

Transport in Plant

1. What is Transportation in Plant?

Ans. Transportation in plants is the process in which substances absorbed or synthesized in one part of the plant are moved to other parts of the plant.

2. Which tissues are responsible for Transportation system in Plant?

Ans. Transportation of water and food in plants is carried out by a conducting system consisting of two main tissues xylem and Phloem. Together they form the vascular bundle of plants.

3. What is Xylem Tissue?

Ans. Xylem is a type of vascular tissue present in plants, which primarily transports water and nutrients from roots to stem and leaves. They also provide mechanical strength to the plants.

4. What are the functions of Xylem?

Abs. The functions of Xylem are

- It transports water and mineral salts from the roots to the aerial parts of the plant.
- Tracheid, vessels and xylem sclerenchyma, provide mechanical strength and support to the plant.

5. How many cells form Xylem tissue?

Ans. The xylem tissue consists of four types of cells:

Xylem Tracheid,
xylem vessels
xylem fibres
xylem parenchyma.

6. What is Tracheid?

Ans. Tracheid is elongated dead cells with tapering ends which provide mechanical strength and support to the plant in addition to conducting water upwards. Their walls have thickenings with lateral pores.

7. What is Vessel?

Ans. Vessels are tube like structures which open at both ends. They are placed one above the other, to form long channels. They provide mechanical support to the plant and conduct water upwards.

8. What is Xylem Parenchyma?

Ans. Xylem Parenchyma is the small, thick walled, living cells, which store food and help to conduct water and mineral salts.

9. What is Xylem Sclerenchyma Tissue?

Ans. The xylem fibres are non-living sclerenchyma cells as they lose their protoplast at maturity. These cells are found in between the tracheid and xylem vessels of the xylem tissue. Sclerenchyma cells are narrow and elongated cells with tapering ends. They are former parenchyma cells that developed secondary cell walls.

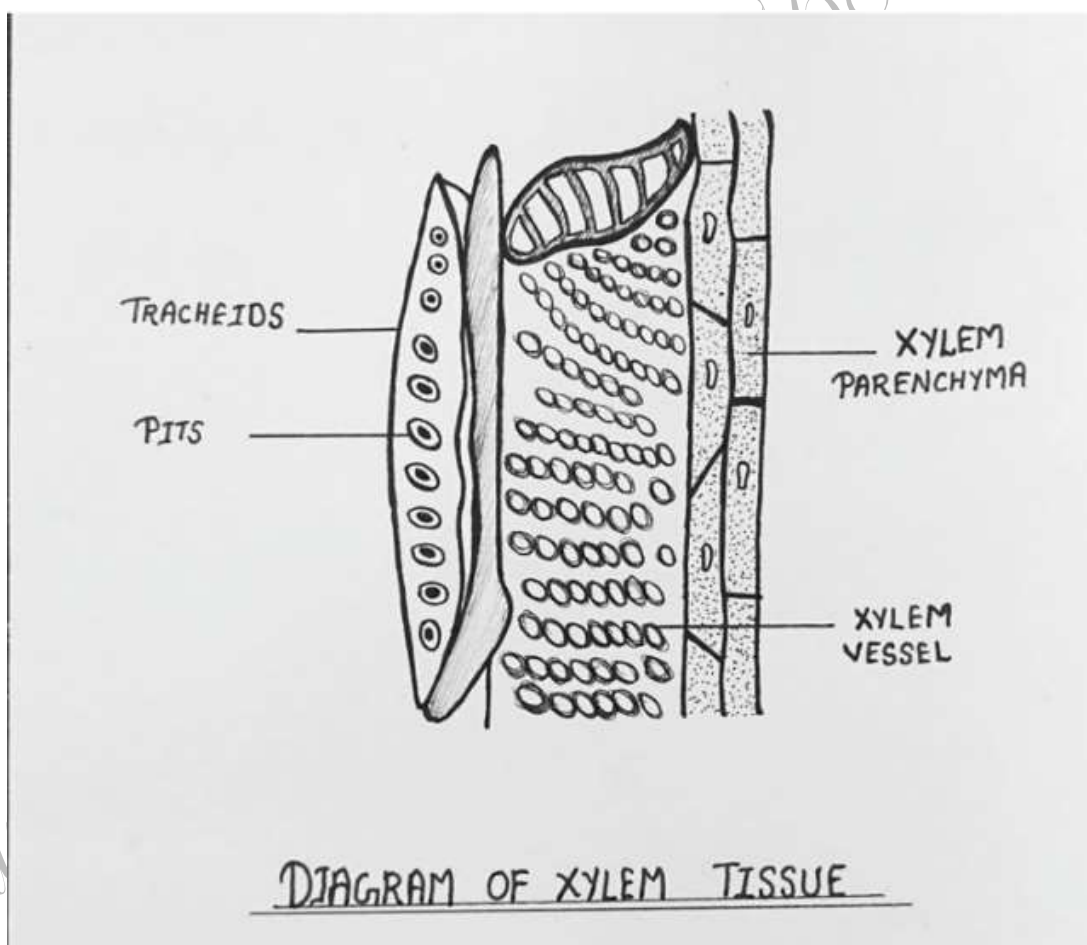
10. What are the functions of Xylem Parenchyma?

Ans. The main functions of xylem parenchyma include:

- Storage of food material in the form of starch, fats, tannins and crystals
- Radial conduction of water takes place by the ray parenchymatous cell
- Xylem parenchyma cells are closely connected to vessels or tracheid through outgrowths called tyloses
- During drought or infection, these tyloses help to prevent damage to vascular tissues
- Xylem parenchyma cells are involved in the maintenance of xylem transport capacity.
- They are responsible for the restoration of vessels and tracheid functionality when there is blockage of the cavity due to the air bubble (embolism). Cavitation occurs due to the high tension of water in the xylem tissues

11. Draw a sectional Diagram of Xylem.

Ans.



12. What is Phloem?

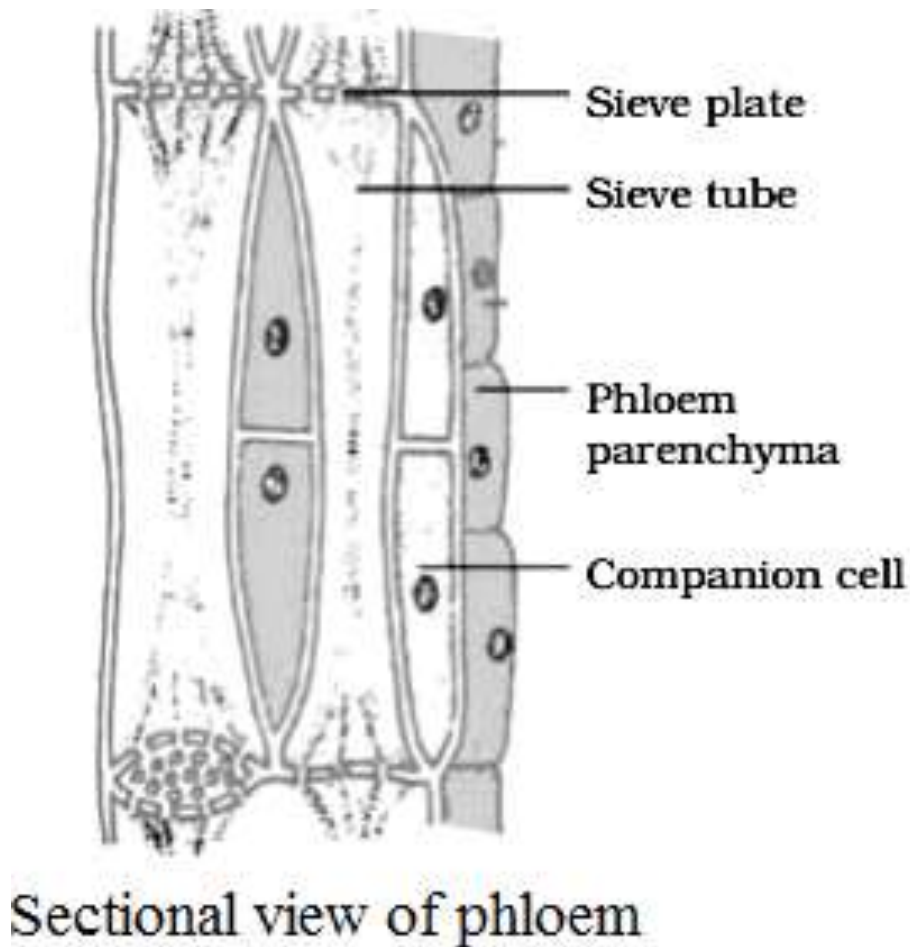
Ans. Phloem is a living tissue in vascular plants which conducts the soluble organic compounds synthesized during photosynthesis downwards from the leaves.

The phloem tissue consists of the following four types of cells:

- a. Sieve tubes,
- b. Companion cells,
- c. Phloem parenchyma and
- d. Phloem fibres.

13. Draw a Sectional Diagram of Phloem.

Ans.



14. What is Sieve Tube?

Ans. Sieve Tube are the major conducting cells in phloem. Sieve tubes are formed of cylindrical cells that are devoid of nucleus. They are found arranged in vertical rows, placed end to end. Their end walls are perforated and are called Sieve plates. Through these sieve plates, food material passes from cell to cell. Thus, sieve tubes play an important role in transporting food.

15. What are Companion Cells?

Ans. Companion cells are living, thin-walled cells that are connected to the sieve-tube members of the phloem through plasmodesmata. These cells help the sieve tubes in the conduction of food.

16. What is Phloem Parenchyma?

Ans. Phloem parenchyma is formed of thin walled parenchymatous cells which are placed between the sieve tubes of the phloem. Phloem parenchyma performs the function of storage of food. It also helps in the translocation of food.

17. What are Phloem Fibres?

Ans. Phloem fibres are dead sclerenchyma fibres formed of elongated cells. These fibres provide mechanical strength and support to the plant.

18. What are the functions of Phloem?

Ans. The functions of Phloem are

- Phloem transports food prepared by the leaves to all parts of the plant.
- Phloem parenchyma helps in the storage of food. The phloem Sclerenchyma provides mechanical support to the plant.

19. What is the difference between Xylem and Phloem?

Ans.

	Xylem	Phloem
Definition	Xylem tissues are the tubular-shaped structure, with the absence of cross walls. This tissue resembles the shape of a star.	Phloem tissues are tubular-shaped, elongated, structures with the presence of walls with thin sieve tubes.
Location	It is located in the centre of the vascular bundle.	It is located on the outer side of the vascular bundle.
Fibres	Xylem fibres are smaller.	Phloem fibres are larger.
Found In	They are present in roots, stems and leaves.	They are present in stems and leaves, which later transports and grow in roots, fruits and seeds.
Movements	These tissues move in a Unidirectional. (only in one direction – upward direction)	These tissues move in a Bidirectional. (both ways – up and down)
Comprises	They live with hollow dead cells.	They live with cytoplasm without the nucleus.
No of Tissues	The total amount of xylem tissue is more.	The total amount of phloem tissue is less.
Features	It consists of tracheid, vessel elements, xylem parenchyma, xylem sclerenchyma and xylem fibres.	It consists of four elements: companion cells, sieve tubes, bast fibres, phloem fibres, intermediary cells and the phloem parenchyma.
Vascular Bundles	Forms vascular bundles with phloem.	Forms vascular bundles with xylem.
Functions	Transports soluble mineral nutrients and water molecules from the roots to the aerial parts of the plant. It Provides mechanical strength to the plant and helps in strengthening the stem. It is responsible for replacing the total amount of lost water molecules through transpiration and photosynthesis.	Transports food and other nutrients including sugar and amino acids from leaves to storage organs and growing parts of the plant. It Translocate the synthesized sugars by the photosynthetic areas of plants to storage organs like roots, bulbs and tubers. It is responsible for transporting proteins and mRNAs throughout the plant.

20. What is Translocation Of Solid?

Ans. During photo synthesis, the plants produce their food as glucose which is stored in the form of starch. This starch is transported in the form of sucrose solution through the phloem upwards and downwards to all parts of the plant including its roots. This is also called Translocation of Solutes.

21. What is the structure of Root System of Plants?

Ans. The Root System of plants consists of a main root, which gives out lateral roots. The lateral roots bear a large number of fine outgrowths called Root hair.

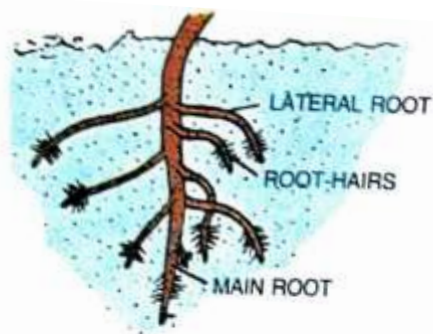


Fig 1.4 Root system of a plant

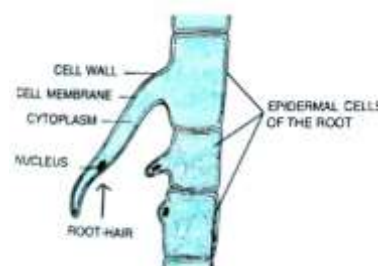
22. What is Root Hair?

Ans. Root hair are unicellular hair like structures present behind the root tips. The function of the root is to absorb water and minerals from the soil by osmosis.

23. Derive the structure of root hair with diagram.

Ans. Root Hair is a long protuberance of an epidermal cell of the root. This cell being a plant cell, has an outer cell wall and an inner cell membrane. The outer cell wall is Rigid and inner cell membrane encloses nucleus, cytoplasm and its contents.

The cell wall is freely permeable so that it allows all substances to pass through it. Cell membranes are semi permeable. It allows water molecules to pass through it and prevents to enter larger molecules. Through this method of cell membrane water molecules can absorbed water molecule from the soil to root cell.



24. How Root hair can absorb water from the soil.

Ans. The root hairs are well-suited or absorbing water from the soil in three ways.

- The numerous root hairs provide a large surface area. More the surface area, greater is the absorption.
- Root hairs contain cell sap, which is of a higher concentration than the surrounding soil water.
- The cell wall is freely permeable, i.e., permits movements of all types of substances. But the cell membrane is semi-permeable. It allows only some substances to pass through it.

25. What is OSMOSIS?

Ans. The movement of water molecules from a dilute solution to a concentrated solution across a semi-permeable membrane is known as OSMOSIS.

26. What is Diffusion?

Ans. The movement of molecules gas, liquid or solid from higher concentration to lower concentration is called Diffusion.

Soil Water and Minerals move into the root hair by the simple process of Diffusion. In day time, carbon di oxide diffuses from the atmosphere into the leaf cells and oxygen diffuses out from the leaf cells into the atmosphere during photosynthesis. The movement of molecules gas, liquid or solid from higher concentration to lower concentration is called Diffusion.

27. What is Active Transport?

Ans. The movement of molecules from their lower concentration to a higher concentration requires energy and is called Active Transport.

The root hair, absorb both water and minerals from the soil. Water enters the root hair cell by osmosis, because concentration of water molecules is higher in the soil than inside the root hairs. But in case of minerals, they are more in concentration inside the root hairs than in the soil. These minerals have to be absorbed from a level of lower concentration to a level of higher concentration.

28. What is Ascent of Sap?

Ans. The water is absorbed by the root hairs from the surrounding soil by the root hairs from the surrounding soil by osmosis. It then moves into the inner cell of the root by cell-to-cell diffusion and osmosis to reach the central xylem, which continues upward into the stem and the leaves. This upward movement of water and minerals is called Ascent of sap.

29. What is Root Pressure?

Ans. It is the pressure developed in the root due to the continuous inflow of water because of cell-to-cell Osmosis. As a result of this pressure, water enters the xylem vessels and helps in pushing the plant sap upwards. Thus, root pressure is one of the forces which contributes to the ascent of sap through the stem into the leaves up to a certain height.

30. What is Transpiration?

Ans. Transpiration is the loss of water in the form of water vapour from the aerial parts of a plant.

31. What is Transpiration Pull?

Ans. As a result of Transpiration, a suction force is created in the Xylem Vessel. This force causes the water to be pulled up from the xylem in the roots to the stem and then to the leaves. This pulling force is called Transpiration Pull.

32. Which factors are affecting the rate of Transpiration?

Ans. The following factors affect the rate of Transpiration:

- a. **Sunlight:** During day time the rate of Transpiration is faster because the stomata remain open to allow the inward diffusion of carbon di oxide for photosynthesis. During night time, the stomata remain closed and hence transportation occurs slowly.
- b. **Temperature:** Transpiration is faster on hot summer days due to faster evaporation of water.
- c. **Wind:** If the wind blows faster the transpiration is increased, because when air blows faster it moves away maximum water vapour from surface level.
- d. **Humidity:** Transpiration is reduced due to increase of Humidity. Due to increase of Humidity air cannot hold any water molecules when it is already laden with moisture.

33. Why transpiration is important in plant?

Ans. The importance of transpiration in plants are:

- a. **Cooling effect:** In transpiration, water gets evaporated from the plant. The heat required for this evaporation is obtained from the plant itself and thus the plant is able to cool itself, when it is hot outside.
- b. **Transpiration helps in maintaining the concentration of the sap inside the plant body:** The roots continue to absorb water from the soil. If excess water is not evaporated out, the sap would then become dilute, preventing further absorption of water along with the minerals required by the plant.

34. What are the uses of water in Plant?

Ans. The water absorbed by the roots is important for the plant in three main ways: Transportation, food production and cooling.

- a. **Transportation:** The water in the plant body, both in xylem and phloem, transports substances in a solution form from one part to another.
- b. **Food production.** Water is required for photosynthesis. It combines with carbon dioxide from the air in the presence of sunlight and chlorophyll to produce glucose and oxygen.
- c. **Cooling.** The heat utilized when water is transpired from the surface of leaves in the form of water vapour induces a cooling effect.

35. Why minerals are essential for plants?

Ans. Nutrient elements or minerals are essential for the plants to grow well and complete their life-cycle properly.

Nutrients are two types

- a. Macro Nutrients
- b. Micro Nutrients

36. What are Macro Nutrients?

Ans. Macro Nutrients are those nutrients which are required in large concentration, for growing the plants.

Ex: Nitrogen (N), Phosphorus (P), Potassium (K)

37. What are Micro Nutrients?

Ans. Micro Nutrients are those type of nutrients which are required in very small amount for growing the plants.

Ex: Iron (Fe), Manganese (Mn), Zinc (Zn)

38. What are the major roles of Macro Nutrients in the plant?

Ans. Main Macro Nutrients are:

- a. Nitrogen (N)
- b. Phosphorus (P)
- c. Potassium (K)

Nitrogen constituent of all proteins.

Phosphorus Constituent of cell membrane and certain proteins.

Potassium helps more abundant in growing tissues, and it involves in the opening and closing of stomata.

39. What are the major roles of Micro Nutrients in the plant?

Ans. Main Micro Nutrients are:

- a. Iron (Fe)
- b. Manganese (Mn)
- c. Zinc (Zn)

Iron constituent of some proteins.

Manganese constituent of some enzymes.

Zinc constituent of plant hormones, activates enzymes.

40. What happen due to deficiency of Nitrogen?

Ans. Leaves become yellowish and wrinkling of central veins due to deficiency of Nitrogen in plant.

41. What happen due to deficiency of Phosphorus?

Ans. Due to deficiency of Phosphorus purple and red spot are seen on leaves and germination of the plant become delayed.

42. What happen due to deficiency of Potassium?

Ans. Growth of the plant is reduced and also transpiration reduced due to deficiency of Potassium.

43. What happen due to deficiency of Iron?

Ans. Leaves become yellowish due to deficiency of Iron.

44. What happen due to deficiency of Manganese?

Ans. Due to deficiency of Manganese leaves of the plant become yellowish with grey spot.

45. What happen due to deficiency of Zinc?

Ans. Due to deficiency of Zinc leaves become deformed and yellowish and plant growth become stunted.