MORE TO KNOW

Kurinji is a rare flower that blooms once in 12 years. It is endemic (found only) to Tamilnadu. The Nilgiris which literally means the "blue mountains" get's its name from the purplish blue flowers of Neelakurinji. The last blooming season was in 2006.

1. When is the next blooming season?

2. How old will you be then?

3.5. MODIFICATIONS OF ROOT, STEM AND LEAVES

Root, stem and leaf have their normal functions as mentioned earlier. In addition to the normal functions, some of the roots, stems and leaves change their shape and structure to do extra functions.

Modifications of Tap Root:

1. Storage Roots:

The tap root becomes thick and fleshy due to storage of food materials. Based on the shape of the root, they are

a) Conical: The root is broad at the apex and gradually tapers towards the base like a cone.

eg: Carrot

b) Fusiform: When the root is swollen in the middle and tapers gradually towards both the ends like a spindle, it is called fusiform.

eg: Radish.

c) Napiform: When the root is swollen at the apex coming almost spherical and tapers suddenly towards the base give a top-like appearance, it is called napiform.

eg: Turnip, beet.

Fig 3.16 Carrot

Fig 3.17 Radish (Mullangi)

Fig 3.18 Beetroot

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2. Respiratory Roots

Plants which grow in saline swamps near the sea shore develop numerous upright aerial roots called respiratory roots. They help in breathing.

eg. Avicennia (vellai alayatri)

It is found at Pitchavaram in Tamilnadu.

Fig 3.19 Avicennia (vellai alayatri)

Fig 3.20. Sweet potato (chakravalli kizhangu)

Modifications of Adventitious Roots

1. Storage Roots

a) Tuberous Roots: Some of the adventitious roots store food and become swollen without any definite shape.

eg. Sweet Potato (chakravalli kizhangu).

b) Fasciculated Roots: The swollen tuberous roots occurring in clusters are called fasciculated roots.

eg. Dahlia.

Fig 3.21 Sugarcane (Karumbu)

2. Supporting Roots

a) Prop Roots: A number of roots are produced from aerial branches. These roots grow vertically downward and fix into the ground. These roots act as pillars and give additional support to the main plant. Such roots are called prop roots.

eg. Banyan.

Fig 3.22 Banyan (Aala maram)

b) Stilt Roots Plants with delicate stems develop short and thick supporting roots from the basal part of the stem. They fix to the ground and give support.Such roots are called stilt root.

eg. Maize, sugarcane

MORE TO KNOW

The big banyan tree in the Indian Botanical Garden near Kolkata has produced over 900 such prop roots from its branches. Its age is more than 200 years and its diameter is well over 360 metre .

SCIENCE

3. Parasitic Roots

Roots of parasitic plants penetrate into the host tissue to absorb nourishment. Such roots are called parasiticroots.

eg. Cuscuta

Fig 3.23 Cuscuta

Fig 3.24 Vanda

4. Epiphytic Roots

There are some plants which grow on the branches of other trees for only shelter and not for food. These plants grow some roots which hang freely in the air and velamen tissue in these roots absorb moisture. Such roots are called epiphytic roots.

eg. Vanda (orchid)

Modifications of stem

In addition to the normal functions of stem, the stem also performs certain special functions in some plants. In such cases, either the complete plant or a part of the stem is modified to do those special functions. Such stems are called modified stems.

1. Underground Stem Modifications

Stem of some plants remain underground and do the function of storage. They are of different types.

a) Tuber: It is modified underground stem which develops by swelling of tip of stem. It stores a large amount of food.

eg. Potato.

Fig 3.25. Potato (Urulai kilangu)

ACTIVITY 3.4

Go to your kitchen, collect some vegetables. Make a list of the vegetables that are modified roots and stems

Fig 3.26 Ginger (Inji)

b) Rhizome: These are thickened stem that grow horizontally under the soil.

eg. Ginger.

2. Sub-Aerial Modifications of Stem

This modification is meant for vegetative propagation. In some plants, branches are weak and they lie horizontal on the ground or may become buried in top soil. Aerial branches and adventitious roots develop at nodes. These are called as Creepers.

The Creepers are of two types.

(a) Runners: eg. Grass, Pumpkin

(b) Stolons: eg. Strawberry.

Fig 3.29 Bougainvillea (Kakitha Poo)

Fig 3.30 Passion flower

Fig 3.27.Grass

Fig 3.28 Strawberry

3. Aerial Stem Modifications

Normally buds develop into branches or flowers. In some plants, the buds undergo modification for definite purpose. Some of the aerial stem modifications are:

a) Stem Tendril: In some plants , the axillary bud is modified into tendril, which helps the plant to coil around a support.

eg. Passion flower, snake gourd.

b) Thorn: In some plants, the axillary bud is modified into thorn for protection.

eg. Bougainvillea.

c) Phylloclade: In some xerophytes, the leaves are reduced to spines. The function of the leaves is taken over by the stem which is green and flat. Such a stem is called Phylloclade.

eg. Opuntia

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Fig 3.31 Nepenthes

Fig 3.32 Pea (Pattani) - Utricularia

MORE TO KNOW

The Amazon Water Lilly bears leaves measuring upto 7 feet in diameter and flowers between 12 and 16 inches.

MODIFICATIONS OF LEAF:

In some plants, the leaf is modified as under:

a) Leaf Tendril: In some plants, the leaf is modified into slender, wiry coiled structure, known as tendril. They help in climbing.

eg. Pea

b) Leaf-Spine: In opuntia, the leaves are reduced to spines. They are protective in function and prevent transpiration.

eg. Opuntia.

c) Pitcher: In some plants, the leaves are modified into pitcher to trap insects to fulfill their nitrogen deficiency.

eg. Nepenthes.

d) Bladder: In some plants, the leaf is modified into a bladder, to trap insects.

eg. Utricularia. (Bladder-wort)

3.6. KINDS OF STEM

Stems of flowering plants attain diverse forms in order to perform their various functions. Based on the texture, stems of plants are grouped under three broad categories.

1) Reduced Stems: In some plants, the stem is reduced to small disc. Nodes and inter-nodes are absent in the disc.

eg. Radish, carrot, turnip, onion.

2) Erect Stems: Most of the flowering plants possess upright erect woody stems.

eg. Bamboo, banyan, eucalyptus, coconut

Fig 3.33 Onion

3) Weak Stems: There are thin, soft and delicate stems which cannot stand erect without support. They are two types.

1. Upright Weak Stems: They may be twiners or climbers

a) Twiners: The stems are long, slender, flexible and very sensitive. They coil around an upright support without any special structure.

eg. bean.

b) Climbers: They climb up the support with some clinging structures

eg. Betelvine (vetrilai), pepper (Milagu).

2. Prostrate Weak Stems: These stems spread over the ground. They may be trailers or creepers.

eg. Tridax (vettukaya poondu).


Fig 3.34 Tridax


Fig 3.35 Bean (Avarai)

3.7. MOVEMENTS IN PLANTS

Plants generally do not move from place to place like animals. But the parts of the plant show growth movements in response to some stimuli like sunlight, water, soil, etc. Therefore, the tendency of the plant parts to grow towards or away from the direction of stimuli,is called tropism.

MORE TO KNOW

J.C.Bose, an Indian Botanist invented Crescograph which showed that plants have feelings

1.Tropism

There are three types of tropism.

a) Phototropism: The tendency of the plant parts to grow either towards or away from the direction of sunlight, is called phototropism.


Fig 3.36 Phototropism

Stem grows towards the sunlight. So, stem is positively phototropic. Root grows away from the sunlight. So, root is negatively phototropic.

b) Geotropism: Roots tend to grow towards the soil or gravity. This

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is called geotropism. Root is positively geotropic and stem is negatively geotropic.

c) Hydrotropism: The roots tends to grow towards the direction of water, whereas stem does not. So, root is positively hydrotropic and stem is negatively hydrotropic.

Fig 3.37 Geotropism

2. Nastic movement

The plant Mimosa - Touch Me Not (Thotta surungi) is sensitive to touch. When the plant is touched, the leaves fold. The folding of leaves in Mimosa is not due to growth. It is an irregular movement and it is called nastic movement.

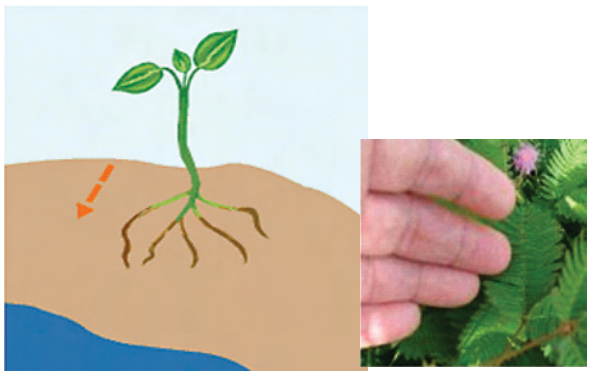


Fig 3.38 Hydrotropism - Nastic movement

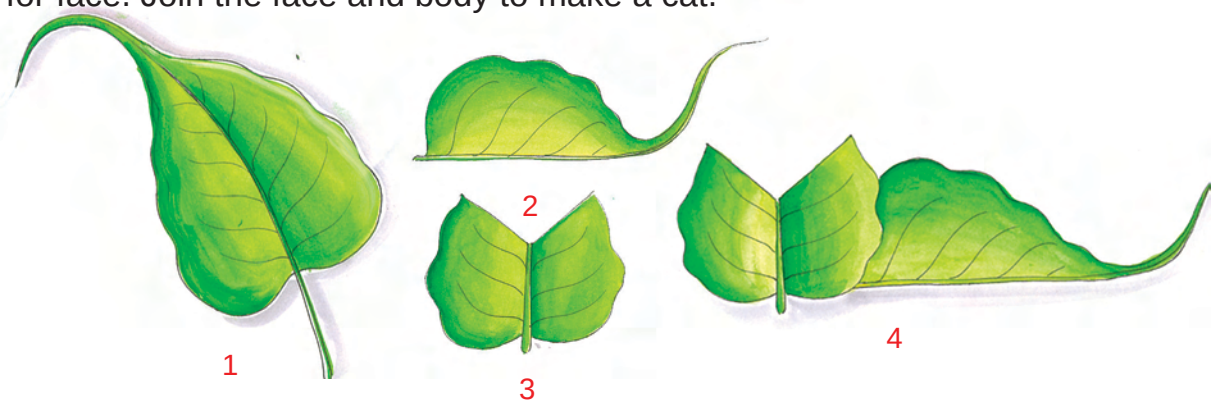
3.8. OBSERVATION OF PLANTS AND TREES

1. Recording data and drawings

Children, we are planning to go for a trekking during the holidays to the hills or the forest area which is nearer to our school. We shall observe the types of plants present over there. Collect different kinds of leaves, flowers, seeds, etc. We shall place the leaves and flowers that we have collected between the pages of our used old note-books, After drying, paste them in a scrap book.

2. Let us make

Children, Let us make animals with leaves. Collect some leaves of peepul tree (Ficus tree). Tear along the midrib to make the body of a cat. Tear V shape for face. Join the face and body to make a cat.



Try to make elephant, deer, tortoise, peacock with different leaves.

EVALUATION

1. Pick out the correct answer:-

   a. Absorption of water is a function of _____ system. (Shoot / root)

   b. Thulasi is an example of a _____ (herb / shrub)

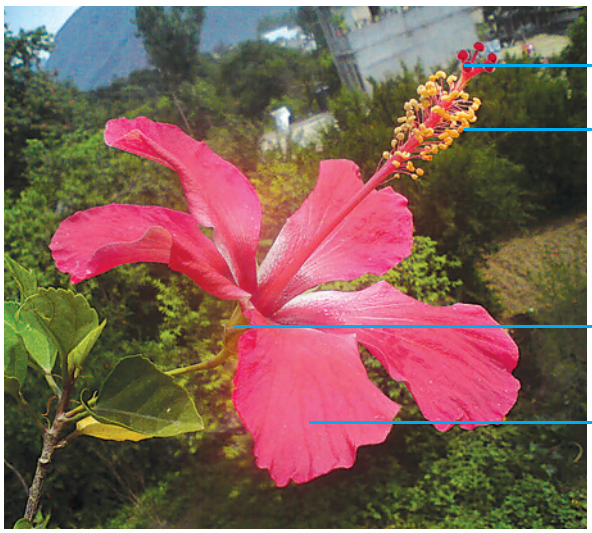
   c. The stalk of a leaf is called _____ (stipule / petiole)

   d. _____ protects the flower when it is a bud. (calyx / corolla)

   e. Movement of plant towards _____ is called phototropism. (Water / light)

2. The diagram of a flower is given below. Label the following parts.

   a) sepal b) petal c) androecium d) gynoecium



3. The jumbled words below are the various movements of a plant. Write the correct word.

   a. SICTAN NASTIC

   b. PSIMORTOEG _____

   c. PISOMTRORDHY _____

   d. SIMPTROOOTHP _____

4. The answers to the following are found in the word grid below. Find the answers and fill in the blanks.

   a. I am a hydrophyte _____

   b. I am a herb _____

   c. I grow in desert _____

   d. I am a tree _____

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e. I produce food in the plant _____

f. I am a fusiform root _____

P	K	U	R	I	N	J	I	O	P
O	Z	Y	R	E	P	P	E	P	Q
T	T	R	A	D	I	S	H	P	T
A	E	O	P	U	N	T	I	A	Q
T	A	L	E	A	F	X	W	D	R
O	K	M	I	M	O	S	A	D	A
W	A	T	E	R	L	I	L	Y	A

g. I am a tuber _____

h. I am a climber _____

i. Touch-me not _____

j. I am a flower endemic to Tamil Nadu _____

5. Match the following.

1. Vallisneria	-	Sugarcane
2. Stomata	-	Opuntia
3. Stilt root	-	Pepper
4. Phylloclade	-	Submerged hydrophyte
5. Climber	-	Transpiration

FURTHER REFERENCE

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Places of scientific importance for visit:

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