

CBSE TEST PAPER-01
CLASS - XI BIOLOGY
(TRANSPORT IN PLANTS)

General Instruction:

- All questions are compulsory.
 - Question No. 1 to 3 carry one marks each. Question No. 4 to 6 carry two marks each. Question No. 7 and 8 carry three marks each. Question No. 9 carry five marks.
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1. Name two anti-transpirants.
2. Define translocation.
3. When does wilting occur?
4. Why cell is called an osmotic system?
5. Distinguish between active transport and passive transport.
6. Give the main purposes of transpiration.
7. Explain pressure flow hypothesis for translocation of sugars in plants.
8. Explain why pure water has maximum water potential.
9. Describe the cohesive force theory of ascent of sap in plants.

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[ANSWERS]

1. PMA (Phenyl mercuric acetate) and ABA (Absciscic acid).
2. The transportation of food from the leaves to other parts of the plant is called translocation.
3. Wilting occurs when the loss of water by evaporation exceeds the rate of of absorption of water.
4. A cell is called as an osmotic system because:-
 - i) It has all the components of an efficient osmotic system i.e. a semi permeable Membrane & different concentration of sap on the two sides of membranes.
 - ii) Flow of water occurs from higher water potential to lower water potential.
- 5.

Active Transport	Passive Transport
i) This is a rapid process.	i) this is a slow process
ii) Energy is needed	ii) No need of energy
iii) It is a vital process.	iii) It is a physical process.
iv) Movement is one direction only	iv) Movement is in both directions
v) Requires carrier proteins	v) does not require carrier proteins
vi) Movement of metabolite against conc. gradient	vi) Movement of metabolite along the conc. gradient.

6. i) Supplies water for the process of photosynthesis.
- ii) Transports of minerals up from the root (in the xylem) and sugars (products of photosynthesis) throughout the plant (in the phloem).
- iii) 80% of the cooling effect of a shade tree is from the evaporative cooling effects of transpiration.
- iv) Maintains shape of plant & structure by keeping cells turgid.

7. The most accepted mechanism for translocation of sugars source to sink is known as pressure flow hypothesis. The glucose is prepared at the source, it is converted into sucrose. The sugars are then moved in the form of sucrose into the companion cell, then into the living sieve tube cells by active transport loading at the source creates a hypertonic condition in vascular tissue- the phloem.

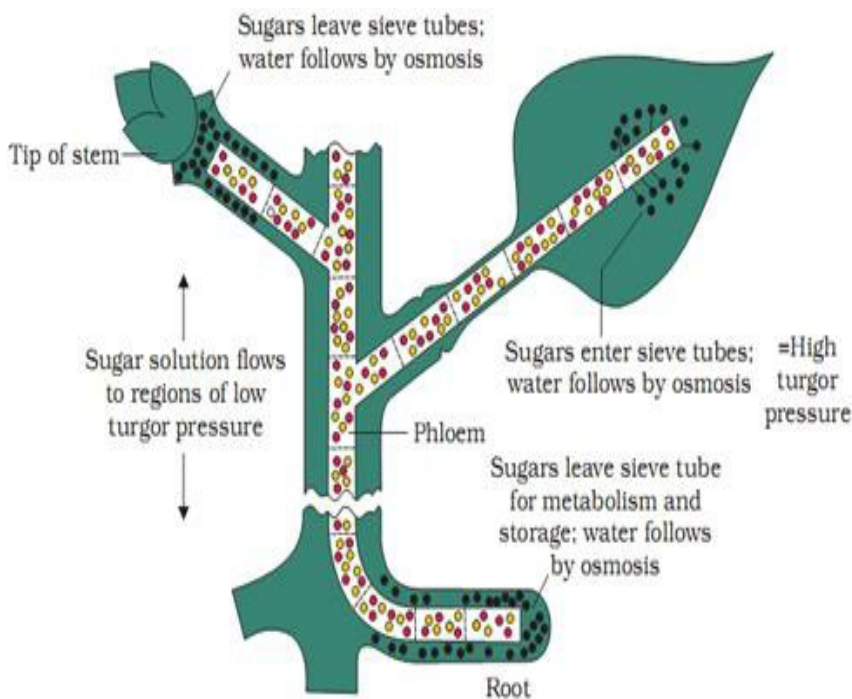


Figure 11.10 Diagrammatic presentation of mechanism of translocation

8. Pure water has maximum water potential because:-

- i) Water molecules possess kinetic energy in liquid as well as gaseous state which are in constant rapid motion.
- ii) The greater the concentration of water in a system, the greater its kinetic energy of its water potential.
- iii) Water potential of pure water at defined temperature and pressure is taken to be zero.
- iv) If we consider two systems having water (example: cell and solution), random movement of water molecules will take place from the system having higher energy to the one with lower energy. At equilibrium, water will move from the system containing water at higher potential to the one having a low potential.
- v) The magnitude of the lowering due to dissolution of solutes is termed as solute potential and is always negative.
- vi) If solute molecules are dissolved in pure water, its concentration decreases,

thereby, reducing its water potential.

9. Cohesive force theory or transpirational pull theory was proposed by Dixon & Jolly. Main aspects of this theory are:-

i) Strong cohesive force or tensile strength of water:- The water molecules attract each other by mutual force which is called the “cohesive force”. The attraction between the walls of xylem elements & the water molecules is called adhesion the cohesive force helps to maintain a long column of water under tension.

ii) Continuity of water column in plant:- air breaks do not hinder the total cohesive system & the tree is able to maintain a rapid flow of sap. The water or the sap can be pulled by the transpiration force.

iii) Transpiration pull or tension of unbroken column of water:- As a result of transpiration water is drawn in the intercellular spaces from the mesophyll cells which consequently draw water osmotically from nearby cells & thus a diffusion pressure deficit or suction force is developed. Due to suction force, the adjacent cells take water from xylem of these veins of the leaves. As the xylem of these veins is connected with xylem of roots through stem xylem a tension is set up in the water column of xylem & whole column is physically pulled up.