FREE NOTES · NCERT + NEET LEVEL

Transport in Plants

Extra reading (purana NCERT chapter, basics aur kuch entrance exams ke liye upyogi): transport ke tareeke, water potential, osmosis, plasmolysis, imbibition, paani ka lamba safar, transpiration, minerals lena aur phloem transport.

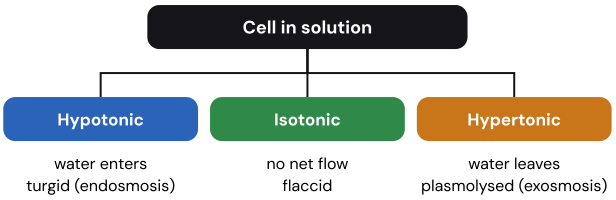
01 Transport ke tareeke
02 Water potential aur osmosis
03 Paani lena aur ascent of sap
04 Transpiration aur stomata
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01 Transport ke tareeke

Process	Energy	Gradient	Notes
Simple diffusion	Nahi	Neeche	Dheema; membrane protein nahi
Facilitated diffusion	Nahi	Neeche	Carrier/channel proteins (porins, aquaporins); uniport, symport, antiport
Active transport	ATP	Ulta (uphill)	Pumps; specific, saturate hota

- Xylem: ek disha (paani, minerals); phloem: dono disha (khana, source → sink).
- **Imbibition**: thos colloids dwara paani sokhna (beej phoolna, baarish me lakdi ka darwaza phoolna).

02 Water potential aur osmosis

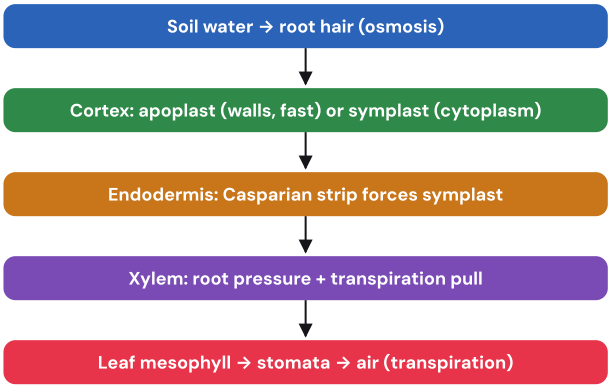


Alag solutions me plant cell

- **Ψw = Ψs + Ψp**. Shuddh paani Ψw = 0 (sabse zyada); solute ghataata (Ψs hamesha negative); turgor pressure Ψp aam taur pe positive.
- Paani zyada (kam negative) se kam (zyada negative) water potential ki taraf.
- **Plasmolysis**: hypertonic solution me protoplast wall se sikudta; wapas ho sakta (deplasmolysis).
- Trick: **"Hyper = paani ka bhookha"**: bahar hypertonic ho to cell se paani kheenchta.

03 Paani lena aur ascent of sap

- Root hairs surface area badhate. **Apoplast** (walls se, tez, nirjeev) aur **symplast** (cytoplasm aur plasmodesmata se, dheema).
- Endodermis pe suberin ki **Casparian strip** apoplast rokti, paani ko cytoplasm se guzarna padta (chunaav).
- **Root pressure**: ions active lene se positive pressure; **guttation** (subah patti ke kinaare hydathodes se boondein).
- **Transpiration pull** (cohesion–tension theory): cohesion (paani–paani), adhesion (paani–xylem wall), surface tension; oonche pedon me sabse zaroori.
- **Mycorrhiza** paani aur minerals lene me madad; *Pinus* ke beej iske bina nahi ugte.



Paudhe me paani ka raasta

04 Transpiration aur stomata

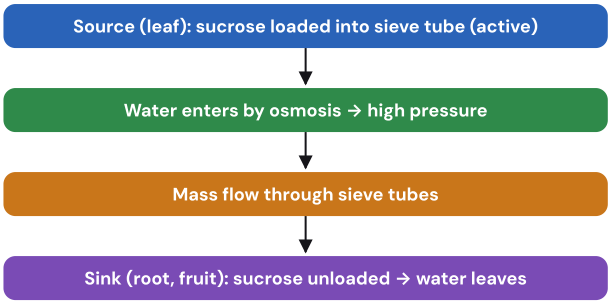
- Paani ka bhaap banke nikalna, zyada tar stomata se; cuticle aur lenticels se bhi. Patti tak aaye paani ka 1% se kam photosynthesis me.
- Guard cells **turgid** hone pe stomata khulte (K^+ aur malate andar, paani peeche; andar ki wall moti, bahar patli, cell bahar mudte); flaccid pe band.
- Dorsiventral (dicot) patti: neeche zyada stomata; isobilateral (monocot): dono taraf.
- Factors: temperature, roshni, nami, hawa (bahar); stomata ki sankhya, paani ki halat, canopy (andar).
- Fayde: kheench banata, photosynthesis ke liye paani, patti thandi (10–15 °C), shape bani rehti. Same CO_2 ke liye C4 plants C3 se aadha paani khote.

05 Minerals lena

- Mitti me minerals kam aur charged, isliye zyada tar root epidermis ke khaas proteins se **active transport** (ATP) se.
- Endodermis ke transport proteins xylem tak jaane wali matra aur type control karte.
- **Remobilisation**: N, P, K, S (aasani se chalne wale) purani se nayi pattiyon me, isliye inki kami pehle **purani pattiyon** me dikhti. Ca (structural, ruka hua) ki kami **naye hisson** me.

06 Phloem transport

- **Pressure flow / mass flow hypothesis** (Münch): shakkar **source** (jahan bani/rakhi) se **sink** (jahan use/store) ki taraf.
- Sucrose active transport se companion cells phir sieve tubes me ⇒ hypertonic ⇒ xylem se paani andar ⇒ pressure se ras aage.
- Source aur sink ulat sakte (basant me jadon ki shakkar kaliyon ki taraf).
- **Girdling experiment**: chaal (phloem) ka chhalla hataane pe upar ka hissa phoolta (shakkar jamti) aur kuch samay baad jadein marti ⇒ phloem khana neeche le jaata.



Pressure (mass) flow hypothesis

07 Important Q&A

Q1. Ca ki kami nayi pattiyon me aur N ki purani me pehle kyun?

N chal sakta, purani se nayi pattiyon me jaata; Ca ruka hua (cell wall ka hissa), isliye naye hisse pehle.

Q2. Ψs = −0.8 MPa aur Ψp = 0.3 MPa ho to Ψw?

Ψw = −0.8 + 0.3 = −0.5 MPa.

Q3. Guttation kya aur kyun?

Subah patti ke kinaare hydathodes se boondein, kam transpiration me root pressure ki wajah se.

08 Common mistakes

- Kehna ki shuddh paani ka water potential sabse kam (sabse zyada, 0).
- Guttation (boondein) aur transpiration (bhaap) mix karna.
- Phloem transport ko ek disha kehna.
- Sochna ki imbibition me membrane chahiye.

09 Practice (NEET style)

1. Paani ke channel proteins?
2. Shuddh paani ka Ψw?
3. Oonche pedon me ascent of sap?
4. Paani ko symplast me bhejne wali strip?
5. Mass flow hypothesis kisne?

ANSWERS

1) Aquaporins · 2) Zero · 3) Cohesion–tension (transpiration pull) · 4) Casparian strip · 5) Münch

10 Quick revision: exam se 5 minute pehle

BASICS

- Diffusion, facilitated, active
- Imbibition: beej phoolna

WATER POTENTIAL

- Ψw = Ψs + Ψp
- Shuddh paani 0
- Hypertonic → plasmolysis

WATER MOVEMENT

- Apoplast tez, symplast dheema
- Casparian strip
- Transpiration pull

FOOD

- Source → sink
- Münch pressure flow
- Girdling experiment

Koi doubt? padhaiadda.netlify.app pe AI Doubt Solver se poocho, ya is chapter ka mock test do.