

Transportation in Plants

1. What is Transportation?

Ans. Transportation is a process in plants which a substance absorbed or synthesized in one-part of the body is carried to the other part of the plant.

- Root of the plant absorb water and minerals from the soil and transport in every part of the plant, such as stem, leaves etc.
- The food prepared by the leaves is transported to every part of the plant.

2. What is Vascular System?

Ans. Plants have a fully-developed transport system for the movement of substances. This is called the Vascular System.

It is made up of two type of long channel-like tubes- Xylem, Phloem.

3. What is Xylem?

Ans. Xylems are the conducting tube which transport water and dissolved minerals from the roots to the leaves through the stem.

It is made up of dead cells and transport only in the upward direction.

4. What are the main parts of Xylem?

Ans. the two elements of Xylem are:

- a. Tracheid
- b. Tracheae or Vessels

5. What are the characteristics of Tracheid?

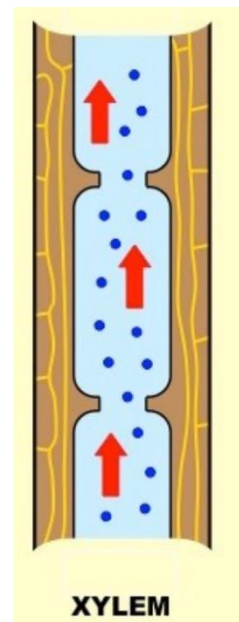
Ans. The main characteristics of Tracheid are:

- a. These are elongated, dead cells with tapering ends and a hard cell wall.
- b. In certain region, the cell wall is thin and forms pits.
- c. Water and minerals flow from one tracheid to another through these pits.
- d. These cells also provide mechanical support to the plants.

6. What are the characteristics of Tracheae or Vessels?

Ans. The characteristics of Tracheae are:

- a. These are long, dead, tube-like structures with thick cell wall.
- b. These are hollow tubes and their ends are attached end-to-end to form long tubes.
- c. Tracheae help in the conduction of water by the process of osmosis and diffusion.



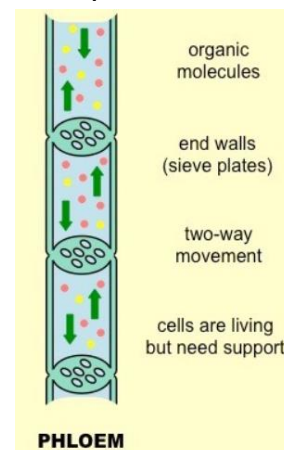
7. What is Parenchymatous Cell?

Ans. The only living cell of Xylem is Parenchymatous Cell. These cells act as storehouse for food, provide mechanical support and help in the conduction of water and minerals.

8. What is Phloem?

Ans. Phloem is a conducting tube made up of living cells which transport food from the leaves to all other parts of the plants.

The transportation in Phloem is both upward and downward direction.



9. What are the main elements of Phloem?

Ans. The elements of the Phloem are

- a. Sieve Tubes
- b. Companion Cells,
- c. Parenchyma Fibers
- d. Dead Fibers

10. What are Sieve Tubes?

Ans. These are the chief elements of phloem consisting of elongated cells. The cells have perforated ends through which they are joined to each other end-to-end.

The food is translocated in whole plant body through these long tubes.

11. What are Vascular Bundles?

Ans. Both the tubes i.e. Xylem and Phloem are arranged together in compact masses called Vascular Bundles.

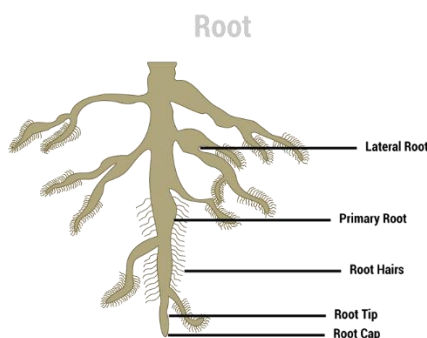
12. What are the differences between Xylem and Phloem?

Ans.

Xylem	Phloem
Thick-walled cells	Thin-walled cells
Composed primarily of dead cells	Composed primarily of living cells
Transports water and dissolved minerals from the roots to the other parts of the plant.	Transports food from the leaves to the other parts of the body.
Transport substances only in the upward direction.	Transports food in both upward and downward directions.

13. What are the main parts of Root system in plants?

Ans. The root systems of plants consist of a Primary Root Which branches into lateral roots. These give rise to thin, thread like outgrowths called root hair.



14. What are the main characteristics of root hair?

Ans. The characteristics of Root hair are: -

- a. Each root hair is an extension of a root cell.
- b. These are extremely small in size, numerous and thin-walled structure.
- c. These features increase in surface area which may be many times the surface area of the root cell.
- d. The increased surface area results in greater absorption.
- e. The cell wall of the root hair is permeable in nature and allows most substances to pass through.
- f. Their cell membrane is semipermeable. i.e. it is permeable to water molecules but impermeable to other substances.
- g. The root hair is in close contact with water present in the space between the soil particles.
- h. The cell sap of root hair contains dissolved sugar and mineral salts. Therefore, it is a more concentrated solution as compared to soil water.
- i. This results in a water gradient and the soil water passes into the root hair cell by osmosis.

15. Why the absorption of water through root is called Passive Absorption?

Ans. The absorption of water is in the direction of concentration gradient and does not require energy. So, it is known as Passive absorption.

16. What is the importance of Root Hair?

Ans. Root Hairs-

- Increase the surface area for the absorption of water.
- Provide close contact with water
- Can reach the small spaces present between the soil particles and
- Allow rapid movement of water molecules into the root due to their thin wall.

17. How water flows from Root hair to Leaf?

Ans. Once inside the root hairs, the water molecules gradually enter the conducting tube of xylem present in the root. These cells are connected to the xylem tubes of the stem and the leaves forming a continuous system of pipes.

The water absorbed in the root xylem, thus, passes on the stem xylem and finally into the leaf xylem cells.

18. What is Diffusion?

Ans. Diffusion is the net movement of molecules from an area of their higher concentration into an area of their lower concentration.

19. What are the properties of Diffusion?

Ans. The properties of Diffusion are

- The diffusion process continues until a state of equilibrium is reached.
- During diffusion process molecules move from their higher concentration to their lower concentration.
- Diffusion occurs rapidly in gases than in liquid and solid.
- The process of diffusion is faster when there is a larger difference between the concentration of the two regions.

Due to this a dry plant absorbs water at a much faster rate than a less dry or moist plant.

- The movement by diffusion is a passive transport as this does not requires any energy.

20. What is Osmosis?

Ans. Osmosis is the diffusion of water molecules across the semipermeable membrane from a solution with higher concentration of water to the solution with lower concentration of water.

It is the movement of water molecules from a dilute solution to the concentrated solution.

21. What are the differences between osmosis and Diffusion?

Ans.

Osmosis	Diffusion
Takes place in liquids only,	Can occur in liquid, gases or solid
Occurs across a semipermeable membrane	Does not requires any membrane.
Slow process	Rapid Process in gas, Slow in solution
Involves diffusion of only water molecules	Involves movement of solution or solvent molecules.

22. How minerals are absorbed by Root hair?

Ans. The minerals are present as dissolved salt in the soil water. These are absorbed by the root hair in the form of ions.

Generally, the mineral ions are at a lower concentration in the soil water than those present inside the root hair cells. As a result, these ions cannot pass into the root hair cells by passive absorption. Therefore, absorption of minerals, unlike water, occurs by active transport which is against the concentration gradient and requires energy. Plants absorb salts of potassium, calcium, nitrates, phosphates and sulphates by active transport. Once absorbed by the root hair, they are passed into the xylem vessels for conduction in plant.

23. What is Passive Transport and Active Transport?

Ans. The transport of molecules according to the concentration gradient does not require any energy is called Passive Transport.

The transport of molecules against the concentration gradient requires energy to pump the molecules and is called Active Transport.

24. What is Active Transport?

Ans. The movement of substances against the concentration gradient i.e. from their region of the concentration to their region of high concentration is called Active Transport.

25. What is ascent of sap?

Ans. The upward movement of water and minerals is called Ascent of Sap.

26. Which factors help ascent sap?

Ans. The following factors help ascent sap.

- a. Root Pressure
- b. Transpiration Pull

27. What is Root Pressure?

Ans. Root Pressure is the pressure which develops in the root due to continuous inflow of water.

Root pressure pushes the water into the root xylem and creates a column of water which is steadily pushed upward.

This pressure is adequate to transport water in herbs, stubs and small trees but not enough for transportation in the tall plants or trees.

28. What is Transpiration?

Ans. Transpiration is the loss of water, in the form of vapour, from the internal tissues of a plant through its aerial parts.

29. What is Translocation?

Ans. The transport of soluble food from the leaves to other parts of a plant is called Translocation.

Translocation occurs with the help of vascular tissues called phloem.

30. How Translocation Process occur in plant.

Ans. Translocation occurs with the help of vascular tissues called phloem.

Translocation of food takes place by active transport. The food in the phloem cells decreases the concentration of water molecules in these cells. As a result, water moves in the cells by osmosis. It exerts pressure on their walls which pushes the food into the adjacent cells. Gradually the food substances reach all parts of the plant where these are utilised during cellular respiration and for building new protoplasm for growth.

31. How plant absorb their sixteen most important nutrients?

Ans. Out of sixteen most important nutrients

- Two nutrients- Carbon and Oxygen are supplied by the air.
 - Third nutrient-Hydrogen is provided by the water.
- These three nutrients constitute 94-99.5% of the total plant tissue.
- Remaining thirteen nutrients (Macronutrients and Micronutrients) come from the soil and form 0.5-6.0% of the plant tissues.

32. Write down the functions of various nutrients in the plant?

Ans.

Type of Nutrients	Nutrients	Function
Macronutrients	Nitrogen	Synthesis of protein for growth required for chlorophyll.
	Phosphorus	Growth, synthesis of cell organelles.
	Potassium	Synthesis of starch, Opening and closing of stomata, Transportation of Sugar.
	Calcium	Formation of cell wall. Metabolic reactions
	Magnesium	Part of Chlorophyll molecule
	Sulphur	Synthesis of Amino Acid
Micronutrients	Iron	Synthesis of Chlorophyll
	Manganese	Help in Photosynthesis
	Zinc	Synthesis of hormones
	Other Micronutrients required by plants are Boron, Chlorine, Copper and Molybdenum	

33. What happen in the deficiency of these nutrients?

Ans.

Nutrients	Effects
Deficiency of Nitrogen	It causes decrease in the content of chlorophyll and results in the yellowing of leaves.
	The Protein content reduces causing stunted growth of plants.
Deficiency of Iron	Iron is needed to produce chlorophyll.
	Its deficiency causes yellowing of leaves because of decreased chlorophyll. It is called Chlorosis.
Deficiency of Magnesium	Magnesium is an important constituent of chlorophyll. Decrease of magnesium results in yellowing of leaves