

# Plant Morphology- Modification of root, stem and leaf

Samacheer, Science, Class 7, Unit 3

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**Looks like a root? Prepare to be surprised, it isn't!**

## Lesson objectives:

### Content objectives:

- ❖ Understand the types and functions of modifications of root, stem and leaf.
- ❖ Identify and illustrate modified roots and modified stem
- ❖ Understand the difference between modified stems and modified roots.
- ❖ Understand how ecological factors in a particular habitat, influence the modification of root, stem and leaf.

### Skill objectives

- ❖ To acquire skills like observation, hypothesis framing, hypothesis testing,

articulation of content using scientific vocabulary.

- ❖ To develop their drawing skills by making them draw intricate plant parts and label them for better understanding

### Pre-requisite knowledge:

- ❖ The characteristics and functions of roots, stem and leaves.
- ❖ Different types of plant habitats.

## ENGAGE

This engage activity will help children to think about the topic of the lesson i.e. Modification of root, stem and leaf and recall their previous knowledge.

(Sample picture)

Potato plant



Sugarcane



The picture or specimen given should be of a full plant. Only then the children will be able to identify the edible part of the plant.

### E.g. Activity:

◆ Students will review their knowledge of characteristics and functions of plant part.

◆ Students will be able to identify the edible part of plants.

(refer sample picture in the first page)

**Example:** spinach, tomato, sugarcane, tapioca and potato plant

1. Teacher will show some specimens to the children or will give some pictures of the above plant parts.

2. Students will identify and say which one is the edible part of the plant. The teacher will ask the students, "We have seen some parts of plants that we eat. Have you noticed the difference between the edible part of the plant and its other parts?"

3. Make the students recall the characteristics and functions of various parts of plants.

## EXPLORE

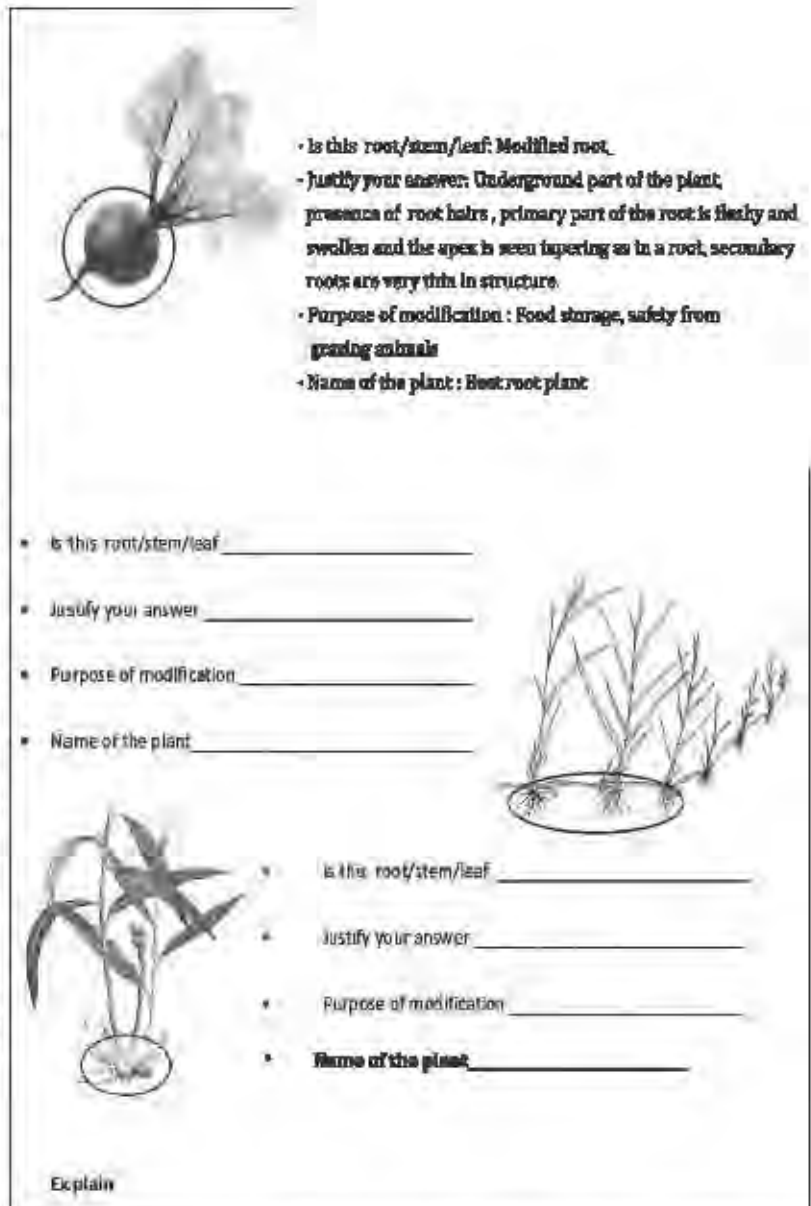
**Objective of this activity:** Students will be able to identify and segregate modified root, stem and leaf

They can be divided into 4 or 5 groups. Each group can be given 1 worksheet.

Each worksheet will have different types of modified roots, stems and leaves

**Examples:** Sugarcane with root, Carrot, Beet root, Radish, Sweet potato, Maize stem with root, Ailicenna root, Cuscuta, Banyan root, Vanda plant, Bottle guard, Onion, ginger, turmeric, mint plant, grass, cactus, opuntia, garlic, pumpkin, pea, Nepenthus, utricularia

**One sample worksheet:**



• Is this root/stem/leaf: Modified root.

• Justify your answer: Underground part of the plant, presence of root hairs, primary part of the root is fleshy and swollen and the apex is seen tapering as in a root, secondary roots are very thin in structure.

• Purpose of modification: Food storage, safety from grazing animals

• Name of the plant: Beet root plant

• Is this root/stem/leaf \_\_\_\_\_

• Justify your answer \_\_\_\_\_

• Purpose of modification \_\_\_\_\_

• Name of the plant \_\_\_\_\_

• Is this root/stem/leaf \_\_\_\_\_

• Justify your answer \_\_\_\_\_

• Purpose of modification \_\_\_\_\_

• Name of the plant \_\_\_\_\_

Explain

Identify whether the circled portion is a modified root/stem/leaf and justify your answer. Write its purpose of modification and the name of the plant.

### EXPLAIN

#### Debriefing from the explore activity

The students will present their classification from the previous activity and justify the same.

The teacher will need to help them in the following places:

- Explaining why a part that may look like a root/stem/leaf may not be root, stem or leaf part. Teacher helps them to recall the

characteristics of root/stem/leaf and explain the cause of modification

- b. Point out from the picture, instances of multiple modifications in the same plant

**Teaching the concept:** Debrief from the explore activity helps set the background for the teaching of this concept. The teacher can now explain the concept of modification in detail:

- a. Modification of roots – Purpose of modification with examples, types of root modification.

- ❖ Here teacher will explain about causes and functions of modifications.
- ❖ Will use some additional examples.
- ❖ Will give differentiation between modifications in tap root and adventitious root
- ❖ Introduce some technical word and give enough explanation.
- ❖ Will use some videos or Real samples or pictures

**Examples:**

1. Food storage-gx: Carrot, radish, Beet root---Tap root modification ,Sweet potato, Dahlia- Adventitious root modification
2. Supporting root-ex Prop root (Banyan) and stilt root (Maize, Sugarcane)
3. Respiration-Eg: Avicennia-
4. Parasitic root: Eg: Cuscuta
5. Epiphytic root-Eg: vanda

<https://www.youtube.com/watch?v=CXy5AYPn75E>

- b. Modification of stems – Purpose of

modification with examples, types of modification with examples

Stem modification will also be explained in the same way.

There are three types of modification in stem.

1. Underground stem modifications

- a). tuber-Eg: Potato
- b). Rhizome: Eg: Ginger

2. Sub aerial stem Modifications

- a). Creeper-
  - i). Stolons (strawberry).
  - ii). Runners. (Pumpkin, grass)

3. Aerial stem modifications.

- a). Stem tendril- Eg: snake guard
- b). Thorn- Eg: Bougainvillea
- c). Phylloclade- Eg: Opuntia

<https://www.youtube.com/watch?v=BmZZjGxjNu8>

4. Modification of leaves – Purpose of modification with examples, types of modification with examples- Good pictures can be used for this part of explanation or real specimen or video

There are actually 4 types of modification in leaf.

- a). Leaf tendril- Eg: Pea
- b). Leaf spine- Eg: opuntia
- c). Pitcher- Eg: Nepenthus
- d). Bladder- Eg: Utricularia

<https://www.youtube.com/watch?v=AOxCnlkQiyQ>

## EXTEND

### Project on growing plants with modified parts.

The teacher will ask the children to choose a plant with a modified part that can be grown at home.

Students will grow plants which has modified parts. They will observe the growth stages of the plant and observe and make notes of the observations.

After 1 week they will bring their grown plant. Children will explain their project (Group wise). Now the teacher will explain how some modified plant parts are useful to human beings and ask the students to carry out a study to understand why these modifications, for adaptability, take place.

For example: Onion, potato, Ginger, Turmeric, and Garlic.

Students will share their experience and teacher will provide additional information.

## EVALUATE

In order to evaluate students' understanding (e.g. recognizing modifications in unfamiliar examples, justifying the cause of modification, etc) she will do the following:

- ❖ Ask students to collect similar modified plants near by their areas and share in the class
- ❖ The following worksheets will be given on the above concept to evaluate student understanding (both objective and subjective):

**worksheets attached in the next Page**

**Reference :**

[http://www.tutorvista.com/content/biology/biology-iii/angiosperm\\_morphology/underground-stem-modifications.php](http://www.tutorvista.com/content/biology/biology-iii/angiosperm_morphology/underground-stem-modifications.php)



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## MODIFICATION OF PLANT PARTS

### Worksheet:1

Understand the relation between the pair of words and complete the second pair:

- 1) Potato: Tuber  
Ginger: \_\_\_\_\_
- 2). Sweet Potato: Underground root  
Potato: \_\_\_\_\_
- 3). Cuscuta root: Nutrition  
Rhizophora root: \_\_\_\_\_
- 4). Vanda: Epiphytic root  
Cuscuta: \_\_\_\_\_
- 5). Carrot: Tap root Modification  
Dahlia: \_\_\_\_\_
- 6). Pitcher plant: Nepenthes  
Bladderworts: \_\_\_\_\_
- 7). Thorns: Modified shoot  
Spine: \_\_\_\_\_
- 8). Opuntia stem :Photosynthesis  
Opuntia leaf: \_\_\_\_\_
- 9). Sub aerial modification of stem: Sweet pea  
Underground modification of stem: \_\_\_\_\_
- 10). Runner: grass  
Stolon: \_\_\_\_\_

## MODIFICATION OF PLANT PARTS

### Worksheet:2

ANSWER THE FOLLOWING:

a) Why are breathing roots found in mangroves only?

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b) Give examples of a root which has more than one modification:- How are these modified plant parts useful to us?

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c) Have you seen any new modified plants other than the ones we have discussed in this lesson, around the school or around your home? If so, Explain its features.

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d) Why do desert plants have spines instead of leaves?

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e) Trees in the mountains have needle like leaves. Give reasons

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f) How do plant safeguard themselves from grazing animals?

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g) Pooja spotted a plant whose leaves were seen growing above the ground. Curious, she pulled the leaves and out came a bulb-like structure which had grown below the ground. What could this be?

- Only a modified root
- Only a modified stem
- Could be a modified leaf
- could be a modified shoot system

**If Pooja claims any of the above, what could her justification be?**