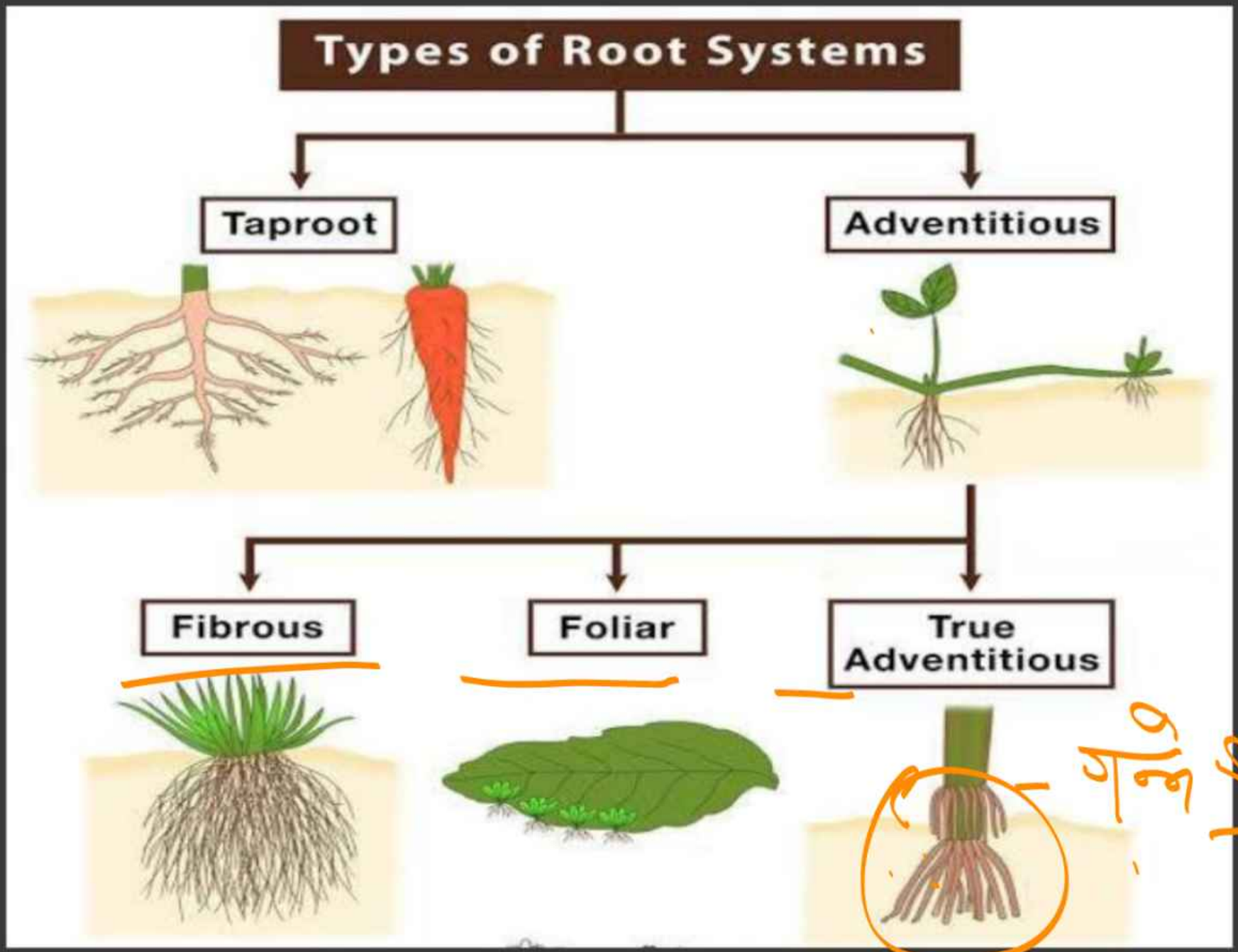
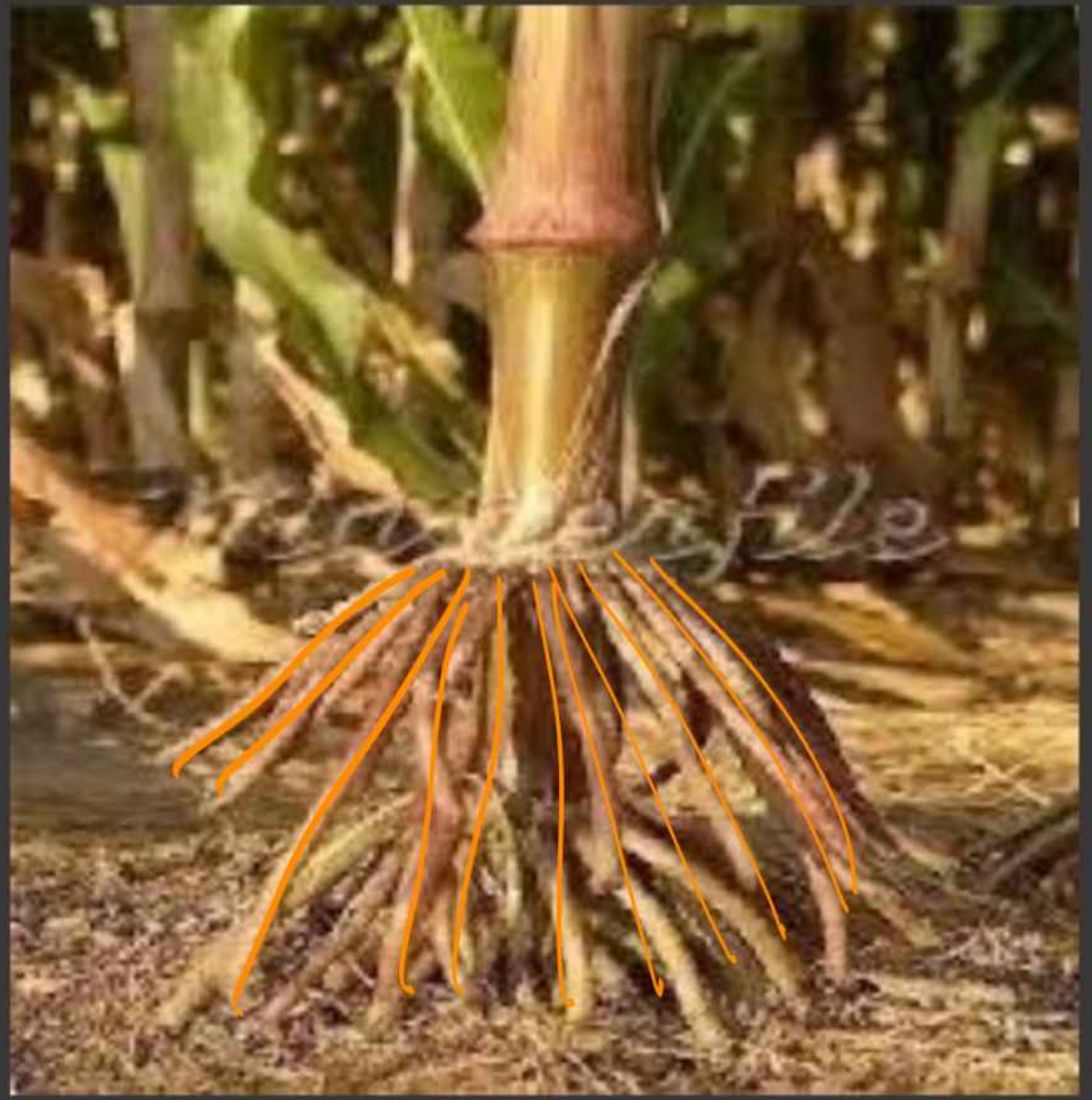
Types of Root Systems

- Taproot
- Adventitious
  - Fibrous
  - Foliar
  - True Adventitious







भूमिगत तना के रूपांतरण
(Underground Modification of Stem)



प्रकंद (Rhizome)



घनकंद (Corm)



बल्ब (Bulb)



कंद (Tuber)

वायवीय तना के रूपांतरण
(Aerial Modification of Stem)



पर्णाभकांड (Phylloclades)



क्लेडोड्स (Cladodes)



काँटे (Thorns)



तना प्रतान (Stem Tendrils)

उपवायवीय तना के रूपांतरण
(Sub-aerial Modification of Stem)



रनर (Runner)



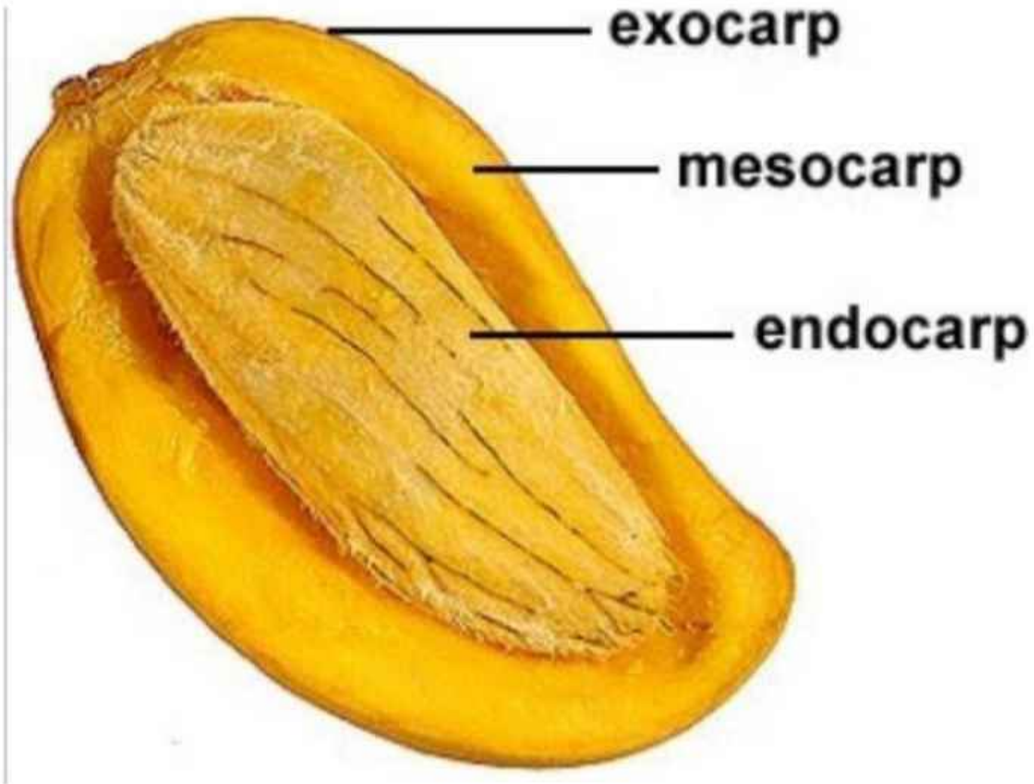
स्टोलॉन (Stolon)



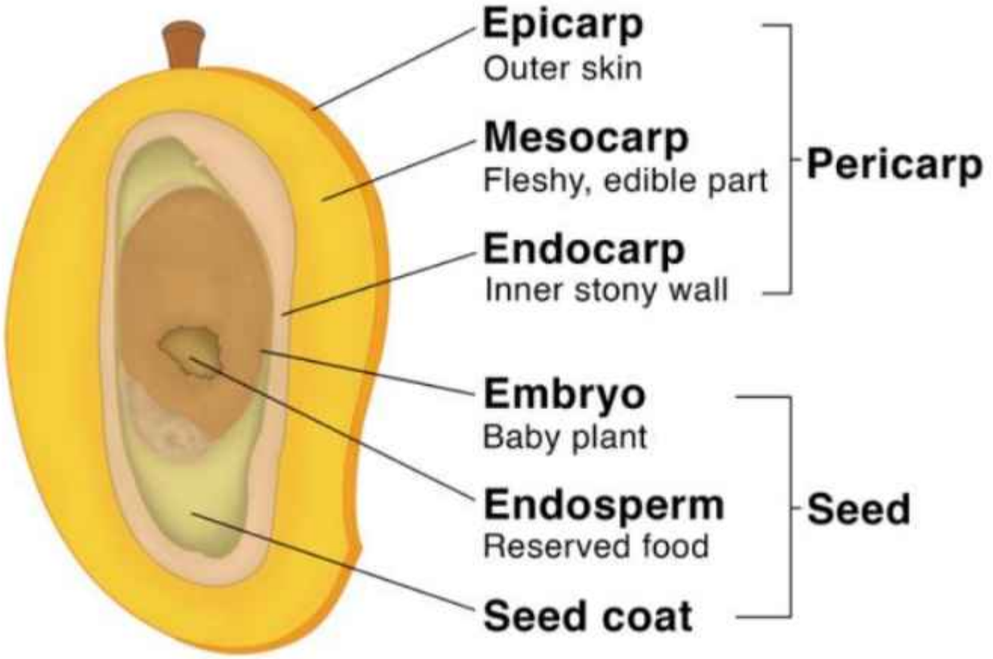
चूषक (Sucker)

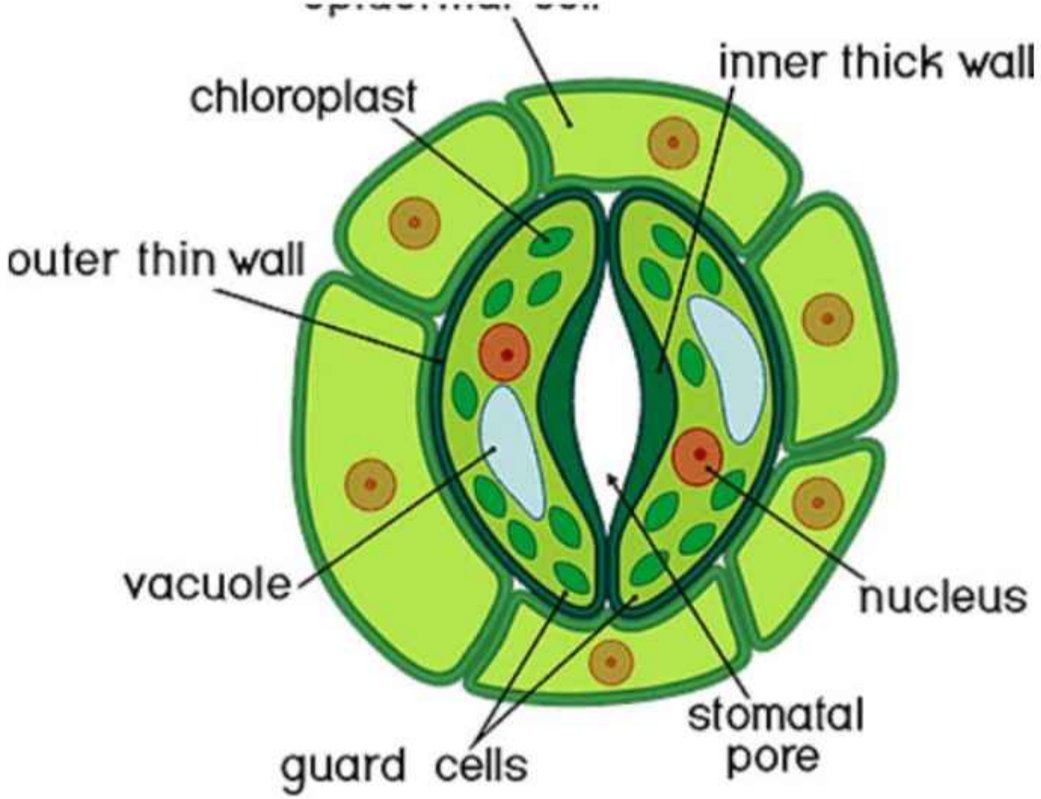


भूस्तारिका (Offset)


exocarp
mesocarp
endocarp

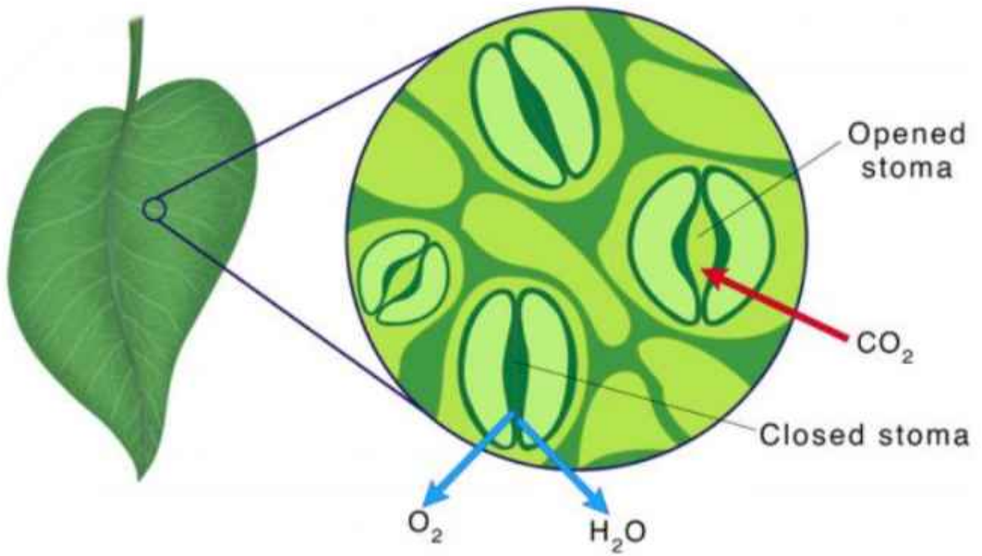
Parts of a Fruit

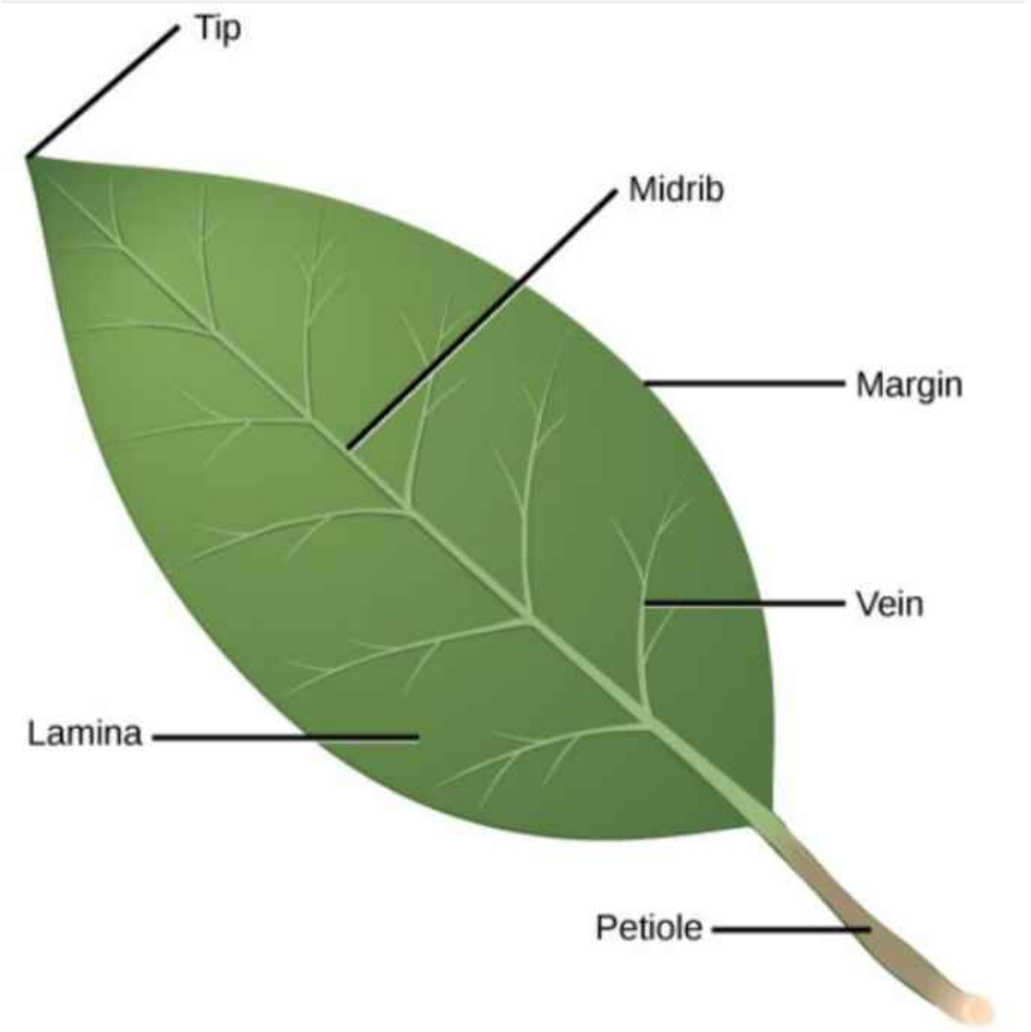



inner thick wall
chloroplast
outer thin wall
vacuole
nucleus
stomatal pore
guard cells

stoma open

Stomata




Tip
Midrib
Margin
Vein
Lamina
Petiole

PLANT MODIFICATION

Modification of Root

To perform special functions the roots change their size and shape.



STORAGE OF FOOD
e.g. Beet root



MECHANICAL SUPPORT
e.g. Banyan tree



GASES EXCHANGE
e.g. Avicennia



SUCKING ROOT
e.g.Cuscuta

Modification of stem

Stem modified for storing the food materials and for vegetative propagation.



AERIAL MODIFIED
e.g. Cactus



SUB-AERIAL MODIFIED
e.g. Eichhornia



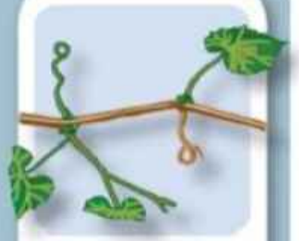
UNDERGROUND STEM
e.g. ColoCasia

Modification of Leaf

Leaves have changed themselves to adopt to their environment



SPINES
e.g.Opuntia



TENDRILS
e.g.Pisum



PHYLLODE



TRAPS
e.g. Nepenthus

Tendril: These types of stems are slender, spirally coiled, which help a plant to climb. Example: Passiflora, Grapevine etc.

Bulbil: These are modified axillary buds which become fleshy and swollen due to the storage of food. They help in vegetative propagation to form a new plant. Example: Dioscorea.

Thorn: These are hard, woody, and pointed structures that protect plants from grazing animals. It originates from the axillary or terminal bud. Example: roses, citrus, bougainvillea, duranta etc.

Cladodes: These are non-fleshy and cylindrical that contain only one internode. Example: Asparagus, butcher's broom.

Phylloclade: These are green, fleshy, and flattened or cylindrical branches containing chlorophyll and photosynthesis. This modification is found in xerophytic plants and stores water. Example: Opuntia, Casuarina,

Aerial stem



Passiflora (Tendril)



Dioscorea (Bulbil)



Bougainvillea (Thorn)



Asparagus (Cladodes)



Opuntia (Phylloclade)

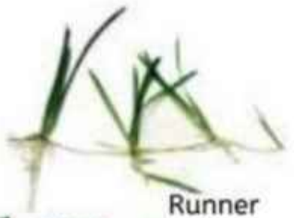
Runner: It is a creeper that runs horizontally along the surface of the soil. Runners have long internodes. The nodes have scale leaves, adventitious roots, and auxiliary buds. An underground runner is known as sobole. Example: Grass, Cynodon, Oxalis.

Offset: These are shorter and thicker than the runner with a single internode. It originates from the leaf axis and grows horizontally. Offsets are often found in aquatic plants like water lettuce, water hyacinth, etc.

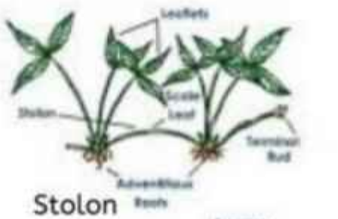
Stolon: It grows above ground for some time and then bends towards the ground until it touches the ground. Stolon arises from the lower part of the main axis. Example: Jasmine, colocasia, etc.

Sucker: The sucker stem is very similar to the stolon, but it grows obliquely upwards and gives rise to a new plant. Example: Garden chrysanthemum, strawberry, pineapple, mentha, etc.

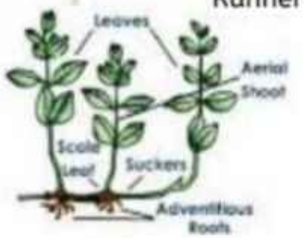
Sub-Aerial Stem



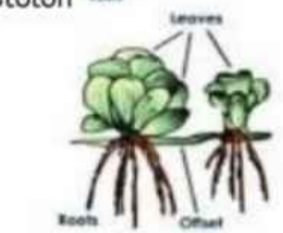
Runner



Stolon



Sucker



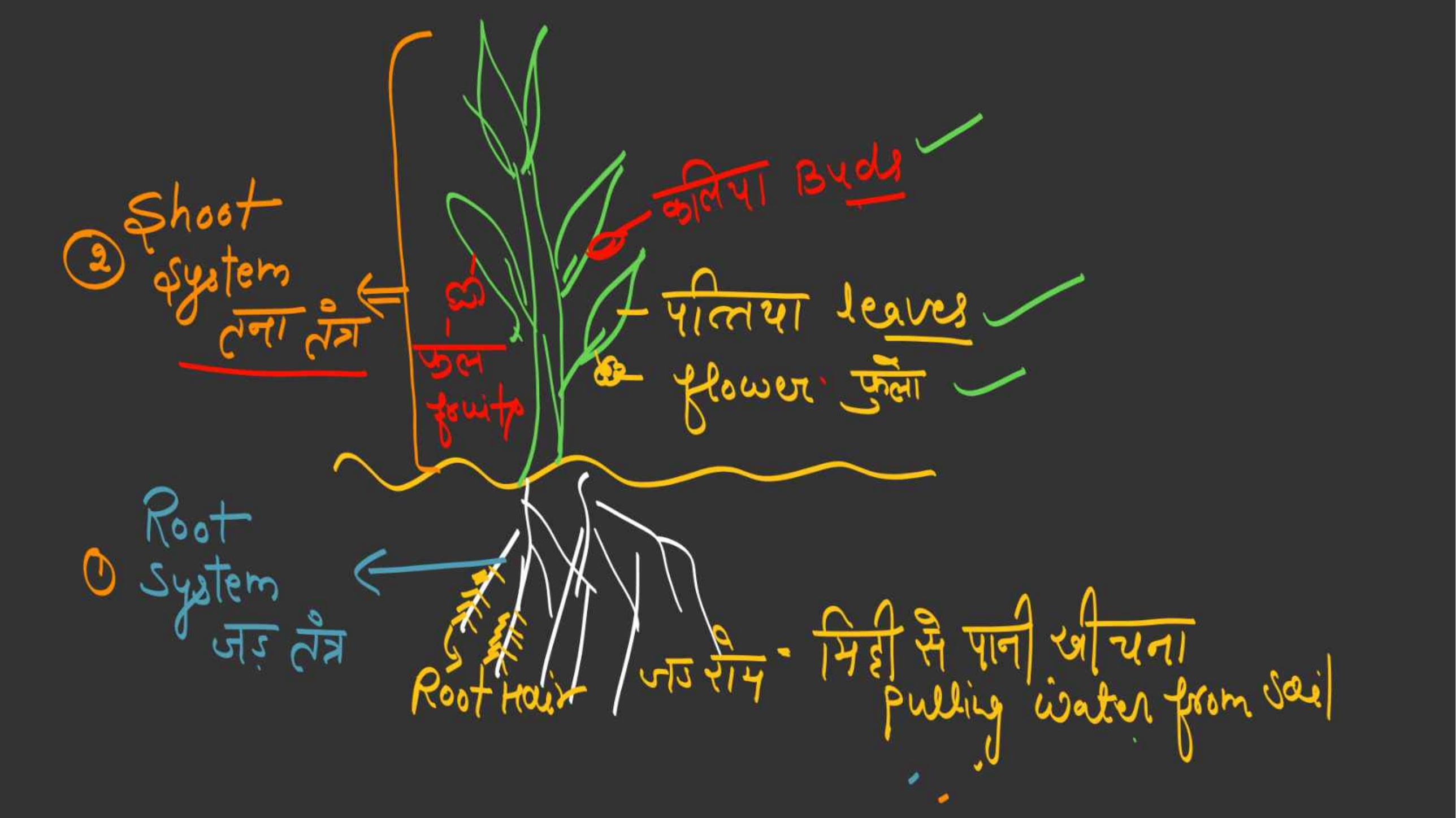
Offset

Plant Morphology
पादप आकारिकी

Morphology
आकारिकी ⇒ पेड़ पौधों के बाह्य भागों का अध्ययन

Study of external part of the plant

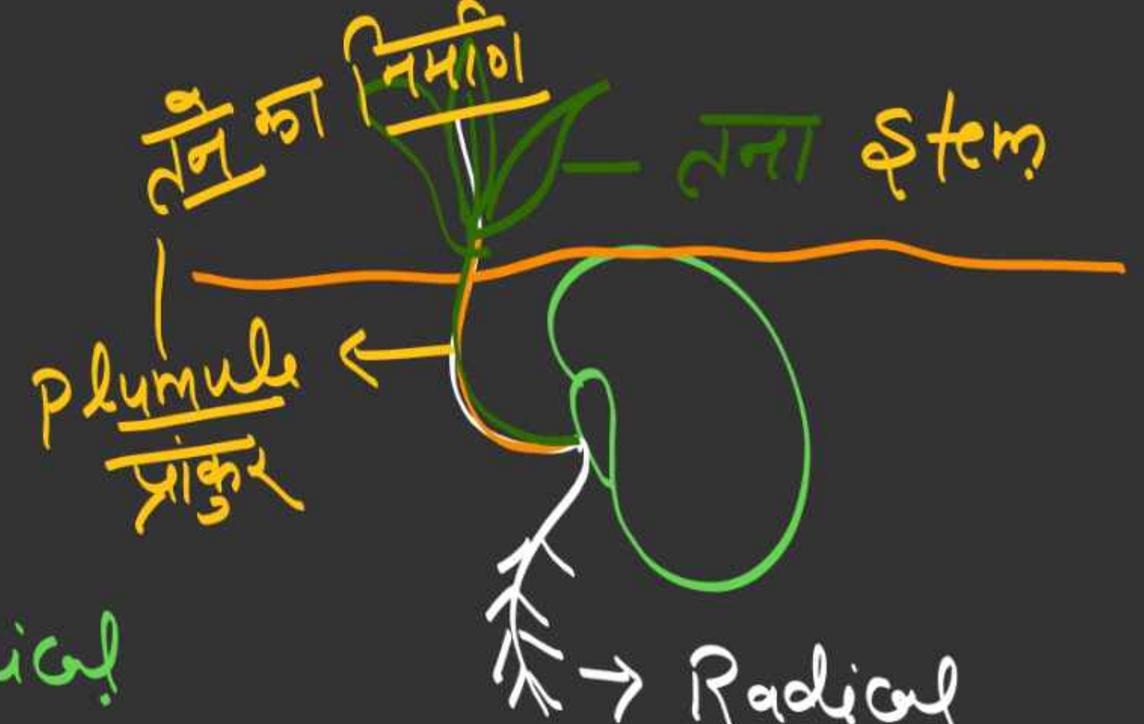
- → जड़ Root
- → तना stem
- → पत्तियां leaves
- → फल fruits
- → फूल flower.


② Shoot system तना तंत्र
फल fruit
कलिका Buds
पत्तिया leaves
flower फूल
① Root system जड़ तंत्र
Root Hair
जड़ रोम
- मिट्टी से पानी खींचना
Pulling water from soil

① Roots जड़ें

⇒ जड़ें का निर्माण मुलांकुर भाग होता है
formation of root take place by Radical

⇒ परासरण की क्रिया द्वारा मिट्टी से पानी व पौषक पदार्थ अवशोषित करना।
Absorption of water & mineral from the soil by osmosis process.

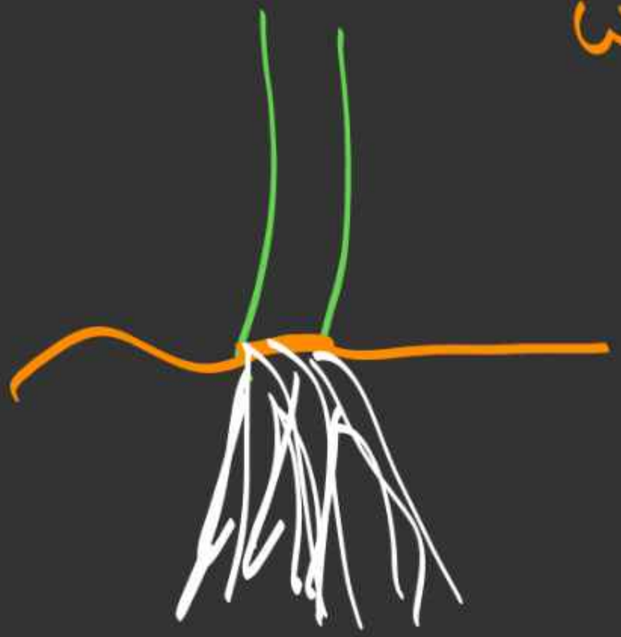


जड़ें का निर्माण
formation of Roots

⇒ Roots ⇒ मिट्टी को बांधकर रखना
जड़ें
Join soil

⇒ Types of Roots
जड़ों के प्रकार

3
गेहूं
Wheat



मूसला जड़ Tap Root ⇒ Primary Root / प्राथमिक जड़ें

रेशेदार जड़ें (जकड़ा जड़ें)
Fibrous Root

अपस्थानिक जड़ें
Adventitious Root

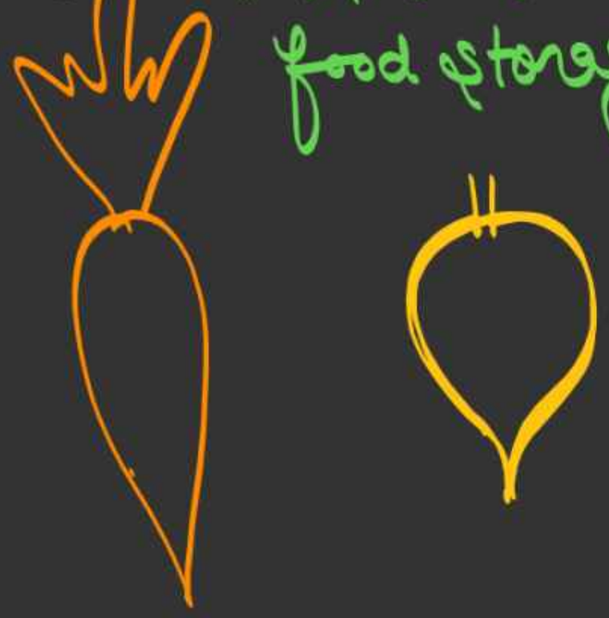
⇒ तने के आधार से निकलती हो
from the Base of stem

पादप के किसी भी भाग निकल सकती हो.
Originate from Any part of plant.

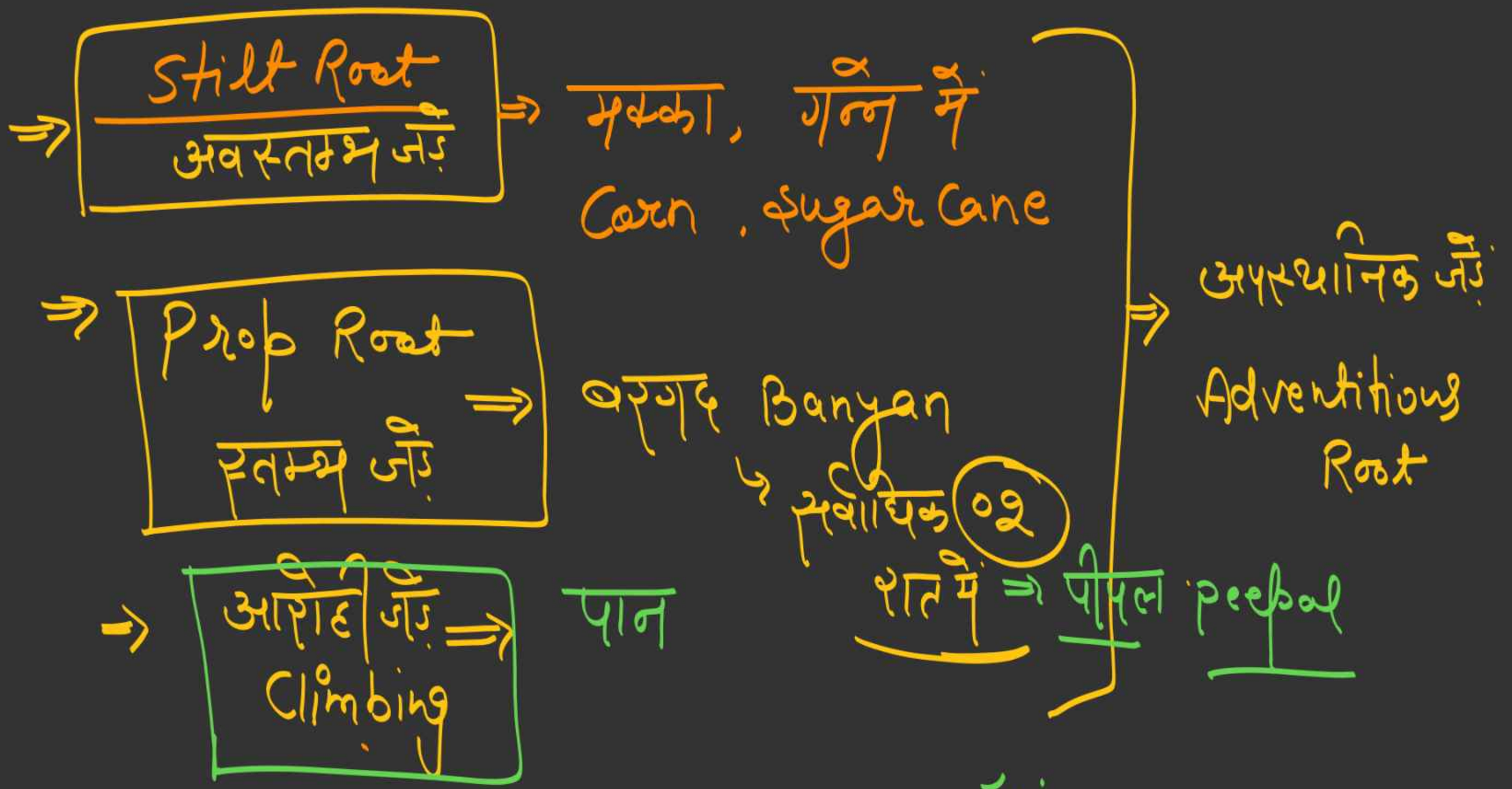
अपस्थानिक जड़ें ⟹ उदाहरण ⟹ बरगद Banyan tree
Adventitious Root Ex

Modified Root रूपान्तरित जड़ें

① भोजन का संचय ⟹ मुसला जड़ Tap Root ✓
food storage



① तुर्करूपी fusiform ⟹ मूली Raddish
② शंकुरूपी Coniform ⟹ गाजर Carrot
③ गाठदार Tuberas ⟹ शकरकंद Sweet potato
④ कुम्भीरूपी Napiform = शलजम


Stilt Root
अवस्तम्भ जड़
मक्का, गन्ना में
Corn, Sugar Cane
Prop Root
स्तम्भ जड़
बरगद Banyan
सर्वाधिक 02
रात में ⇒ पीपल peepal
आरोही जड़
Climbing
पान
अपस्थानिक जड़
Adventitious Root

⇒ श्वसन जड़ ⟹ दलदली क्षेत्रों में पायी जाती हैं

Respiratory Root — Meshy area

↳ उदाहरण ex ⇒ मैनग्रोव Mangrove

⇒ प्रकाश light ⇒ Photonegative प्रकाशीय ऋणात्मक होती हैं

⇒ Gravity गुरुत्व ⇒ Geopositive गुरुत्वीय धनात्मक होती हैं

...

② तना Stem

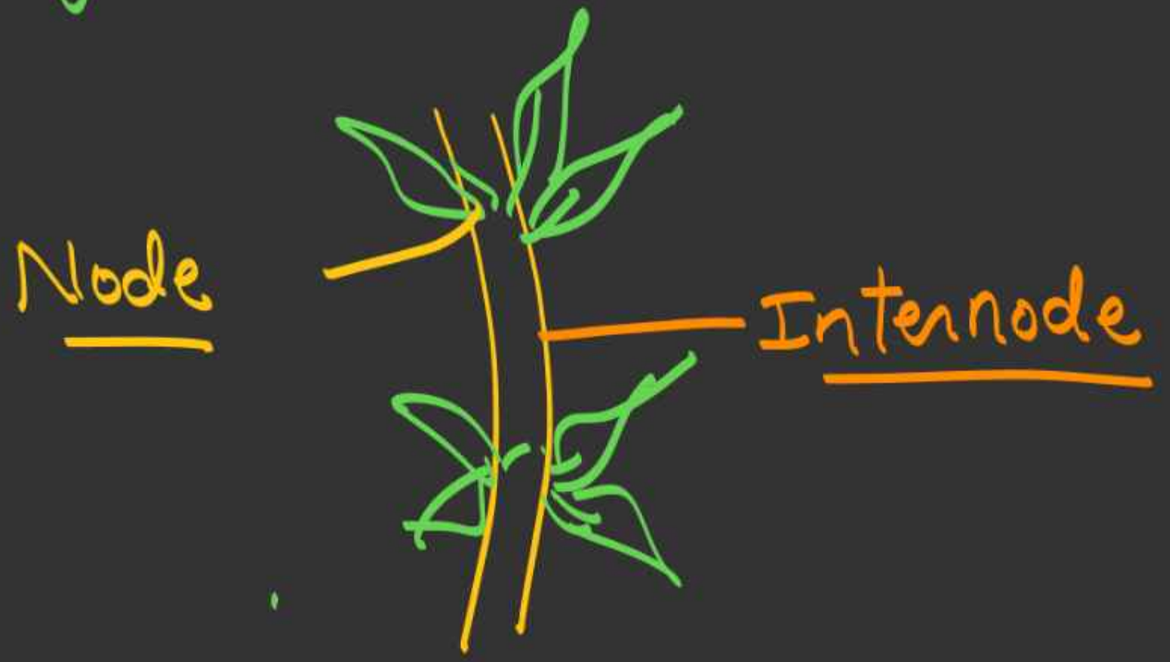
⇒ बीज के प्राकुंर भाग उत्पन्न होता है
originate from plumule part of seed.

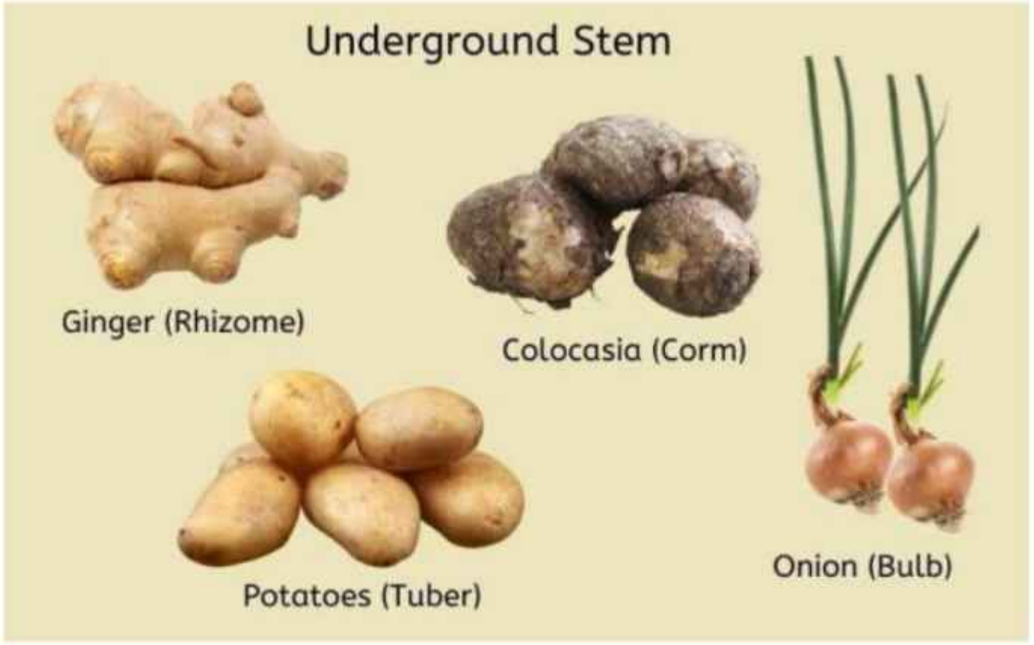
⇒ पादप को यान्त्रिक शक्ति प्रदान करता है
Provide mechanical support.

⇒ तने पर सभी भाग ⇒ नोड, इन्टरनोड, पत्तियां, फल, फूल पाये जाते है
All structure like- node, Internode, leaves, fruit, flowers are present

⇒ प्रकाश light ⇒ Photopositive प्रकाशीय धनात्मक

⇒ Gravity गुरुत्व ⇒ Geonegative गुरुत्वीय ऋणात्मक




Underground Stem
Ginger (Rhizome)
Colocasia (Corm)
Potatoes (Tuber)
Onion (Bulb)


Underground Stem
Aerial Stem
Sub-Aerial Stem
Rhizome
Corm
Bulb
Tuber
Phylloclades
Cladodes
Thorns
Runner
Stolon
Sucker
Offset