

Veda International School

Kusugal Road, Hubballi

(Proposed ICSE Board) UDISE Code: 29090203210

Grade:8.

Sub: Biology

Topic: Transport of water, Minerals and food in plants

Key words

Xylem- water conducting vascular bundles

Phloem-Food conducting vascular bundles

Semi-permeable- It allows only water to pass through not the other molecules

Diffusion- Movement molecules from a region of higher concentration to a region of lower concentration

Osmosis- The movement of water molecules from the region of higher concentration to the region of lower concentration.

Ascent of sap- The upward movement of water and minerals in a plant through the xylem

Translocation- The transportation of food from leaves to other parts of a plant.

EXERCISE

A. Short Answer Questions:

1. Why do plants need water?

Ans: Plants need water to transport substances in the solution form from one part to another. Water is also used for food by the process of Photosynthesis.

2. What are the features of root hair that help in the absorption of water?

Ans: Following at Q the features of root hair that help in the absorption of water:

- (i) They have a large surface area that allows more absorption of water.
- (ii) Nunneries tiny pores present all over the membrane of root hair allow water molecules to enter.
- (iii) The cell sap of root cells is more concentrated than the surrounding soil water.
- (iv) The cell wall of root hair is freely permeable and the cell membrane is semipermeable.

3. Define:

Ans:(a) **Diffusion** — Diffusion is the movement of molecules for region of higher concentration to a region of lower concentration until an equilibrium is reached.

(b) **Osmosis** — Osmosis is the movement of water molecules from a region of higher concentration to a region of lower concentration through a semi-permeable membrane.

(c) **Active transport** — The movement of particles from a region of lower concentration to a region of higher concentration by utilising energy is called active transport

4. What is transpiration?

Ans:The loss of excess water from plants mainly through leaves as water vapour is called transpiration.

The process of transpiration and absorption of water by root hair are interdependent. More the water lost through transpiration, more it is absorbed by root hair.

5. During an experiment on two plants (A and B) ,plant A was watered daily for a month. Plana B was not watered for a month.

Ans:(a) The likely reason for the observed difference is that plant A received consistent and sufficient water supply, allowing it to carry out essential physiological processes such as photosynthesis, transpiration, and nutrient absorption. Water is crucial for various plant functions, and a lack of water can lead to dehydration, wilting, and ultimately, death, as observed in plant B.

- a In the case of plant B, which was not watered for a month and subsequently died, the first type of tissues to stop working would likely be the vascular tissues, specifically the xylem. The xylem is responsible for the transport of water and minerals from the roots to the rest of the plant. Without water, the xylem would be unable to fulfil its function, leading to a disruption in the water supply to various parts of the plant. This can result in wilting, loss of turgor pressure, and eventually, the death of the plant.

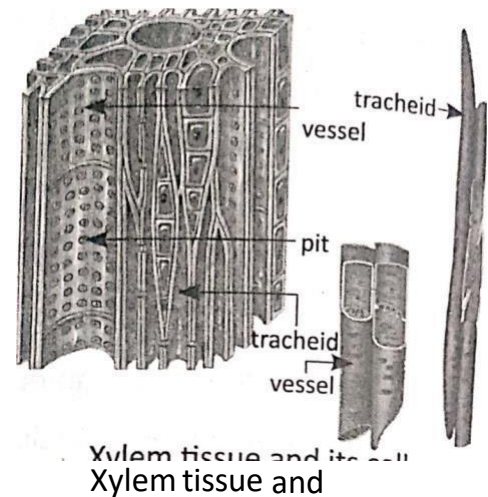
B. Long Answer Questions:

1. Describe the structure of (a) xylem (b) phloem

Ans: (a) Structure of Xylem:

Xylem is a complex conducting tissue. It is made up of four types of cells — vessels, tracheid's, xylem parenchyma and xylem fibres. Except for the xylem parenchyma, all other cells are dead. The cells of the xylem are thick walled.

- (i) Vessels: These are long tubelike structures formed by a row of cells placed end to end. The end walls are dissolved to form a continuous hollow tube. They are open at both ends. The walls have deposition of lignin.
- (ii) Tracheid's: These are long and narrow cells that taper its cells at both ends. The walls have deposition of lignin.
- (iii) Xylem fibre: These are long and narrow sclerenchyma cells. They taper at both ends.
- (iv) Xylem parenchyma: These are living cells. They have thin cell walls.

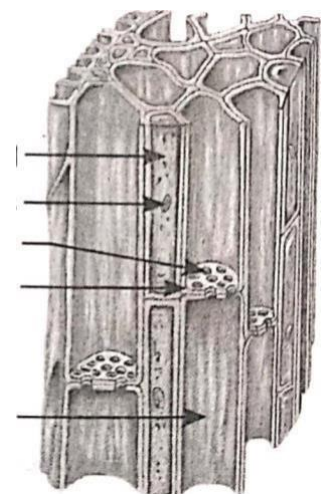


(b) Structure of phloem:

Phloem is also a complex conducting tissue. It is made up of four types of cells — sieve tubes, companion cells, companion cell phloem parenchyma and nucleus phloem fibres. sieve pores

Sieve tubes: These are tube- sieve plate like structures. They are made of elongated and thin-walled cells, joined end to end. The sieve tube end walls are perforated. They are called sieve plates. Phloem tissue

Companion cells: These are elongated thin-walled cells. They are placed adjacent to sieve tubes and are connected to them by pore:



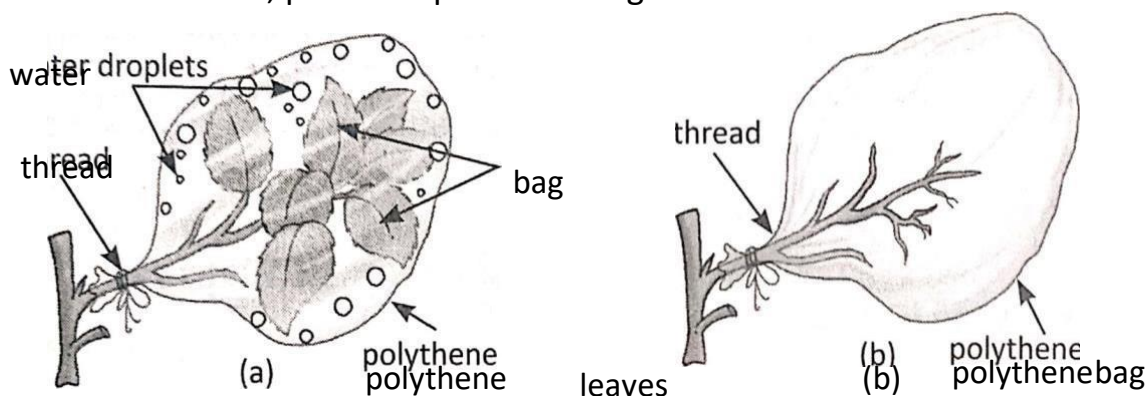
Phloem fibres: These are thick-walled, spindle-shaped, dead cell made of sclerenchyma fibres. They give mechanical strength to the plant.

Phloem parenchyma: These are thin-walled parenchyma cells • **Aim:** To show that plants lose water through their leaves

2. Write an experiment to show that plants lose water through their leaves.

Ans: Things needed: One small and well-watered potted plant, two polythene bags and two threads **Method:**

1. Take a small and well-watered potted plant.
2. Cover one branch of the plant with a polythene bag.
3. Remove the leaves from another branch of the same plant and cover it with another polythene bag.
4. Tie both the polythene bags tightly with thread.
5. Now, place the plant in sunlight for 5-6 hours.



Observation: Small water droplets appear inside the polythene bag over the branch with leaves. There are no water droplets inside the polythene bag over the branch without leaves.

Conclusion: Plants lose water through leaves.

3. The table here shows the features of four different plants

Ans:(a) The plant with the lowest transpiration rate and more root hairs is Plant B. While both Plant A and Plant B have low transpiration rates, the higher number of root hairs in Plant B suggests that it has a greater surface area for water absorption compared to Plant A. Therefore, Plant B will likely absorb water at a slower rate than the other plants.

(b) Several factors influence the rapid transport of water in plants: **Environmental Temperature:** Higher temperatures generally increase the rate of evaporation,

leading to greater transpiration and a more efficient transport of water in plants.

Root Absorption: Efficient absorption of water by roots from the soil is crucial.

Adequate soil moisture and a well-developed root system contribute to rapid water uptake. **Xylem Structure:** Healthy and functional xylem vessels play a vital role in the upward transport of water. Any blockages or damage to xylem can hinder water movement.

C. Application/Skills based questions:

- a. **Relative Humidity:** Lower humidity levels create a steeper concentration gradient, facilitating faster water movement from the plant to the surrounding atmosphere.
- b. **Wind or Air Currents:** A gentle breeze can help in the removal of water vapour from the leaf surface, enhancing transpiration and water transport.
- c. Abdul is a gardener. He observes that a balsam tree is showing symptoms like curling of leaf tips and yellowing of leaves. Which of the following fertilisers should he add to the soil of the plant— potash or ammonium chloride? Give a reason your answer.

Ans: Potash must be added to the plants as plants are showing these symptoms due to deficiency of potassium. Potash contains potassium salts in the form of nitrates, sulphates and chlorides.

- d. In an experiment of transpiration, a scientist removes half the leaves of a plant and covers the remaining half with a thick waxy coating. What will he observe and why?

Ans: He will not observe transpiration in plant as some leaves are removed and others have thick waxy coating. The waxy coating covers the stomata and thus, transpiration will not occur.

- e. Both Priya and Sonam pluck some flowers from their garden. Priya puts her flowers in water, but why?

Ans: Priya's flowers will remain fresh for a few days because water along with minerals support flowers to survive for few days.

- f. Neha places a green potted-plant in a dark room. She covers the plant with a polythene bag. Will she observe water droplets inside the polythene bag after 5-6 hours? Why/Why not?

Ans: No. She will not observe transpiration as in the absence of sunlight transpiration does not occur.

