow on land are called **terrestrial plants**.

Depending on the different terrestrial habitats, plants can be divided into five main groups: Plants in plains with less rainfall, plants in plains with heavy rainfall, plants in mountains, plants in deserts, plants in coastal areas.

Plants in Plains

Plains are large, flat areas of land.

1. Plants in plains with less rainfall

Some plains have very hot weather with a few months of rainfall.

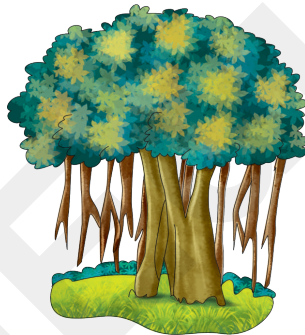
Adaptation

- ✦ Trees growing in these areas have many branches.
- ✦ Most trees in these areas shed their leaves during autumn. Therefore, they are called **deciduous trees**.

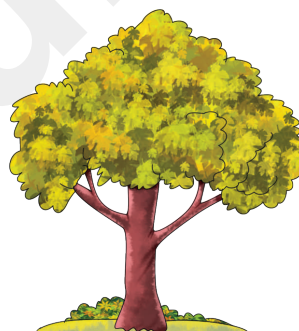
Examples: Mango, Banyan, Neem, Peepal, Gulmohar etc.



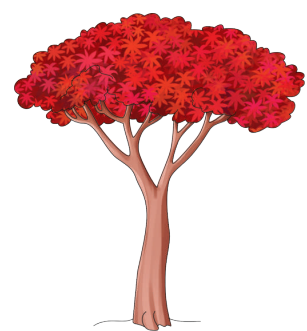
Mango tree



Banyan tree



Neem tree



Gulmohar tree

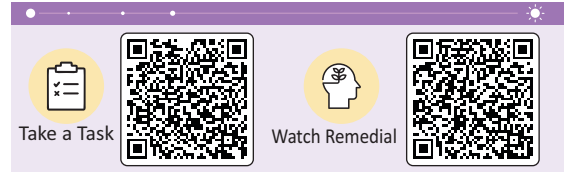
2. Plants in areas with heavy rainfall

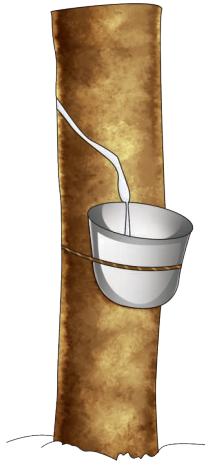
Some plains receive heavy rainfall. The weather is hot and damp in these areas.

Adaptation

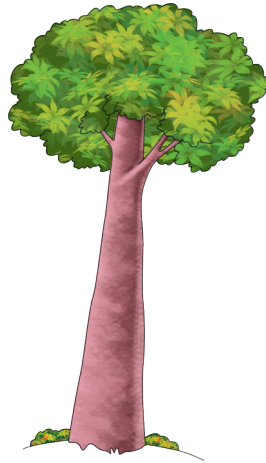
- ✦ Trees here have drip tips and waxy surfaces on leaves to shed the excess water.
- ✦ There is abundant growth of plants and some plants grow on top of the other to reach the sunlight.
- ✦ Most trees found in these areas remain green throughout the year. These trees are called **evergreen trees**.

Examples: Rubber, Coconut, Teak etc.





Rubber tree



Teak tree



Coconut tree

3. Plants in mountains

It is generally colder in mountains than in plains.

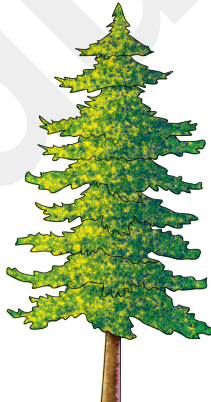
Adaptation

- ✦ Trees grow tall and straight and are usually cone-shaped. This helps to slide snow off their branches.
- ✦ The trees have small, needle-like leaves.
- ✦ They bear cones with seeds instead of flowers so that they are not destroyed by snow.

Examples: Fir, Pine, Cedar, Mosses, Ferns etc.



Cedar tree



Fir tree



Pine tree

4. Plants in deserts

The areas receive very less rainfall. Plants can survive on minimum water.

Adaptation

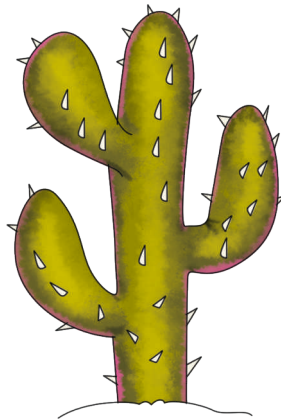
- ✦ The plants have small leaves and many spines which help them to conserve water.
- ✦ The leaves have thick waxy coating which help to retain water for a long time.
- ✦ There are leafless plants that store water in their green stems. The stems help in photosynthesis.

- ✦ Roots are near the soil surfaces that soak up water before it evaporates.

Example: Cactus, Joshua Tree, Date Palm, Keekar etc.



Date tree



Cactus



Keekar tree

5. Plant in saline coastal areas

The coastal areas have poor and saline soil. The area is rocky and sandy where it is very difficult for the roots to grow.

Adaptation

- ✦ Trees have deep roots and strong flexible stem to tolerate strong winds.
- ✦ The leaves are thick and formed of many long stripes to tolerate strong winds.
- ✦ The fruits and seeds are scattered by sea water to far off places.

Example: Coconut Tree



Coconut Tree

6. Plants in marshes

The soil here is sticky and clayey and holds a lot of water and very little air. The trees that grow here are called mangroves.

Adaptation

- ✦ Mangrove trees have breathing roots which grow above the soil.
- ✦ Breathing roots also help to absorb water and minerals that are required to carry out photosynthesis.

Example: Rhizophora, Aavecennia etc.

Did you know ?

Tree resin which has been fossilized is known as amber, it sometimes contains plant material or small animals that were trapped inside.



Mangrove forest

Did you know ?

A tree absorbs up to 48lbs of carbon dioxide a year. A tree also reduce global warming.

Check 'N' Mate

Critical Thinking

Write 'T' for true and 'F' for false statements.

1. Some plains have very hot weather with few months of rainfall. ☐
2. Everygreen trees remain green throughout the year. ☐
3. The leaves of coastal area plants are thin that cannot tolerate strong winds. ☐
4. Mangrove trees have breathing roots which grow above the soil. ☐

Activity

Creative Learning

Field Study – Divide the class into six groups. Give each group a specific type of plant to study: water plant, tree, flowering plant, grass, moss, or shrub. Each group member should find a specific plant in his/her category and do some observations. They should record 10 observations, and include a labelled sketch. Students should meet back with their groups and share their observations with group members. Each student should create a chart showing similarities and differences in the group's type of plants. After discussion, each student should answer this question, "How is _____ (type of plant) adapted to where it lives? Each group should then prepare to present their findings to the rest of the class using chart paper.

Class Discussion – Each group will share the information they have gathered. Discuss with the class the different adaptations plants have for living in different environments. Students should record in their notebooks three adaptations they have discovered.

Adaptation in Aquatic Plants

Aquatic Plants

Plants that grow in water are called **aquatic plants**. These are of three types-floating plants, fixed plants and the underwater plants.

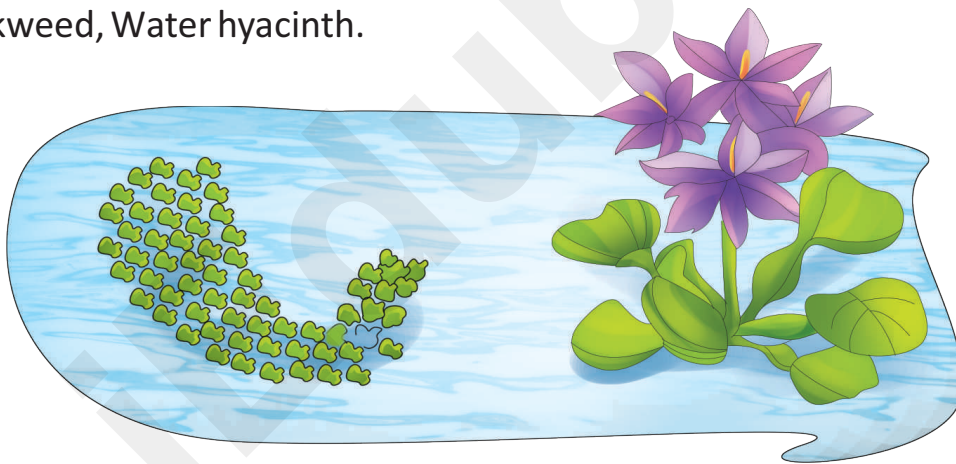
Floating Plants

Some plants float freely on the surface of the water body. These plants are called **floating Plants**.

Adaptation

- ✦ These plants have spongy bodies that help them to float in water.
- ✦ The roots are not fixed to the water bed and are poorly developed.
- ✦ Waxy leaves prevent stomata from damage.
- ✦ Stomata are found on the upper surface of leaves so that they can easily breathe through it.
- ✦ Stems are hollow and flexible to bear the current of water.

Example: Duckweed, Water hyacinth.



Duckweed

Water Hyacinth

Fixed Plants

These plants are fixed to the bottom of the water bed.

Adaptation

- ✦ The roots are fixed to the water bed.
- ✦ They have long hollow stems, which help the broad leaves and flowers to float.
- ✦ The stem is very flexible.



Water Lily



- ✦ The leaves have stomata on the upper side, so that they can easily breathe.

Example: Water lily, Lotus.

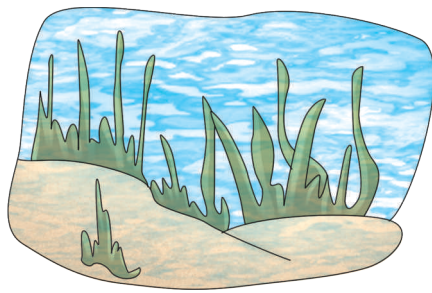
Underwater Plants

These plants are totally **submerged** in water and are also called submerged plants. They are used in aquariums.

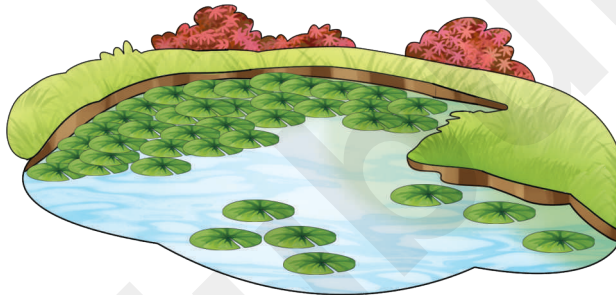
Adaptation

- ✦ They have narrow and thin leaves with no stomata.
- ✦ They breathe through their body parts. They use the carbon-dioxide breathed out by aquatic animals.
- ✦ They have very delicate and flexible shoots.

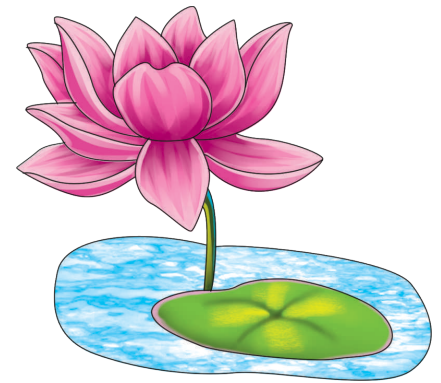
Example: Tape grass, Pond weed etc.



Tape grass



Weed



Lotus

Did you know ?

The Amazon Rainforest has the nickname "Lungs of the Planet" because it produces more than 20 per cent of the world's oxygen.

Some Other Adaptations in Plants

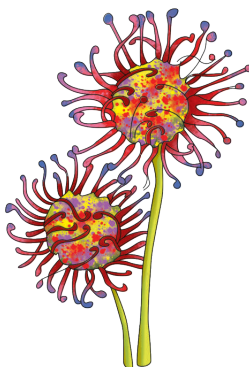
Besides the plants that we have read about, there are some plants which have unusual features. Thus, they are considered as unusual plants.

- ✦ There are some plants that are carnivorous in nature. They grow in soil that is poor in minerals. To get the minerals, they trap and eat insects. Their leaves are modified to trap insects. Such plants are called **insectivorous plants**. Example: Venus flytrap, pitcher plant and sundew.
- ✦ Some plants cannot make their own food as they do not have chlorophyll in them and absorb their nutrition from dead plants and animals. Such plants are called **saprophytic plants**. Example: Indian pipe and coral root.
- ✦ Some plants derive their nutrition from another living host plant. They are called **parasitic plants**. Example: dodder and mistletoe.
- ✦ There are some plants that smell like rotten fish. This smell attracts flies and other insects which **pollinate** the flower of this plant. Example: corpse flower.

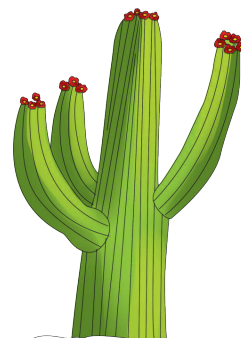




Pitcher plant



Sundew



Sanguaro cactus

Check 'N' Mate

Critical Thinking

Fill in the blanks with correct words.

1. _____ (Floating/Fixed) plants float freely on the surface of water body.
2. _____ (Stomata/Chlorophyll) are found on the upper surface of leaves.
3. _____ (Under water/Floating) plants have narrow and thin leaves with no stomata.



In a Nutshell

- ✦ Plants adapt or adjust to their surroundings. This helps them to live and grow.
- ✦ Plants growing in different habitats have certain features that are suited to their natural surroundings.
- ✦ Plants that grow on land are called terrestrial plants.
- ✦ Terrestrial plants include the plants growing in mountains, desert, coastal areas, marshes and the plants growing in areas of less rainfall and heavy rainfall.
- ✦ Plants that grow in water are aquatic plants.
- ✦ Aquatic plants include—floating aquatic plants, fixed aquatic plants and underwater plants.
- ✦ There are some special adaptations in plants like insectivorous plants, saprophytic plants and parasitic plants.



Key Words

Improving Vocabulary

Flexible	:	Capable of bending easily without breaking
Submerged	:	Descend below the surface of an area of water
Pollinate	:	To take pollen from one plant or part of a plant to another so that new plant seeds can be produced



Gap Analyzer™

EXERCISE

That turn curiosity into confidence—let's begin!



A. Objective Type Questions.

1. Trees are tall, straight and cone shaped in:
 - a. Deserts
 - b. Hilly areas
 - c. Plains
2. In the plains we find:
 - a. Mango and peepal
 - b. Mango and cactus
 - c. Pine and fir
3. Spines instead of leaves are found in:
 - a. Cactus
 - b. Pine
 - c. Duckweed
4. These plants do not have stomata:
 - a. Floating plants
 - b. Fixed plants
 - c. Underwater plants
5. Which of the following is not an insectivorous plant?
 - a. Venus flytrap
 - b. Cactus
 - c. Pitcher plant

B. Fill in the blanks :

1. The plants that grow on land are known as _____.
2. The plants that grow in water are known as _____.
3. The percent of the earth's surface covered with water is _____.
4. Several branches is a feature of trees in _____.
5. Thorns on plants is a feature of trees in _____.

C. Very Short Answer Questions.

I. Give examples for the following :

1. Plants that live on land _____
2. Water plants _____
3. Plants that eat insects _____
4. Trees that lose their leaves during winter. _____

II. How do the following help these plants to survive?

1. Roots of a mangrove tree _____
2. The stem of a cactus plant _____
3. The sloping shape of conifers _____
4. The stem of aquatic plants _____
5. Leaves of coconut trees _____

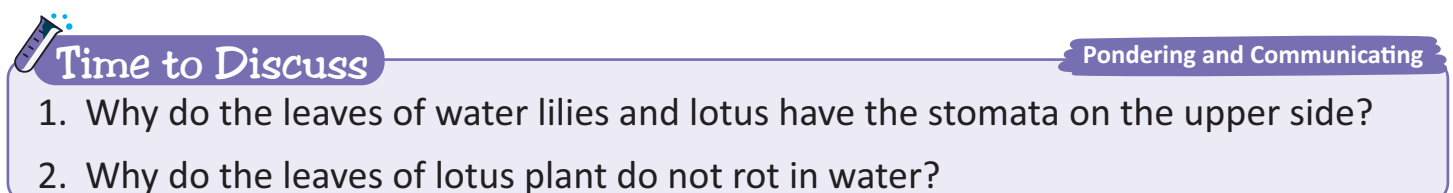
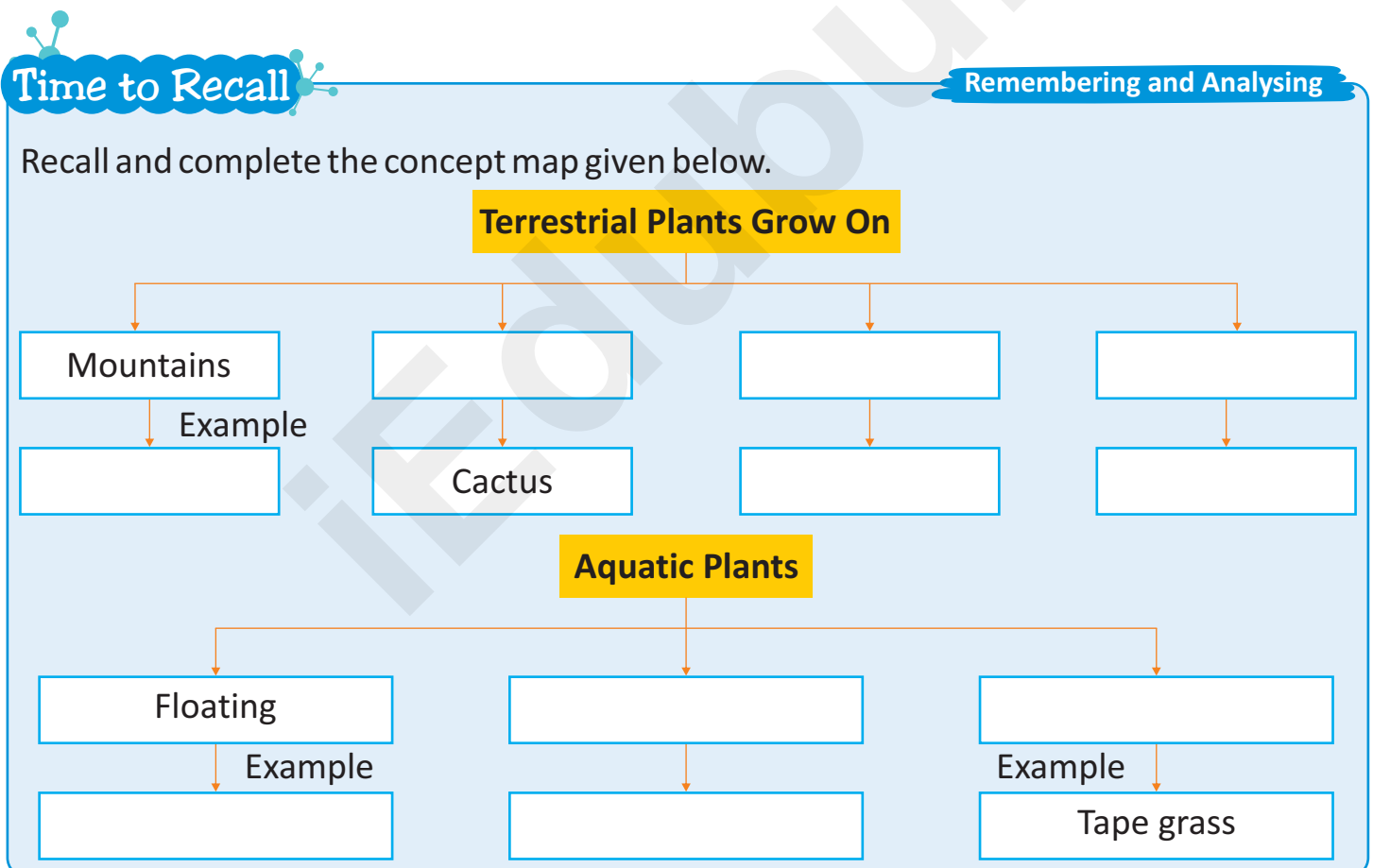
C. Short Answer Questions.

1. Why is adaptation important for plants?
2. Why do some trees lose their leaves in winter?
3. Why do mangroves have breathing roots?
4. Why do some plants eat insects?
5. How does cactus survive in deserts?



D. Long Answer Questions.

1. Differentiate between terrestrial and aquatic plants with examples.
2. How do plants in hills adapt in order to live in cold conditions?
3. Why do coastal plants have deep roots and long flexible stems?
4. How are the fixed aquatic plants different from underwater plants?
5. What are the differences between saprophytic plants and parasitic plants?



Time to Apply

Applying and Creating

Tanisha was new to school and was not able to adjust or make new friends. One day her friend Tina gifted her a desert plant and explained her how the plant adapts itself to the desert. Tanisha realised that she should try and adjust to her new environment.

- i. What plant do you think Tina gifted to Tanisha?
 - a. Lotus
 - b. Pitcher plant
 - c. Cactus
- ii. What does the plant have instead of leaves to prevent loss of water?
 - a. Cones
 - b. Spines
 - c. Hair like structures



Time to Observe

Observing, Critical Thinking, Analysing

Which of these plants folds its leaves at the touch of an animal to protect itself?



a. Poison Ivy



b. Mimosa



Time to Create

Creating and Collaborating

Collect some pictures of plants and paste them on a chart paper. Below each picture, write its name and the type of habitat it grows in.



Time to Discuss

Pondering and Communicating

Identify and name these plants. Choose from the help box.

Banyan tree Pitcher plant Sundew Saguaro cactus

