3 Diversity and Functions of Plant Parts

Plants in our environment show an enormous diversity as animals. Observe the diversity of plants in the forest shown in Figure 3.1.

Figure 3.1▲ A rain forest

The major reason for the beauty and the wonder of a forest is the diversity of plants. Plants differ each other in its size and morphological features. The reason for this vast diversity is the adaptations of plants to survive in different environments.

You have already learnt the parts of a plant in grade 7.

Recall what you have learnt and engage in Activity 3.1 to study further about the parts of a plant.

Activity 3.1

You will need : - 'Kuppameniya'/'kuppaimani' or a 'monarakudumbiya'/ 'seethaviyar selugkaluner' plant.

Method : -

- Uproot the plant from the soil without damaging the root system, and wash properly.
- Observe the plant and identify its parts.
- Draw a diagram and name the parts.

Figure 3.2 shows the main parts of a plant.

Compare your diagram with the given figure.

Every flowering plant consists of fruits, leaves, stem and roots. But they do not appear same in every plant. They have an extensive diversity. Let us have a review about the diversity and the functions of leaves, stem and roots of a plant.

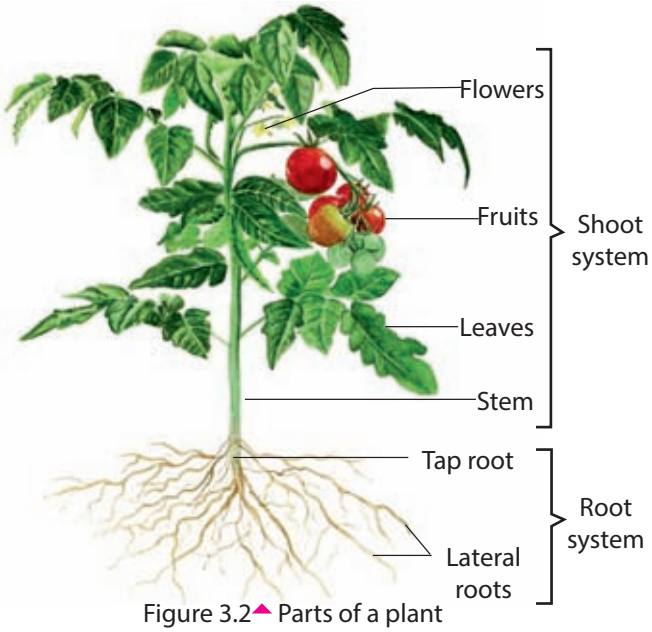


Figure 3.2 Parts of a plant

3.1 Diversity and functions of plant leaves

Leaves are considered as the most significant part of a plant. Most of the leaves are green in colour. The main function of a leaf is **photosynthesis**. Food is produced in plants having chlorophyll by using carbon dioxide, water and solar energy. This process is known as photosynthesis.

Plant leaves are well adapted for efficient photosynthesis. Let us do Activity 3.2 to study about this.

Activity 3.2

You will need : - Some leaves of jak, mango, temple flower and manioc

Method : -

- Observe the leaves well.
- Compare the thickness of the leaves.
- Draw the area of the leaves on a square ruled sheet and compare them.

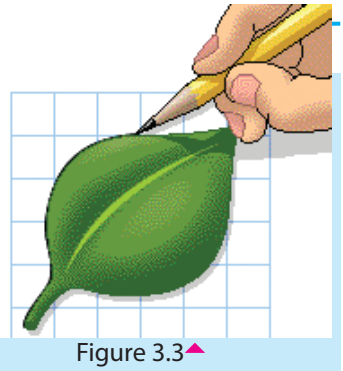


Figure 3.3

For the purpose of photosynthesis a leaf is typically flat and thin to expose to light over a broad area and allow light to penetrate fully into the tissues.

Thick and fleshy leaves can also be seen as an adaptation to adverse (arid) environmental conditions.

e.g:- Aloe, temple flower, yellow oleander (kaneru)

Figure 3.4 shows the parts of a leaf.

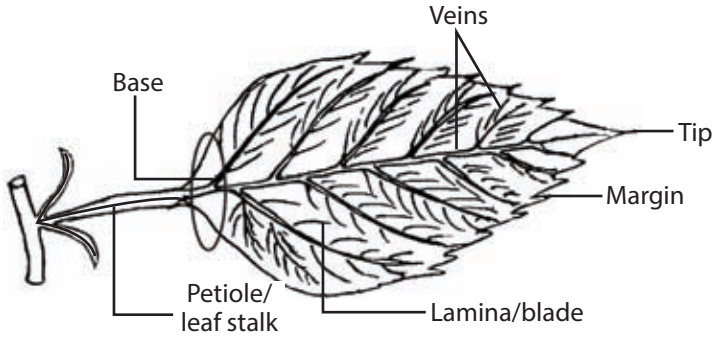


Figure 3.4 Parts of a leaf

Does every leaf have the same shape of petiole, margin, base and tip? Do Activity 3.3 to study about it.

Activity 3.3

You will need : - Some leaves that can be found in your environment (e.g: mango, papaw, rose, temple tress, 'Bo leaf'/'arasa illai')

Method: -

- Obtain leaves from different plants in your environment.
- Observe the leaves and draw pictures having different blades, bases, margins and tips.

When you observe the blades of these leaves you will understand that they have different shapes (Figure 3.5).

Figure 3.5 Diversity of leaf blades

You would have observed that there is a wide variation in leaf structure. That is due to their adaptations for the main function as well as various other functions.

Study the following diagrams and identify further the diversity of leaves. If you observe the tips of those leaves you will notice that the tips are different as sharp, curved, pointed, divided etc (Figure 3.6).

Figure 3.6 ▲ Diversity among leaf tips

The margins can be serrate or smooth. (Figure 3.7)

Figure 3.7 ▲ Diversity among leaf margins

The bases and the petiole of leaves too have different forms (Figure 3.8).

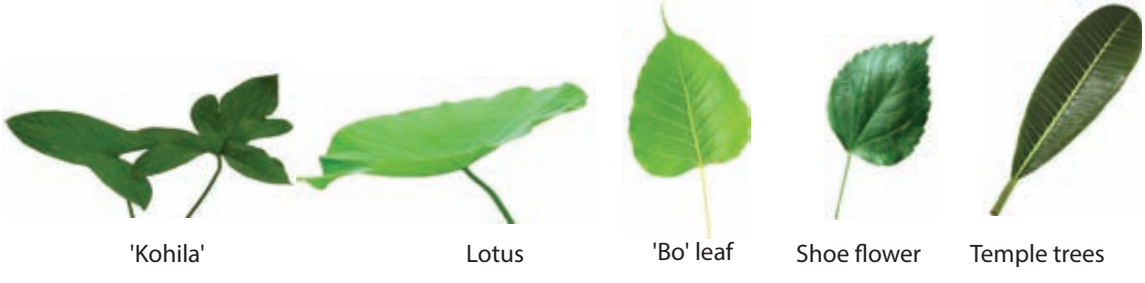


Figure 3.8 ▲ Diversity among leaf base

When you observe the environment you will be able to study more about other adaptations of leaves.

Leaf arrangement

The leaves are fixed to the stem in a way to expose all the leaves to the sun light. The pattern of fixing the leaf to the stem of a plant is known as **leaf arrangement**. Leaf arrangment supports efficient photosynthesis. Some leaf arrangements are given below.

- Leaves are on alternate sides of the stem.

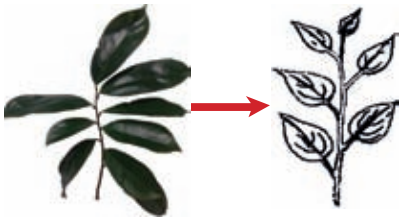


Figure 3.9 'Anona' ('Katu Anoda')/ 'Annamunna'

- Leaf attachments paired at nodes and in opposite directions.

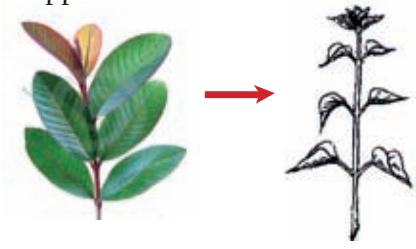


Figure 3.10 Guava

- Three or more leaves attach at each node on the stem in a whirl.

Figure 3.11 'Rukkaththana'/ 'Earlilaippalai'

- Leaves are attached in a spiral manner around the stem.

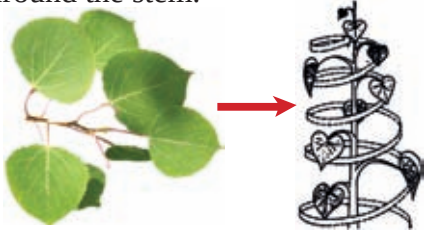


Figure 3.12 'Kanda'/'Vattakkanni'

Assignment 3.1

- Observe the environment and identify the leaf arrangements as much as possible.
- Complete the given table using your observations.

Table 3.1

Leaf arrangement	Examples of trees
Leaves are on alternate sides of the stem.	.....
Leaf attachments paired at nodes and leaves in opposite directions.	.....
Three or more leaves attach at each node on the stem in a whirl.	.....
Leaves are attached in a spiral manner around the stem.	.....

Let us now consider the other functions of leaves.

- Transpiration is the process of evaporation of water through stomata from plants (Figure 3.13). Transpiration helps to transport water to the upper parts of the plant.

Figure 3.13 ▲ Internal structure of a leaf

The leaves of plants in arid environments, are adapted to minimize transpiration.

Some adaptations are given below.

- Thick, waxy cuticle — e.g. - temple trees, oleander
- Leaves reduced to spines — e.g. - cactus
- Thin leaves — e.g. - 'kasa' / 'savukku'
- Reduced number of leaves — e.g. - 'navahandi' / 'kally', 'heerassa'/'pirattai'

Temple trees

Cactus

'Kasa'

Figure 3.14 ▲ Adaptations to minimize transpiration

- Some leaves are adapted to store water. They have become fleshy because they have specialized tissues to conserve water (Figure 3.15).

'Akkapana'

Aloe

Figure 3.15 ▲ Plants with water storage leaves

- Some leaves produce new plants through asexual reproduction.

  e.g. :- 'Akkapana', 'begonia'

Let us do Activity 3.4 to study how some plant leaves produce new plants.

Activity 3.4

You will need : - some leaves of plants such as akkapana, begonia, peparomia

Method : -

- Make a small cut at the veins of the above mentioned leaves and cover the place with soil
- Keep them watering for several days
- After 3-4 days observe the roots near the veins of the leaves.

'Akkapana'

Begonia

Peparomia

Figure 3.16

3.2 Diversity and functions of plant stems

The basic functions of a stem are supporting and bearing leaves, buds, flowers, fruits, seeds of the plant and keeping the plant upright. Also the stem transports water and minerals throughout the plant. Most stems are found above the ground. Some stems grow underground and are known as **underground stems**.

In addition to the basic functions, stems have adapted to fulfill other functions. Let us study the diversity of stems based on their adaptations.

- Most stems produce new living tissues allowing plants to grow and reproduce. **These stems are known as propagative stems.** Given below are some examples for propagative stems (Figure 3.17, 3.18).

'Gotukola'

'Undupiyaliya'/ 'Sirupulladi'

'Ambul ambiliya'/ 'Puliyarai'

Figure 3.17 Some plants reproduced by runners/ stolon

Banana

'Kalanduru'/ 'Paalargu'

Paddy

Figure 3.18 ▲ Some plant species re-produced by Suckers

- Some plants store food in aerial stems (Figure 3.19).

Sugar cane

'Kithul'

Figure 3.19 ▲ Some plants with storage stems

- Some underground stems serve the functions of storage of food perennation and sexual propagation. During the adverse seasons the aerial parts get destroyed but the underground stem survives. During favourable seasons new sprouts come out from the underground stem using stored food (Figure 3.20).

Turmeric

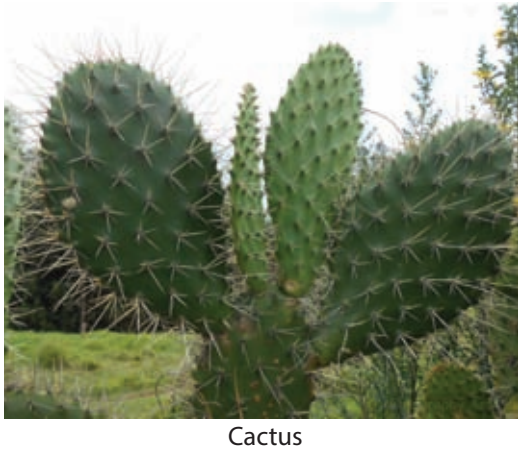
Ginger

Onion

Potato

Figure 3.20 ▲ Some plants reproduced by underground stem

- Some stems are green and photosynthetic. Such stems are called **photosynthetic stems** (Figure 3.21).



Cactus

'Daluk' / 'Sathurakkalli'

Figure 3.21 ▲ Some photosynthetic stems

- Some plants fix to a support to climb up and absorb sun light efficiently. Such stems are called **climbing stems** (Figure 3.22).

'Venival/ Maramanjal'

Beans

Figure 3.22 ▲ Some plants with climbing stems

Assignment 3.2

- Complete Table 3.2 using examples for each type of stems which have adapted to carryout the functions given below.

Table 3.2

Propagative stems	Aerial stems with food storage	Underground stems	Photosynthetic stems

3.3 Diversity and functions of plant roots

The basic function of root is to anchor the plant in the soil, absorb and transport water and minerals. There are some roots which are adapted to satisfy other functions.

Other than the tap root and its branches, there are roots which arise from other parts of the plants. These roots are known as adventitious roots.

There are roots that adapted to fulfill many other functions. They are given various names.

- **Tuberous roots** - The roots that are swollen due to storage of food are known as tuberous roots. Some tuberous roots allow the plant to survive in unfavourable seasons. Food can be stored either in the tap root or in adventitious roots.

  - Storage of food in tap root

Carrot Radish Beet

Figure 3.23 ▲ Some plants that store food in tap root

- Storage of food in adventitious roots


Manioc


Sweet potato


Dahlia

Figure 3.24 ▲ Some plants that store food in adventitious roots

- **Prop roots -** Adventitious roots that arise from branches. They penetrate the soil and helps to support branches.


Banyan Tree


'Rath kadol '/ 'Sen kandal'

Figure 3.25 ▲ Some plants with prop roots

- **Stilt roots -** Adventitious roots arise from the stem, grow below the ground and support the stem.


'Vetakeyya'/'Thalai'


'Rampa'


'Maha kadol'/'Perung kandal'

Figure 3.26 ▲ Some plants with stilt roots

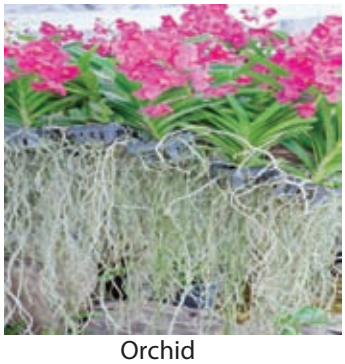
- **Climbing /Clasping roots -** Roots that help the climbing stem/ creepers to fix to a surface/support.


Betel


Pepper

Figure 3.27 ▲ Some plants with climbing roots

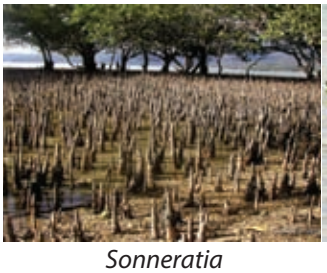
- **Aerial roots -** These roots absorb moisture from the atmosphere and supply the plant. These specialized roots can be found mostly in epiphytes.


Orchid


Vanilla

Figure 3.28 ▲ Some plant with aerial roots

- **Respiratory roots -** These roots absorb air from the atmosphere and supply to the plant. They are specialized roots which can be found mostly in mangrove plants.


Sonneratia


'Maha kadol'

Figure 3.29 ▲ Some plants with respiratory roots

- **Propagative roots -** These roots produce new plants.

Curry leaves

Guava

'Beli/Vilvam'

Figure 3.30 ▲ Some plants with propagative roots

Assignment 3.3

Collect some root specimens and study them. Consider the necessary steps that should be taken to conserve these roots.

Assignment 3.4

Plan a field visit to observe the nature and the diversity of plants. Study the adaptations of plants and relate them to their functions.

Plants play a vital role in the environment. Therefore, it is your duty to explore and collect specimens with minimum damage to the environment.

Summary

- The major parts of a plant are roots, stem, leaves, fruits and flowers.
- There is vast diversity among parts of the plants. Adaptation of plant parts to their functions is the reason for this vast diversity. There are some plant parts that exhibit special adaptations.
- The basic function of a leaf is photosynthesis. Also some leaves are adapted to store food and water and also for propagation.
- The basic function of a stem is to hold leaves, flowers, fruits and transport water and minerals throughout the plant.
- Some stems are adapted for photosynthesis, to climb up, propagation and to store food.
- The basic function of roots is to anchor the plant in the soil, absorb water and minerals.
- Tuberous roots, prop roots, stilt roots, climbing roots, aerial roots and respiratory roots are adapted for special functions.
- The reason for vast diversity among plants is their functions and adaptations to survive in different environments.

Exercise

1) Write the main function of the given plant parts.

a) Plant leaves .....

b) Stem .....

c) Roots .....

2) Write the special adaptations of the following plant roots/stems/leaves.

i. Cactus
ii. Carrot
iii. Banyan
iv. Aloe
v. Sweet potato
vi. Pepper
vii. Begonia
viii. 'Navahandi'
ix. 'Niyangala'
x. Orchid
xi. Guava
xii. 'Rampa'

3) Fill in the blanks.

i) The pattern in which leaves grow on the stem is known as ……..

ii) Sugar cane, palmyrah are examples for ……. stems.

iii) The leaves of the cactus tree reduced to spines is an adaptation to minimize …….

iv) Curry Leaves, beli, bread fruit trees often use the ……. for propagation.

v) Respiratory roots are specialized roots that can be seen in ……..…… plants.

Technical Terms

Diversity of leaves	-	පත්‍රවල විවිධත්වය	-	இலைகளின் பல்வகைமை
Diversity of stems	-	කඳන්වල විවිධත්වය	-	தண்டுகளின் பல்வகைமை
Diverstiy of roots	-	මුල්වල විවිධත්වය	-	வேர்களின் பல்வகைமை
Photosynthetic stems	-	ප්‍රභාසංශ්ලේෂක කඳන්	-	இலைத்தொழில் தண்டுகள்
Climbing stems	-	ආරෝහක කඳන්	-	ஏறும் தண்டுகள்
Propagative stems	-	ප්‍රචාරණ කඳන්	-	இனம்பெருக்கும் தண்டுகள்
Underground stems	-	භූගත කඳන්	-	நிலக்கீழ்த் தண்டுகள்
Tuberous stems	-	ආකන්දී කඳන්	-	முகிழுருவான தண்டுகள்
Tuberous roots	-	ආකන්දී මුල්	-	முகிழுருவானவேர்கள்
Prop roots	-	කරු මුල්	-	தாங்கும்வேர்கள்
Stilt roots	-	කයිරු මුල්	-	மிண்டிவேர்கள்
Aerial roots	-	වායව මුල්	-	காற்றிற்குரிய வேர்கள்
Respiratory roots	-	ශ්වසන මුල්	-	மூச்சுவேர்கள்
Storage roots	-	සංචිත මුල්	-	சேமிப்பு வேர்கள்
Propagation	-	ප්‍රචාරණය	-	இனப்பெருக்கம்