ENTRI

MORPHOLOGY OF ANGIOSPERM

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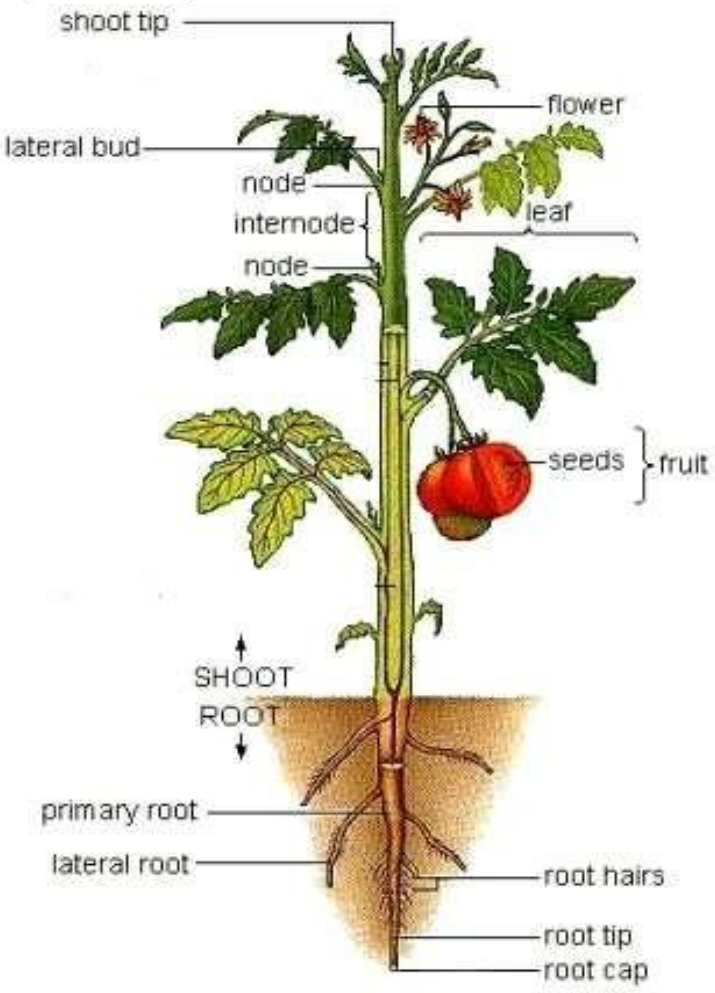
Kerala PSC Expert



PLANT BODY

Root System

- Consist of Roots and its Branches

Shoot System

- Consist of Stem, branches , leaves, flowers

PARTS OF PLANT BODY

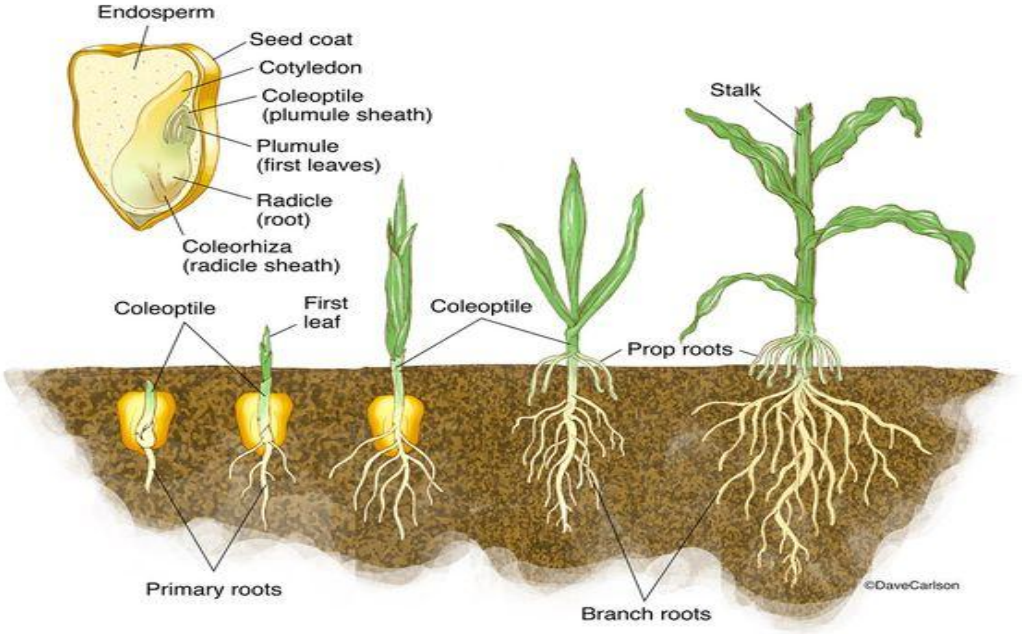
Vegetative Parts

- Root
- Stem
- Leaves

Reproductive Parts

- Responsible for reproduction
- Flowers

ROOT


Endosperm
Seed coat
Cotyledon
Coleoptile
(plumule sheath)
Plumule
(first leaves)
Radicle
(root)
Coleorhiza
(radicle sheath)
Coleoptile
First
leaf
Coleoptile
Stalk
Prop roots
Primary roots
Branch roots
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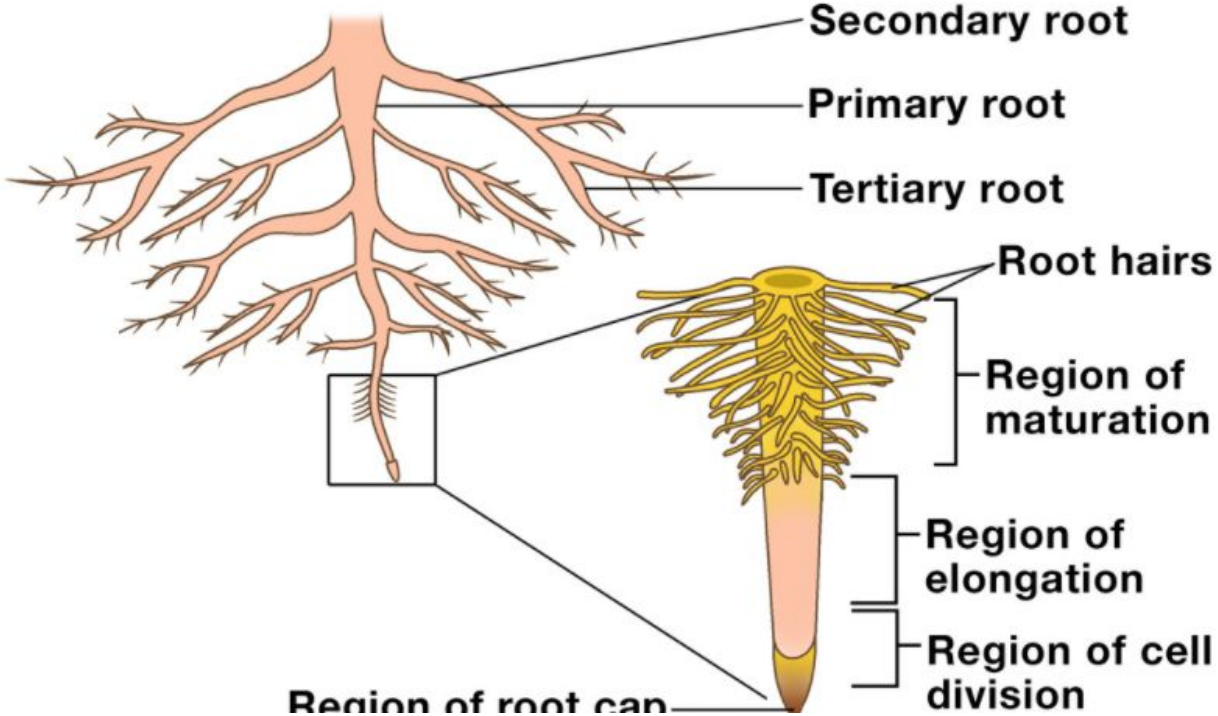
ADVENTITIOUS ROOT

- Root from any part of the plant other than radicle

FUNCTIONS OF ROOT

- Absorption of water and minerals
- Proper anchorage
- Storing reserve food materials
- Synthesis of plant growth regulators

REGIONS OF ROOT

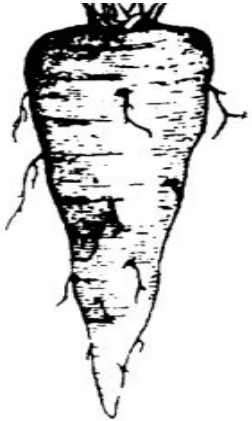


- **Root cap/ Calyptra:** Cap like structure at the tip of root
- Floating hydrophytes contain some air bladders at the tip of root called **root pockets** for balancing on the surface
- **Meristematic region:** Actively dividing region & Produce new cells
- **Elongation zone:** Rapid elongating region
- **Maturation region:** Differentiated region, epidermis produce root hairs

MODIFICATION OF ROOT

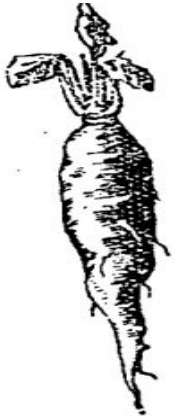
I. ROOT MODIFIED AS THE STORAGE ORGANS

a. Tap root modified as the storage organ



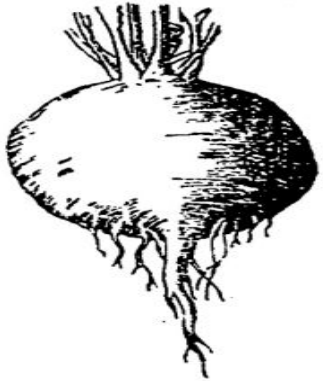
Conical root

Conical root is broadest on top and gradually tapers towards the lower end ***(e.g. Daucus carota*** *-* **Carrot)**



Fusiform root

In this root the middle portion is broad and tapers towards both ends. (e.g. ***Raphanus sativus-*** **Radish)**



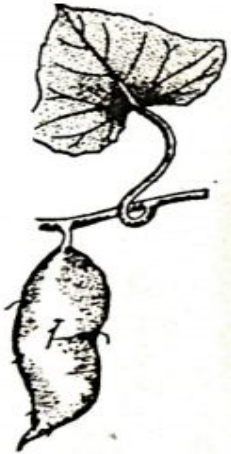
Napiform

In this type, the root is spherical or globular above and tapers abruptly at the lower end. (e.g. ***Beeta vulgaris-*** **Beet root)**

Tuberous

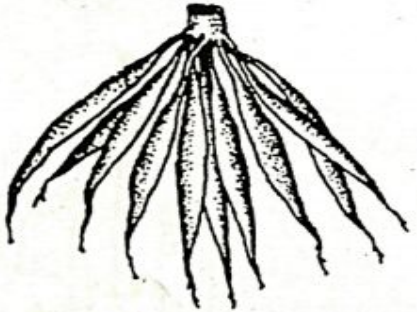
This root has no definite shape but the root is thick and fleshy. (e.g. ***Mirabilis jalapa-*** **4 o' clock plant)**

b. Adventitious root modified as storage organs



Tuberous root

Some adventitious roots become swollen due to the storage of food. These tuberous roots arise from the lower side of the stem at the nodes (e.g. ***Ipomea batata*** *-* **Sweet potato)**

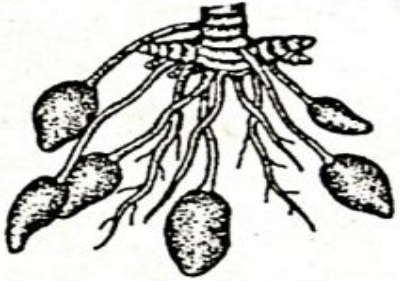


Fasciculated root

Tuberous storage roots occur as ***a cluster*** *at the base of the stem (e.g.* ***Asparagus, Dahlia, Manihot utilissima*** *- Tapioca) etc.*

Moniliform root

The storage roots swell at intervals and look like a beaded structure. (e.g. ***Momordica charantia*** - Bittergourd)



Nodulose root

Root becomes suddenly swollen near the apex (e.g. : ***Curcuma amada*** **- Mango ginger)**

II. ROOTS MODIFIED FOR MECHANICAL SUPPORT

Stilt root

Roots grow obliquely downwards and support the stem (e.g. ***Pandanus)***

Prop root

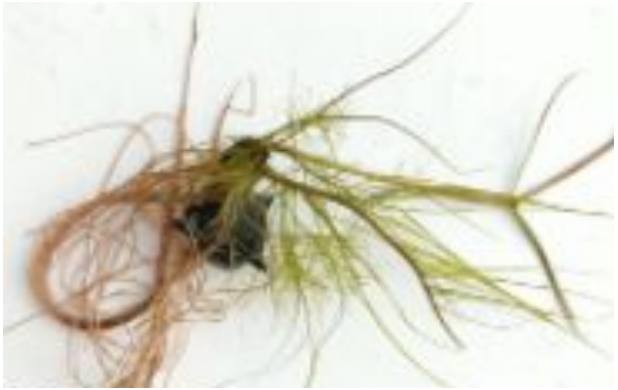
Horizontal aerial branches produce roots which are provided with root caps. They grow stouter and become as strong as the main trunk. (e.g.. ***Ficus*** **- Banyan tree)**

Climbing root

Climbers climb up their support with the help of adventitious roots growing from the nodes. (e.g. ***Piper nigrum*** **- Pepper).**

III. ROOT MODIFIED FOR PHYSIOLOGICAL FUNCTIONS

- **Assimilatory root**



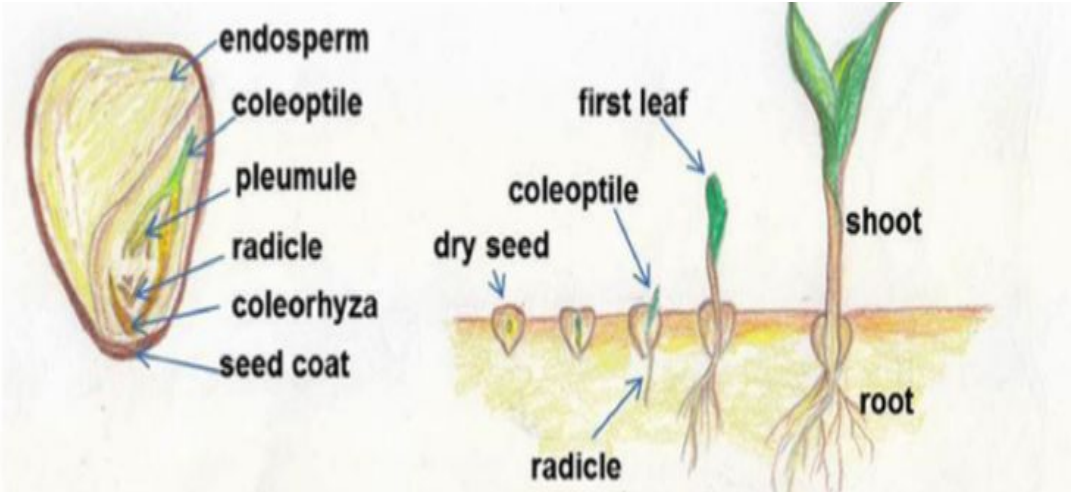
Trapa natans

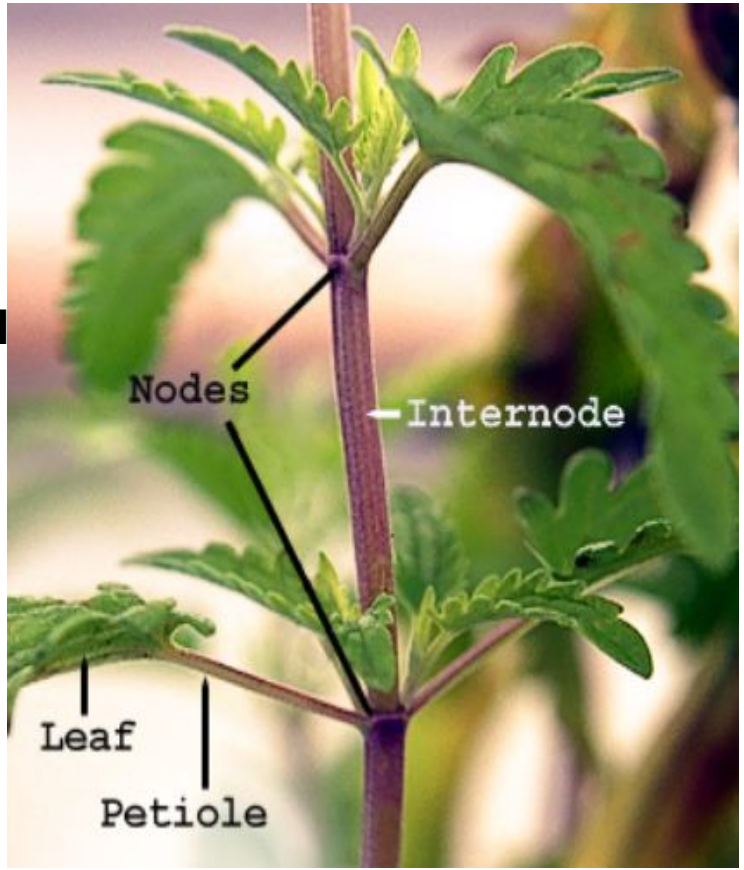
- **Pneumatophores**

Avicennia

STEM

- Axis of shoot system
- **Nodes:** Leaves and buds arise
- **Internodes:** Region between two nod





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FUNCTIONS OF STEM

- Support branches
- Storing reserve food materials
- Conduction of food and water
- Support and protection
- Vegetative propagation

MODIFICATIONS OF STEM

I. AERIAL STEM MODIFICATIONS

a. Stem tendrils

- Leafless, coiled structures
- Produced by week stems
- Help to climb

b. Hooks

- Lateral buds modified into pair of curved hooks

c. Thorns

- Axillary buds modified

c. Phylloclade

- Flat, green leaf like swollen
- Performing functions of leaf
- Having internodes

d. Cladode

- Performing functions of leaf
- Having internodes
- Reduced leaves

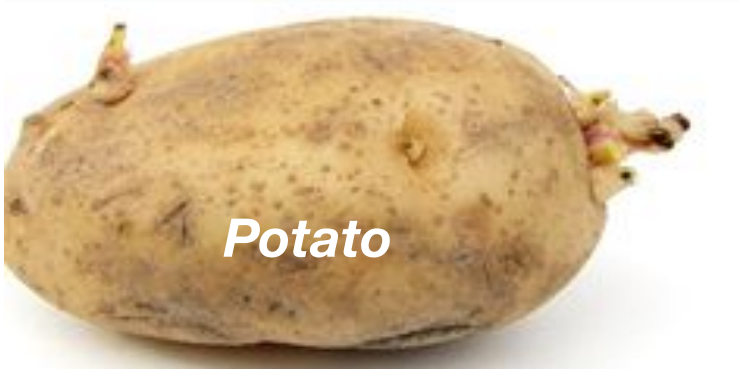
II. UNDERGROUND STEM MODIFICATION

a. Rhizome

- Thick, fleshy stem
- Nodes and internodes
- Buds and adventitious roots

b. Stem tuber

- Swollen tips of the branches
- Eyes or buds are present

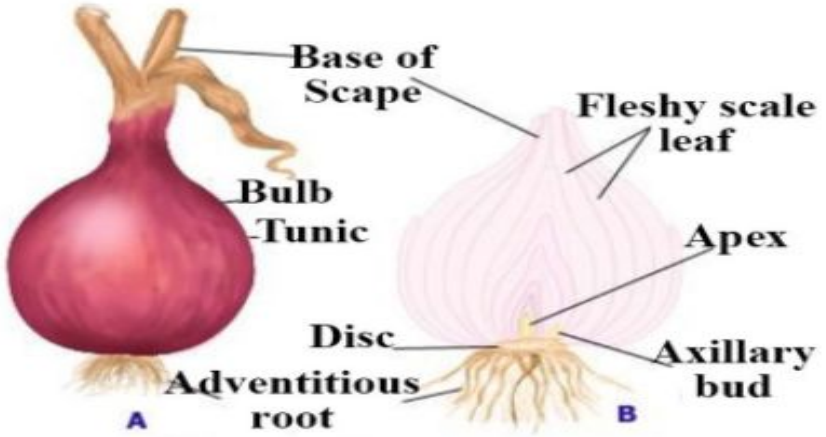


c. Corm

- Solid condensed
- Prominent bud

d. Bulb

- Short, Disc shaped
- Internodes
- Scales leaves arise



III. Sub-Aerial Stem Modifications

Runner

Stoleon

Sucker

Offset

a. Runner

- Long slender internodes
- From nodes it produce leaves and adventitious roots
- *Oxalis*

b. Offset

- Short thick internodes
- Cluster of leaves upwards and cluster of roots below from each node
- Eichornia

- c. Sucker
- Lateral branches grow upwards as leafy shoot
- Chrysanthemum.

d. Stolon

- Originate from base of stem Mentha

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1. Which of the following is an aerial stem modification ?

D Tendrils

A Rhizome

B Runner

C Offset

D Tendrils

2. Pneumatophores occur in plants of ?

B **Marshy soil**

- **Some branches of tap root grow vertically upwards in to the air from horizontally secondary roots. These roots are called pneumatophores.**

A **Sandy soil**	B **Marshy soil**
C **Deserts**	D **Water**

3. Root cap takes part in ?

B Absorption of water and minerals

- Cap-like parenchymatous multicellular structure, protects the root-apex.

A Formation of new cells	B Absorption of water and minerals
C Protection of root meristem	D Storage of food

4. Assimilatory (Photosynthetic) roots a characteristic of ?

- **B Both 1 & 3 correct**

These roots develop chlorophyll and become photosynthetic. Synthesize carbohydrates from carbon dioxide and water in presence of light, e.g., Trapa, Tinospora, Taeniophyllum and podostemon.

A *Trapa* and *Tinospora*	B Both 1 & 3 correct
C *Taeniophyllum* and *Podostemon*	D None of these

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5. Root pockets are found in ?

Free floating hydrophytes
Root pocket: A modified root cap found in floating aquatic plants for balancing, which cannot be regenerated, e.g., Pistia, Eichhornia, Lemna.

A **Hydrophytes**

B **Fixed floating hydrophytes**

C **Free floating hydrophytes**

D **Submerged hydrophytes**

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THANK YOU