

Board – ICSE

Class – 10

Topic – Absorption by Root

1. Name the following:
 - a. The fraction of soil water readily available to plants.
 - b. The process by which plants lose water.
 - c. The pressure exerted by the cell wall to balance the turgor pressure.
 - d. The process that occurs in plants when the root pressure is high and transpiration is low.

Ans.: (i) Capillary water (ii) Transpiration (iii) Wall pressure (iv) Guttation.

2. Write the correct answers from the given options:
 - a. Osmosis involves the diffusion of:
 - i. Suspended particles from lower to higher concentration.
 - ii. Suspended particles from higher to lower concentration.
 - iii. Water from more concentrated solution to less concentrated solution.
 - iv. Water from less concentrated solution to more concentrated solution.

Ans: Water from less concentrated solution to the more concentrated solution.

- b. The space between the cell wall and plasma membrane in a plasmolysed cell is filled with:
 - i. Isotonic solution
 - ii. Hypotonic solution
 - iii. Hypertonic solution
 - iv. Water

Ans.: Hypertonic solution

3. Mention if the following statements are true/false. If false, rewrite the wrong ones by changing only the words printed in bold face.

- (i) Osmosis regulates the opening and closing of stomata.
- (ii) Guttation occurs when the loss of water by transpiration exceeds the rate of uptake by roots.
- (iii) In endosmosis, movement of water molecules takes place from the outside into the cell, when it is placed in a hypertonic solution.
- (iv) Cells that have lost their water content are said to be deplasmolysed.
- (v) Xylem is the water conducting tissue in plants.

Ans: (i) True (ii) False (Wilting) (iii) True (iv) False (Plasmolysed) (v) True

4. Match the items of column I with those in column II.

Column I	Column II
(1) Xylem	(a) semi-permeable
(2) Phloem	(b) permeable
(3) Cell membrane	(c) downward flow of sap
(4) Root pressure	(d) upward flow of water
(5) Cell wall	(e) guttation

Ans: (1) d (2) c (3) a (4) e (5) b

5. What is the difference between plasmolysis and deplasmolysis?

Ans: Plasmolysis is the shrinkage of cytoplasm from a living cell under the influence of the surrounding strong solution (hypertonic solution). When a plasmolysed cell becomes fully turgid, when it is placed in a hypotonic solution, the process is called deplasmolysis.

6. What forces are involved in the absorption of water from the soil by root hair?

Ans: Transpiration pull of the aerial parts of the plants, cohesive forces between water molecules, adhesive forces between water and xylem vessels, and root pressure are the various forces.

7. **Why do aquatic plants growing in fresh water become flaccid when put into saline water?**

Ans: Saline water being hypertonic brings about exosmosis, causing plasmolysis and flaccidity.

8. State three ways in which roots are suited for absorbing water.

Ans: In land plants most of the water is absorbed through the roots. Roots are suited for absorbing water in the following ways:

- Surface area of roots: Roots are branched extensively ending in millions of root tips. Numerous root hairs are present in the root hair zone of the root tip. Therefore, all together the roots of plants provide tremendous surface area which facilitates absorption of water.
- Root hair contains cell sap of a concentration higher than that of the surrounding water. This characteristic is an important requirement to draw in the water from outside.
- Root hairs have thin walls: Root hairs are an extension of the epidermal cell of root. The cell wall is thin and allows the movement of water molecules and dissolved

substances freely in and out. The cell membrane is thin but semi-permeable, i.e., it allows water molecules to pass through but not larger molecules of dissolved salts.

9. What is the difference between a flaccid cell and a turgid cell?

Ans: Turgidity is a condition when a cell is fully stretched with water and all its walls are in a state of tension. e.g. when stomata is open. When a cell loses water from its cytoplasm and the plasma membrane is withdrawn, it is said to be flaccid, e.g., when stomata closes.

10. Give any two examples of turgor movements in plants.

Ans: (i) Turgor pressure helps to push through the hard ground as in mushrooms and in a seedling.

(ii) Sometimes, the roots of certain trees have been seen to crack the walls or a concrete floor of an adjoining building. This again is due to turgor pressure.

11. What is the difference between “flaccid” and “turgid”? Give one example of flaccid condition in plants.

Ans: When a cell is put in a hypertonic solution, the cell content becomes shrunken and the cell is no “tighter”. This condition of the cell is called flaccid. If the cell is kept in hypotonic solution, the cell wall becomes rigid and stretched by the increase in volume of vacuoles due to absorption of water. The cell is then said to be turgid.

12. Concentration of mineral nutrient elements is higher inside the root hairs than in the surrounding soil. How do roots take them in from the soil?

Ans: Absorption of water by the root is by means of root hair. A root hair contains cell sap which has a higher concentration of salts as compared to the outside soil water. This difference sets off osmosis and the outside water diffuses into the root hair. From the cell bearing root hair, water continues to pass to adjoining cells one after another to finally enter the xylem vessels. The turgidity acquired by the cells in the process also helps to push the water upwards through the xylem vessels. Absorption of mineral elements from the soil involves active transport by the cells.

13. Explain why grass is killed if salt is sprinkled on it?

Ans: Living cells of grass roots occur in turgid condition when salt is sprinkled on it, plasmolysis occurs and the cells die.

14. Explain why Jams and pickles do not spoil easily.

Ans: Jams and pickles do not spoil easily because sugaring and salting of these foodstuffs raises the osmotic pressure of the medium thus killing the bacteria and fungi due to plasmolysis.

15. Explain why a closed can of dried seeds bursts open if some water enters it by accident.

Ans: The seeds imbibe water and swell up. The attraction of the dry cell walls and protoplasm for water causes an imbibitional pressure to develop within the plant body. It is this imbibition pressure that causes the can to burst open.

16. What is meant by 'ascent of sap'? List three factors that are responsible for this.

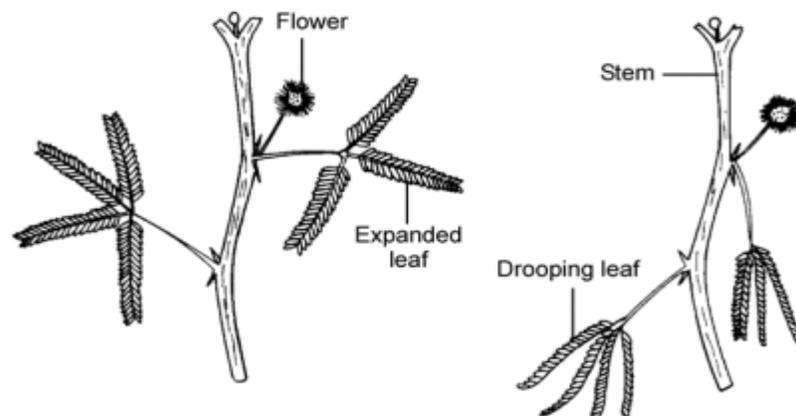
Ans: The upward conduction of water from the roots to the shoot apex is called ascent of sap. The three factors that are responsible for ascent of sap are:

- Root pressure
- Transpiration pulls
- Forces of cohesion and adhesion.

Loss of water from the aerial surfaces through transpiration causes a transpiration pull. This leads to absorption of water from soil. Because of cohesive forces among water molecules and adhesive forces between water and xylem vessels, a water column is maintained from the base of the plant to its top.

17. Leaves of a sensitive plant wilt and droop down on a slight touch. What mechanism brings about this change?

Ans: Drooping of the leaflets of sensitive plant: If any leaf of Mimosa (Touch-me-not) is touched, it will fold up and within 2-3 seconds the entire leaf droops. Slowly the leaf recovers. Stimulus of touch leads to loss of turgor pressure at the base of leaflets and base of petioles causing the leaf to wilt temporarily.



18. Explain two manifestations of root pressure.

Ans: The two manifestations of root pressure are:

- a. Exudation or Bleeding: Sometimes sap (water with dissolved inorganic and organic substances) exudes from the injured part of the plant. Exudation of milky latex from *Calotropis* is an example.
- b. Guttation: When root pressure is high and transpiration is low, water drops ooze out through special structures called hydathodes. It can be seen in garden nasturtium.

19. Explain how soaked seeds swell up and burst their seed coats.

Ans: If you soak some seeds, it will swell up after few hours and ultimately burst their seed coats. In this case, the water continues to diffuse in through the membranous cover of seed coat. This influx of water builds up an internal pressure that may reach a limit, which the seed coat no longer can bear and they burst.

20. What is transpiration pull? How is it caused?

Ans: As the water is lost from the leaf surface by transpiration, more water molecules are pulled up due to the tendency of water molecules to remain joined (cohesion), and thus to produce a continuous column of water through the stem.