Ch. TRANSPORT IN PLANTS

@Gargigaikee

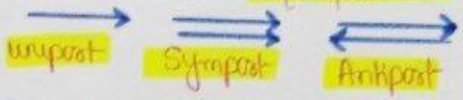
Xylem ⇒ Unidirectional
Phloem ⇒ Bidirectional
Translocation ⇒ transport of water, mineral, sugar

Imbibition: diffusion water is absorbed by solid surface
Eg Germination of seed

Means of Transport:

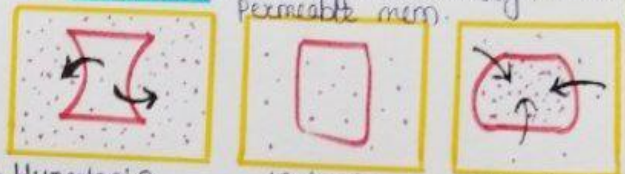
I. Diffusion:
- Passive Transport
- No ATP Expenditure
- Higher Conc to lower Conc
- Independent of living cell.

II. Fascilitated Diffusion:
- Passive Transport
- against Conc gradient
- Channel Proteins (Porins)
  water channel - Aquaporins



III. Active Transport:
- Active Transport
- ATP Expenditure
- Uphill

IV. Osmosis: movt of water through semi permeable mem.



Hypertonic
- Exosmosis
- Plasmolysed

Isotonic
- no movt
- Flaccid

Hypotonic
- Endosmosis
- Turgid

Plant-water Relationship:

(-ve) (+ve)
$\Psi_w = \Psi_s + \Psi_p$

DPD = OP - TP

Solute Conc $\propto \frac{1}{\Psi_w} \propto \frac{1}{\text{Solute poten.}}$

$\Psi_w \propto \Psi_s$
(always -ve) (+ve)

Long distance Transport of water:

Bulk Transport (mass flow - En masse) → Translocation

-ve hydrostatic pressure	+ve hydrostatic pressure
- Pull	- push
- Suction pressure	- Root pressure

Apoplast	Symplast
# fast	# slow
water moves through non sticky spaces	water is forced to move through protoplast. (Casparian strips)
Eg intercellular spaces.	

Root Pressure:

Root → Ion in soil
↓ active Transport
water inside root cell
↓
Pressure in xylem
↓
+ve root pressure

Guttation:
- On humid day water droplets ooze out of leaf
- Hydathodes (Small pores)

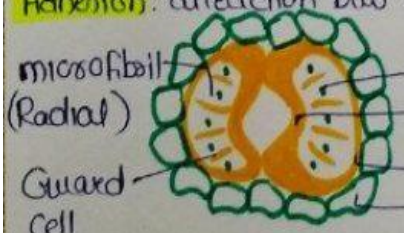
Mycorrhiza:
Symbiotic association blw fungus + roots of higher plants
Pinus ~~root~~ seed can not germinat without fungus

C4 plants are more Efficient (mini. water loss)

Transpiration uses
1. Creates pull
2. water for photosynthe
3. Cool leaf surface
4. maintain turgidity

Transpiration Pull:

Cohesion: mutual attraction blw water molecules.
Adhesion: attraction blw water & xylem wall



Opening
- turgid stomata
- malate + H^+ goes into nearby cells

closing
- Flaccid stomata
- H^+ comes into Guard cell

Factors affecting Transpiration:

External
- temp
- light
- Humidity
- wind

Internal
- no of stomata
- water state
- Canopy structure

Uptake of Mineral Ions:
- Conc of minerals in soil is less : active absorption by roots
- Suberin → active Transport → one direction
- Readily mobilised: N, P, K, S — Deficiency in old part
- not Remobilised: Ca, S — Deficiency seen in young part

Phloem Transport:
- Transport of food → Source → Sink.

Pressure flow / mass flow Hypothesis
- munch

Sucrose move into Companion cell
↓
Sieve Tube (active)
↓
$\Psi_p \downarrow$ (Hypotonic) → Xylem to phloem (OP)

Phloem sap move into sieve - then root
↑
water move from