

11

Transport in Plants

TOPIC 1

Means of Transport

01 The main difference between active and passive transport across cell membrane is

[NEET (Odisha) 2019]

- (a) passive transport is non-selective whereas active transport is selective
- (b) passive transport requires a concentration gradient across a biological membrane whereas active transport requires energy to move solutes
- (c) passive transport is confined to anionic carrier proteins whereas active transport is confined to cationic channel proteins
- (d) active transport occurs more rapidly than passive transport

Ans. (b)

The main difference between active and passive transport across the cell is that passive transport requires concentration gradient across biological membrane whereas during active transport, the movement of molecules is from high concentration to low concentration that means they move against the concentration gradient by using ATP.

02 Which of the following is not a feature of active transport of solutes in plants?

[NEET (Odisha) 2019]

- (a) Occurs against concentration gradient
- (b) Non-selective
- (c) Occurs through membranes
- (d) Requires ATP

Ans. (b)

Option (b) is not a feature of active transport of solutes in plants. Active transport of solutes in plants is carried out by membrane proteins. Like enzymes, the carrier proteins are very specific (i.e. selective) in what they carry across the membranes. Active transport uses energy (ATP) to pump molecules against a concentration gradient.

03 Water entering root due to diffusion is part of

[CBSE AIPMT 1996]

- (a) endosmosis
- (b) osmosis
- (c) passive absorption
- (d) active absorption

Ans. (c)

Most of the water is absorbed by the plants passively. The force for this type of water absorption originates in the aerial parts of the plant due to the loss of water in transpiration. The root serves only as pathway and is not actively involved in this process.

04 An innovative professor who wanted to give a live demonstration of a physiological process, filled a glass bottle with previously moistened mustard seeds and water. He screwcapped the bottle and kept it away in a corner and resumed his lecture. Towards the end of his lecture there was a sudden explosion with glass pieces of bottle thrown around.

Which of the following phenomena did the professor want to demonstrate? [CBSE AIPMT 1990]

- (a) Diffusion
- (b) Osmosis

(c) Anaerobic respiration

(d) Imbibition

Ans. (d)

If certain substances for example seeds are dropped in water, within a few hours they absorb the water and swell up considerably. These substances are called imbibants and the phenomenon is known as imbibition. The blast occurred due to increasing imbibitional pressure whose magnitude is extremely high.

TOPIC 2

Plant-Water Relation

05 The process responsible for facilitating loss of water in liquid form from the tip of grass blades at night and in early morning is

[NEET (Sep.) 2020]

- (a) root pressure
- (b) imbibition
- (c) plasmolysis
- (d) transpiration

Ans. (d)

Root pressure is positive hydrostatic pressure. It develops in tracheary element at night and in early morning. Which results loss of water in liquid form from tip of grass blades.

Imbibition is the process by which colloidal solid particles absorb water and swell without being dissolved. Which results loss of water in liquid form from tip of grass blades.

Plasmolysis is the process in which cells lose water in a hypertonic solution.

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

06 Xylem translocates
[NEET (National) 2019]

- (a) water and mineral salts only
- (b) water, mineral salts and some organic nitrogen only
- (c) water, mineral salts, some organic nitrogen and hormones
- (d) water only

Ans. (c)

Xylem in plants helps in the translocation of water, mineral salts, some organic nitrogen and hormones from the soil to the aerial parts of the plant. This process is known as the ascent of sap and it involves four major forces namely root pressure, capillarity, transpirational pull and cohesion and adhesion of water molecule and cell wall.

07 The water potential of pure water is
[NEET 2017]

- (a) zero
- (b) less than zero
- (c) more than zero, but less than one
- (d) more than one

Ans. (a)

The value of water potential of pure water is highest and it is zero. Water molecules possess kinetic energy. Greater the concentration of water in a system, greater is its kinetic energy or its water potential.

If we add solute in water, the solution has fewer free water molecule and concentration of water decreases thus reducing its water potential.

08 Two cells A and B are contiguous. Cell A has osmotic pressure 10 atm, turgor pressure 7 atm and diffusion pressure deficit 3 atm. Cell B has osmotic pressure 8 atm, turgor pressure 3 atm and diffusion pressure deficit 5 atm. The result will be
[CBSE AIPMT 2007]

- (a) movement of water from cell B-A
- (b) no movement of water
- (c) equilibrium between the two
- (d) movement of water from cell A-B

Ans. (d)

The water moves from lower DPD to higher DPD, i.e. from cell A to cell B. This is because when a cell is placed in pure water, the water enters into the cell as a result of the diffusion pressure deficit (DPD) of cell sap.
 $DPD = OP - TP$.

09 Water enters a cell due to
[CBSE AIPMT 2001]

- (a) OP (b) SP (c) TP (d) WP

Ans. (b)

Suction pressure (also called DPD) is believed to suck water (cause movement of water molecule) from pure solvent/hypotonic solution. It is a measure of the ability of the cells to absorb water. BS Meyer (1938) coined the term suction pressure or DPD.

10 In soil, water available for roots (to plants) is
[CBSE AIPMT 1999, 91]

- (a) capillary water
- (b) hygroscopic water
- (c) gravitational water
- (d) chemically bound water

Ans. (a)

Water is present in the space between the soil particles. A large proportion of water is retained between the soil particles against the gravitational force. This is called capillary water. It is readily available to plants for absorption by roots.

11 The water potential and osmotic potential of pure water are
[CBSE AIPMT 1998]

- (a) 100 and zero (b) zero and zero
- (c) 100 and 200 (d) zero and 100

Ans. (b)

The term water potential indicates the net tendency of any system to donate water to its surroundings. The water potential of pure water at atmospheric pressure is zero. Any addition of solute to this water reduces its water potential and makes its value negative. The osmotic potential of pure water also would be zero.

12 If turgidity of a cell surrounded by water increases, the wall pressure will
[CBSE AIPMT 1997]

- (a) increase
- (b) decrease
- (c) fluctuate
- (d) remain unchanged

Ans. (a)

If a plant cell is placed in a hypotonic solution/pure water, water starts moving in by endosmosis. As the volume of the protoplast increases, it begins to exert pressure against the cell wall (turgor pressure). The cell wall exerts equal and opposite pressure (wall pressure) on the protoplast.

13 Osmotic pressure in the leaf cells is positive during
[CBSE AIPMT 1997]

- (a) excessive transpiration
- (b) low transpiration
- (c) excessive absorption
- (d) guttation

Ans. (a)

Osmotic pressure in the leaf cells is positive during excessive transpiration. Transpiration is a physical and physiological process in which aerial parts of a living plant remove water in the form of vapours. As the water is lost from the leaf surface by transpiration, osmotic pressure of the leaf cells increases.

14 The movement of water from one cell of the cortex to the adjacent one in roots is due to

- (a) accumulation of inorganic salts in the cells
- (b) accumulation of organic compounds in the cells
- (c) chemical potential gradient
- (d) water potential gradient

Ans. (d)

Water potential is the difference in the chemical potential per unit molal volume of water in a system and that of pure water at the same temperature and pressure. Water always moves from the area of high water potential to the area of low water potential.

15 The direction and rate of water movement from cell to cell is based on
[CBSE AIPMT 1992]

- (a) WP (b) TP
- (c) DPD (d) incipient plasmolysis

Ans. (c)

The difference between the diffusion pressure of the solution and its solvents at a particular temperature and atmospheric condition is called DPD. The direction and rate of water movement from cell to cell is based on DPD (Diffusion Pressure Deficit).

16 Water potential can be obtained by
[CBSE AIPMT 1991]

- (a) $OP + TP$ (b) $OP = WP$
- (c) $\Psi_s + \Psi_p$ (d) $OP - DPD$

Ans. (c)

Water potential is the difference between the free energy of water in a system and free energy of pure water. It can be obtained by $\Psi_w = \Psi_s + \Psi_p$. It is a function of solute potential and pressure potential.

- 17** Mainly conduction of water in an angiosperm occurs through
[CBSE AIPMT 1990]

(a) tracheids (b) xylem vessels
(c) sieve tubes (d) All of these

Ans. (b)

The water absorbed by roots has to be conducted upward so as to meet the needs of tissues there. Water moves up through the lumen of xylem vessels.

- 18** Root system in a plant is well developed [CBSE AIPMT 1990]

(a) due to deficiency of auxins
(b) due to deficiency of cytokinins
(c) due to deficiency of minerals
(d) for increased absorption of water

Ans. (d)

Water in land plants is mainly absorbed through the roots, especially at the tips in the region of root hairs. Therefore, root system in a plant is well developed, for increasing absorption of water.

TOPIC 3 Ascent of Sap

- 19** Match the List-I with List-II.
[NEET 2021]

List-I	List-II
A. Cohesion	1. More attraction in liquid phase
B. Adhesion	2. Mutual attraction among water molecules
C. Surface tension	3. Water loss in liquid phase
D. Guttation	4. Attraction towards polar surfaces

Choose the correct answer from the options given below.

A B C D
(a) 2 4 1 3
(b) 4 3 2 1
(c) 3 1 4 2
(d) 2 1 4 3

Ans. (a)

(A)-(2), (B)-(4), (C)-(1), (D)-(3)

Cohesion is the property of like molecules (of the same substance) to stick to each other due to mutual attraction, e.g. attraction of water molecules.

Adhesion is the property of different molecules or surfaces to cling to each other. Adhesion is the attraction of molecules of one kind for molecules of a different kind, and it can be quite

strong for water, especially with other molecules bearing positive or negative charges.

At liquid-air interfaces, **surface tension** results from the greater attraction of liquid molecules to each other (cohesion) than to the molecules in the air (adhesion). The process by which plants lose water in liquid form usually from tips and margins of leaves is called **guttation**.

- 20** A few drops of sap were collected by cutting across a plant stem by a suitable method. The sap was tested chemically. Which one of the following test results indicates that it is phloem sap?
[NEET 2016, Phase II]

(a) Acidic
(b) Alkaline
(c) Low refractive index
(d) The absence of sugar

Ans. (b)

The phloem sap is alkaline in nature. It continuously pumps protons from its companion cells to the other neighbouring cells during transport of sugars.

- 21** Root pressure develops due to
[CBSE AIPMT 2015]

(a) active absorption
(b) low osmotic potential in soil
(c) passive absorption
(d) increase in transpiration

Ans. (a)

Root pressure is the positive pressure that develops in the roots of plants by the active absorption of nutrients from the soil. When the nutrients are actively absorbed by root hairs, water (along with minerals) increases the pressure in the xylem. This pressure pushes water up to small heights.

- 22** A column of water within xylem vessels of tall trees does not break under its weight because of
[CBSE AIPMT 2015]

(a) dissolved sugars in water
(b) tensile strength of water
(c) lignification of xylem vessels
(d) positive root pressure

Ans. (b)

A column of water within xylem vessels of tall trees does not break under its weight because of high tensile strength of water, i.e. an ability to resist a pulling force. This high tensile property

depends on cohesion, adhesion and surface tension property of water. Due to these forces only transpiration driven ascent of xylem sap occurs.

- 23** Which of the following criteria does not pertain to facilitated transport?
[NEET 2013]

(a) Requirement of special membrane proteins
(b) High selectivity
(c) Transport saturation
(d) Uphill transport

Ans. (d)

Uphill transport is a process in which diffusion of a component occurs from a less concentrated stream to a more concentrated permeable stream. Facilitated transport is a form of passive transport in which materials are moved across the plasma membrane by a transport protein down their concentration gradient.

It requires integral membrane proteins and highly selective biological membranes to cross. Saturation occurs in facilitated, diffusion because not enough carriers may be available to handle all the free solute molecules. The rate of movement may reach a maximum. Thus, uphill transport does not pertain to facilitated transport.

- 24** The rupture and fractionation do not usually occur in the water column in vessel/tracheids during the ascent of sap because of
[CBSE AIPMT 2008]

(a) lignified thick walls
(b) cohesion and adhesion
(c) weak gravitational pull
(d) transpiration pull

Ans. (b)

The vertical conduction of water from root to aerial parts of plant is called **ascent of sap**. The water molecules remain joined to each other due to a force of attraction called cohesion force. This attraction is due to the presence of hydrogen bonds between them.

The magnitude of this force is very high therefore, continuous water column in the xylem cannot be broken easily due to the force of gravity or other obstructions offered by internal tissues in the upward movement of water. This adhesive property of water i.e., attraction between the water molecules and the walls of xylem also ensures the continuity of water column in xylem.

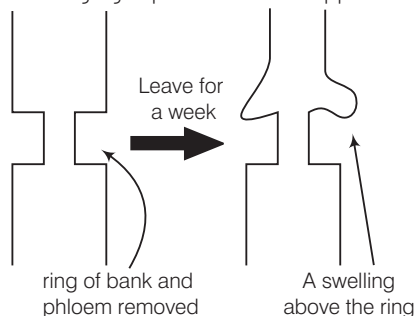
25 Meaningful girdling (ringing) experiment cannot be performed within sugarcane because

[CBSE AIPMT 1992]

- (a) its phloem is situated interior to xylem
- (b) its stem surface is covered with waxy coating
- (c) its vascular bundles are not present in a ring
- (d) its stem is thin

Ans. (c)

In ringing experiment removal of bark breaks the continuity of epidermis, cortex and phloem. It shows clearly that epidermis, cortex and phloem do not take part in transport of sap or water. In sugarcane (monocot) the vascular bundles are scattered, therefore, ringing experiment is not applicable.



26 Guttation is caused by

[CBSE AIPMT 1992]

- (a) transpiration
- (b) osmosis/DPD
- (c) root pressure
- (d) osmotic pressure

Ans. (c)

Guttation refers to the exudation of droplets of liquid water from the margins and tip of leaves through a group of cells called hydathodes. Guttation depends on root pressure.

27 Soil water available to roots is

[CBSE AIPMT 1991]

- (a) surface water
- (b) hygroscopic water
- (c) gravitational water
- (d) capillary water

Ans. (d)

Water, which is mainly held between the spaces of soil particles forming a septum of capillaries, is called capillary water. It is most important form of water which is mainly taken by the plants.

TOPIC 4 Transpiration

28 Grass leaves curl inwards during very dry weather. Select the most appropriate reason from the following [NEET (National) 2019]

- (a) Flaccidity of bulliform cells
- (b) Shrinkage of air spaces in spongy mesophyll
- (c) Tyloses in vessels
- (d) Closure of stomata

Ans. (a)

Flaccidity of bulliform cells is the most appropriate reason for the curling of grass leaves during dry weather. Bulliform cells are present between the epidermal cells of the leaf and they help to minimise the water loss due to transpiration during water stress period.

29 Stomatal movement is not affected by

- (a) O_2 concentration [NEET 2018]
- (b) Light
- (c) Temperature
- (d) CO_2 concentration

Ans. (a)

Stomatal movement is not affected by CO_2 concentration. Stomata are tiny pore complexes found in the epidermis of leaves and other soft aerial parts. They are meant for the gaseous exchange but are also the main source of transpiration. Stomatal movements are affected by many factors like light, temperature and CO_2 concentration. In the majority of plants, the stomata are open in light and close in darkness. Normally high temperature above $30^\circ C$ reduces stomatal opening in many species. Low CO_2 concentration usually induces opening of stomata while high CO_2 concentration closes the same.

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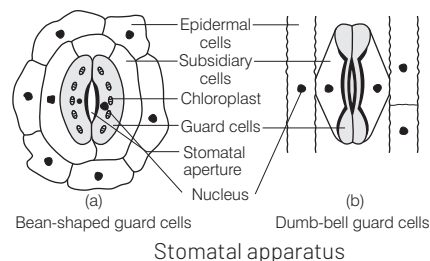
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31 Stomata in grass leaf are

- (a) rectangular [NEET 2018]
- (b) kidney-shaped
- (c) dumb-bell-shaped
- (d) barrel-shaped

Ans. (c)

Epidermis of all green aerial parts of plants contain minute opening called stomata. It is surrounded by guard cells and neighbouring subsidiary cells collectively termed as stomatal apparatus. Kidney-shaped or bean-shaped guard cells are present in dicots only, while in monocots like grasses, these cells are dumb-bell shaped. Guard cells differ from rest of the cells in shape, size and thickenings.



32 Which of the following facilitates opening of stomatal aperture ?

- (a) Contraction of outer wall of guard cells [NEET 2017]
- (b) Decrease in turgidity of guard cells
- (c) Radial orientation of cellulose microfibrils in the cell wall of guard cells
- (d) Longitudinal orientation of cellulose microfibrils in the cell wall of guard cells

Ans. (c)

Stomata are tiny pore complexes. Each stomata is surrounded by two specialised green epidermal cells called guard cells. The opening of the stoma is facilitated by the orientation of the microfibril in the cell walls of the guard cells. Cellulose microfibrils are oriented radially rather than longitudinally making it easier for the stoma to open.

33 Water vapour comes out from the plant leaf through the stomatal opening. Through the same stomatal opening carbon dioxide diffuses into the plant during photosynthesis. Reason out the above statements using the following options.

[NEET 2016, Phase I]

- (a) Both processes can happen together because the diffusion coefficient of water and CO_2 is different
- (b) The above processes happen only during night time
- (c) One process occurs during day time and the other at night
- (d) Both processes cannot happen simultaneously

Ans. (a)

Diffusion of water vapour and CO_2 are independent process. Their diffusion depends on the difference in their partial pressure in the atmosphere as well as inside the leaves.

34 In land plants, the guard cells differ from other epidermal cells in having [CBSE AIPMT 2011]

- (a) mitochondria
- (b) endoplasmic reticulum
- (c) chloroplasts
- (d) cytoskeleton

Ans. (c)

The guard cells of stomata in land plants are specialised epidermal cells which contain chloroplasts. In rest of epidermal cells, chloroplasts are absent. The chloroplasts of guard cells are capable of poor photosynthesis as there is absence of NADP reductase enzyme.

35 Guard cells help in [CBSE AIPMT 2009]

- (a) protection against grazing
- (b) transpiration
- (c) guttation
- (d) fighting against infection

Ans. (b)

Guard cells help in transpiration. Stomata are surrounded by two specialised epidermal cells, called guard cells. Because of their small size guard cells are rapidly influenced by turgor changes and thus regulate the opening and closing of stomata. Stomata are involved in releasing water

vapour into the atmosphere. This process is known as transpiration.

36 Stomata of a plant open due to [CBSE AIPMT 2003]

- (a) influx of hydrogen ions
- (b) influx of calcium ions
- (c) influx of potassium ions
- (d) efflux of potassium ions

Ans. (c)

Accumulation of K^+ ions in the guard cells during the day time is responsible for migration of water molecules from subsidiary cells to guard cells. This increases turgidity of guard cells and thus stomata open.

37 Opening and closing of stomata is due to [CBSE AIPMT 2002]

- (a) hormonal change in guard cells
- (b) change in turgor pressure of guard cells
- (c) gaseous exchange
- (d) respiration

Ans. (b)

When the guard cells become turgid, the stomata open. On the other hand, if the guard cells loose water, these become flaccid, the inner walls sag and the pore closes.

Thus, stomatal movement occurs due to changes in turgor pressure of guard cells.

38 Glycolate induces opening of stomata in [CBSE AIPMT 2001]

- (a) presence of oxygen
- (b) low CO_2 concentration
- (c) high CO_2 concentration
- (d) absence of CO_2

Ans. (b)

Light causes photosynthesis which leads to reduction in CO_2 concentration \rightarrow synthesis of glycolate \rightarrow oxidation of glycolate \rightarrow ATP synthesis \rightarrow activation of K^+ pump \rightarrow movement of K^+ in guard cell \rightarrow movement of water into guard cells \rightarrow swelling of guard cell \rightarrow opening of stomata.

39 Which of the following is used to determine the rate of transpiration in plants? [CBSE AIPMT 1994]

- (a) Porometer
- (b) Potometer
- (c) Auxanometer
- (d) Tensiometer

Ans. (b)

Potometer is an apparatus for measuring the rate of transpiration. It is also known as Transpirometer.

40 Which of the following is an effective adaptation for better gas exchange in plants? [CBSE AIPMT 1993]

- (a) Presence of multiple epidermis
- (b) Presence of hair on the lower epidermis
- (c) Presence of waxy cuticle covering the epidermis of the leaves
- (d) The location of the stomata primarily on the lower surface of the leaf, the side turned away from the direct sun rays

Ans. (d)

Stomata are meant for the gaseous exchange but are also the main source of transpiration. The presence of stomata on the lower surface of leaf, the side turned away from the direct sun rays is an effective adaptation for better gaseous exchange in plants.

41 Conversion of starch to organic acid is essential for [CBSE AIPMT 1992]

- (a) stomatal closure
- (b) stomatal opening
- (c) stomatal initiation
- (d) stomatal growth

Ans. (b)

The starch hydrolyse into glucose 1-phosphate so that, osmotic potential becomes lower in guard cells. As a result of this water enters into the guard cell by osmotic diffusion from surrounding epidermal and mesophyll cells. Guard cells become turgid and stomata will open. The starch-sugar interconversion theory about the mechanism of stomatal movement was given by Seyere (1923) and modified by Steward (1964).

42 In guard cells when sugar is converted into starch the stomatal pore [CBSE AIPMT 1992]

- (a) opens fully
- (b) opens partially
- (c) closes completely
- (d) remains unchanged

Ans. (c)

According to starch-sugar interconversion theory, during night the

glucose 1-phosphate (sugar) converts into starch in guard cells and thus increasing the osmotic potential. The guard cells release water, become flaccid and stomata closes.

43 In a terrestrial habitat which of the following is affected by temperature and rainfall condition? [CBSE AIPMT 1989]

- (a) Translocation
- (b) Transpiration
- (c) Transformation
- (d) Thermodenaturation

Ans. (b)

Transpiration increases with increase in temperature and decreases with rainfall conditions. Transpiration will also depends on number of stomata as more stomata may provide more pores for transpiration.

44 Basis of stomatal opening is [CBSE AIPMT 1988]

- (a) exosmosis
- (b) endosmosis
- (c) decrease in cell sap concentration
- (d) plasmolysis of guard cells

Ans. (b)

The entry of water into a cell when placed in less concentrated solution is called endosmosis. Due to increase in osmotic pressure and diffusion pressure deficit of guard cells endosmosis of water from the surrounding epidermal and mesophyll cells takes place into the guard cells. The guard cells swell and the stomata open.

45 Stomata in angiosperms open and close due to [CBSE AIPMT 1988]

- (a) their genetic constitution
- (b) effect of hormones
- (c) change of turgor pressure in guard cells
- (d) pressure of gases inside the leaves

Ans. (c)

The turgor pressure of guard cell increases due to the osmotic diffusion of water from the surrounding epidermal and mesophyll cells. Thus, the guard cells swell and stomata open.

46 The spraying of phenyl mercuric acetate in leaves [CBSE AIPMT 1988]

- (a) increases transpiration
- (b) reduces transpiration
- (c) increases rate of photosynthesis
- (d) causes guttation

Ans. (b)

Phenyl mercuric acetate is an antitranspirant. It covers the stomata as a film and resist the diffusion of water therefore, reduces the rate of transpiration. Other antitranspirants include Abscisic Acid (ABA) and aspirin.

TOPIC 5 Phloem Transport

47 Select the incorrect statement. [NEET (Oct.) 2020]

- (a) Transport of molecules in phloem can be bidirectional
- (b) Movement of minerals in xylem is unidirectional
- (c) Unloading of sucrose at sink does not involve the utilisation of ATP
- (d) Elements most easily mobilised in plants from one region to another are phosphorus, sulphur, nitrogen and potassium

Ans. (c)

Statement (c) is incorrect. It can be corrected as Unloading of sucrose at sink does require utilisation of ATP. Long distance transport of sucrose from the source to sink is carried out by phloem. It is a bidirectional movement. Both loading of food at the source and unloading of the same at sink region are active processes, i.e. require energy in the form of ATP.

48 What is the direction of movement of sugars in phloem? [NEET (National) 2019]

- (a) Upward
- (b) Downward
- (c) Bidirectional
- (d) Non-multidirectional

Ans. (c)

Sugars show bidirectional movements in phloem unlike unidirectional movement of water in xylem. In phloem, sugars move in both directions depending upon the source-sink relationship.

Initially leaves act as source of food from where it moves to the sink (parts

requiring food). Later, the food in sink is mobilised towards the growing buds of the plant.

49 The translocation of organic solutes in sieve tube members is supported by [CBSE AIPMT 2006]

- (a) P-proteins
- (b) mass flow involving a carrier and ATP
- (c) cytoplasmic streaming
- (d) root pressure and transpiration pull

Ans. (b)

According to mass flow hypothesis the transport of organic solutes takes place from source to sink, this transport also depends on metabolic energy.

According to cytoplasmic streaming hypothesis (which was given by de Vries, 1885) the transport of organic solutes takes place by combination of diffusion and cytoplasmic streaming. Cytoplasmic streaming carry organic solutes from one end to the other end of sieve tube.

P-proteins has a role as defence against phloem feeding insects and sealing of damaged sieve tubes.

50 Loading of phloem is related to [CBSE AIPMT 2001]

- (a) increases of sugar in phloem
- (b) elongation of phloem cell
- (c) separation of phloem parenchyma
- (d) strengthening of phloem fibre

Ans. (a)

Sugar synthesised in leaves (source) is 'loaded' in phloem through which it is transported to all other parts of plants where it is required (sinks).

51 Translocation of carbohydrate nutrients usually occurs in the form of [CBSE AIPMT 1992]

- (a) glucose
- (b) maltose
- (c) starch
- (d) sucrose

Ans. (d)

In plants, translocation, i.e. the movement of organic nutrients from the region of supply to the region of sink or utilisation occurs through phloem (sieve tube/sieve cells) tissue. Translocated organic nutrients constitute 10-26% carbohydrates (usually sucrose) and 1% nitrogenous components (mostly amino acids).