1. Phloem sap is made up of
(a) water and minerals (b) water and sucrose
(c) water and glucose (d) Both (b) and (c)

2. In plants, which of the following are translocated through phloem?
(a) Hormones (b) Amino acids
(c) Sugars (d) All of these

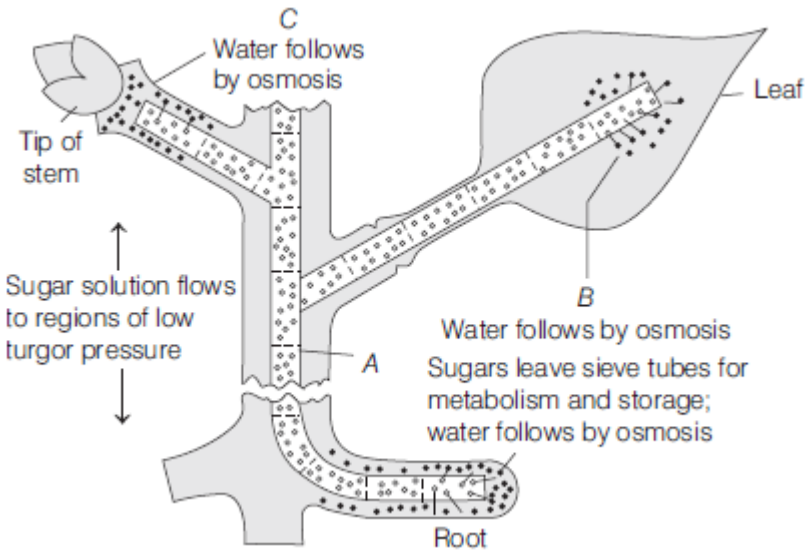
3. Pressure flow hypothesis is for
(a) translocation of sugars
(b) translocation of water
(c) translocation of minerals
(d) None of these

4. The accepted mechanism used for the translocation of sugars from source to sink is
(a) root flow hypothesis (b) pressure flow hypothesis
(c) transpirational pull (d) stem flow hypothesis

5. Loading of phloem sets up a ..... that facilitates mass movement in phloem.
(a) concentration gradient
(b) pressure gradient
(c) water potential gradient
(d) Both (a) and (b)

6. When sugars enter sieve tubes, water flows by osmosis, resulting in
(a) water potential (b) osmotic gradient
(c) turgor pressure (d) DPD

7. In the given diagram, identify the marked phenomenon/part and choose the correct option.



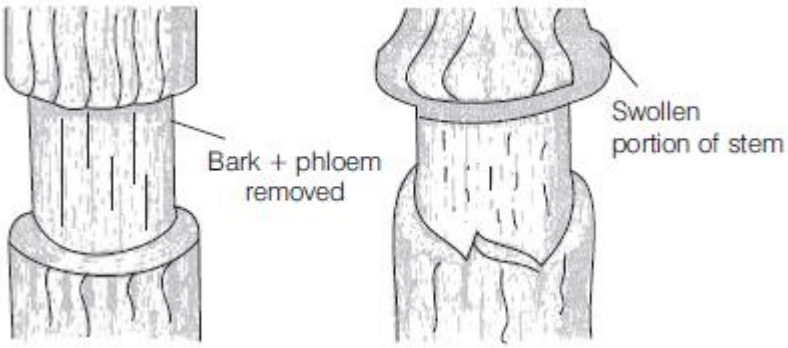
(a) A–Phloem, B–Sugar leaves sieve tube, C–Sugar enters sieve tube
(b) A–Xylem, B–Sugar leaves sieve tube, C–Sugar enters sieve tube
(c) A–Phloem, B–Sugar enters sieve tube, C–Sugars leave sieve tubes
(d) A–Xylem, B–Sugar enters sieve tube, C–Sugars leave sieve tubes

8. Sugar is loaded into sieve tube by
(a) simple diffusion (b) active transport
(c) facilitated transport (d) passive transport

9. If you are given a task to analyse phloem sap chemical, which of the following will be present in least concentration?
(a) Water (b) Sugar
(c) Minerals and nitrogen (d) Hormones

10. Why the transport of organic food through phloem is bidirectional?
(a) Roots serve as source, while leaves are the sink region
(b) Source and sink regions are irreversible
(c) The relationship between the two regions (source and sink) is variable
(d) Translocation of organic solute is regulated by energy

11. The diagram given below represents the simple ringing or girdling experiment. Bark containing phloem is removed. This experiment proves and justify that phloem is the path for translocation of food. In the given diagram, swollen part of stem has been indicated. Choose the correct option for the formation of the swollen part of stem.



(a) Accumulation of food material just above the ringing space
(b) Accumulation of minerals and water just above the ringing space
(c) Due to a repairing mechanism
(d) Injured part undergoes turgor change

12. If cell A with OP = 5 and TP = 4 is surrounded by cells with OP = 3 and TP = 1, what will be the direction of water movement
(a) From cell A to other cells (b) From other cells to cell A
(c) Water will not move (d) Water will move up

13. Water potential can be calculated by
(a) OP + TP (b) π + WP
(c) Ψ + PW (d) π + TP

14. Which of the following is not against concentration gradient
(a) Transpiration (b) Diffusion
(c) Translocation (d) All the above

15. With an increase in the turgidity of a cell, the wall pressure will
(a) Increase (b) Decrease
(c) Fluctuate (d) Remain unchanged

16. Osmotic concentration of a solution may be governed by
(a) Concentration of solute (b) Temperature of solution
(c) Ionization of solute (d) All the above

17. The turgor pressure of a turgid cell is equal and opposite to
(a) Root pressure (b) Wall pressure
(c) Diffusion pressure (d) All the above

18. How water potential Ψ is affected by the presence of solutes and insoluble colloids
(a) Ψ is increased
(b) Ψ is decreased
(c) Remains unchanged
(d) Increased for solutes and decreased for colloids

19. Water potential Ψ measured in *bar* or in
(a) lb/in^2 (b) *mm* of *Hg*
(c) atm (d) All the above

20. When a cell is fully turgid, which of the following will be zero
(a) Wall pressure (b) Osmotic pressure
(c) Turgor pressure (d) Water potential

21. 0.1*M* solution of a solute has a water potential of
(a) –2.3 bars (b) 0 bar

(c) 22.4 bars (d) + 2.3 bars

22. Osmotic pressure of a solution is
(a) Greater than pure solvent
(b) Less than pure solvent
(c) Equal to pure solvent
(d) Less than or greater than pure solvent

23. Increase in temperature and velocity of wind cause an increase in transpiration initially but later it slows down, because
(a) Of closure of stomata
(b) Water is not made available
(c) The air around the plant becomes humid
(d) Of mechanical disturbance

24. Phenyl mercuric acetate
(a) Reduces transpiration rate
(b) Reduces photosynthesis
(c) Reduces respiration
(d) Kills the plant

25. Use of anti–transpirant may check
(a) Transpiration in fruit plants
(b) Transpiration in vegetable plants
(c) Transpiration in crop plants
(d) All the above

26. Transpiration increases by
(a) High humidity (b) Wetness in soil
(c) High temperature (d) Low wind velocity

27. Which of the following exhibits a direct proportionality to transpiration
(a) Light and relative humidity
(b) Temperature and relative humidity
(c) Temperature and wind
(d) Relative humidity and wind

28. Transpiration increase with increase in
(a) Humidity (b) Temperature
(c) Minerals (d) Soil moisture

29. The transpiration is regulated by the movements of
(a) Subsidiary cells of the leaves
(b) Guard cells of the stomata
(c) Mesophyll tissue cells
(d) Epidermal cells of the leaves

30. Clarification of mechanism of opening and closing of guard cells is based on which of the following theory
(a) Entry and exit of potassium in guard cell
(b) Photosynthetic process taking place in guard cell
(c) Starch–sugar conversion
(d) Transpiration

1. (b)
2. (d)
3. (a)
4. (b)
5. (*c*) The movement of sugars in the phloem begins at the source, where sugars are loaded (actively transported) into a sieve tube. Loading of the phloem sets up a water potential gradient that facilitates mass movement in the phloem.
6. (a)
7. (c)
8. (b)
9. (c)
10. (*c*) Long distance transport of the substances takes place through bulk flow system. Organic nutrients are supplied over long distance transport by phloem tissue from source to sink region. The direction of transport of these organic nutrients can be upward or downward, i.e. bidirectional. This is due to the variable relationship between synthesis region or source site and sink or utilisation region.

11. (*a*) Option (a) is correct. In girdling or ringing experiment, the path of organic nutrients in the stem of plant is represented, which is carried out by phloem. In the experiment, a ring of bark along with phloem is cut from the stem. Due to the absence of phloem in the ringing part, translocation of food does not take place and gets accumulated above the ring. Bark also swells up and may rise to adventitious roots. Ascent of sap in plants can be demonstrated by girdling experiment.

12. (a) D.P.D. (S.P.) of cell A = O.P. – T.P.
= 5 – 4 = 1 atm.
D.P.D. (S.P.) of cell B = 3 – 1 = 2 atm.
So, movement of water is from cell A to cell B, *i.e.*, direction of movement of water is from lower D.P.D. (S.P.) to higher D.P.D. (S.P.).

13. (a) Water potential is represented by Greek letter 'ψ'
(Psi) $\psi = \psi_s + \psi_p$
where, $\psi \rightarrow$ Water potential
$\psi_s \rightarrow$ Solute potential or osmotic potential
$\psi_p \rightarrow$ Pressure potential

14. D

15. (a) Wall pressure is the pressure exerted by the cell wall to counteract the turgor pressure.

16. D

17. (b) The pressure exerted by the cell wall over the protoplast to counter the turgor pressure. Normally wall pressure is equal and opposite to turgor pressure (WP = TP).

18. (b) Because insoluble colloids does not increase water potential.

19. (d) A bar is a pressure unit which equals 14.5 lb/in^2, 750 mm Hg or 0.987 atm.

20. (d) In case of fully turgid cell, the net movement of water in to the cell is stopped. The cell is equilibrium with the water outside. The water potential in such case will be zero (0).

21. (a) 0.1*m* sucrose solution has an OP of 2.3 bars. Water potential has negative sign so – 2.3 bars.

22. A

23. (a) Increase in temperature leads to opening of stomata even is night but within a certain physiological range. Again very high temperature leads to closing of stomata even in day (mid-day closure). Similarly very high wind velocity decreases transpiration by lowering temperature.

24. (a) Phenyl mercuric acetate is an example of antitranspirant which causes partial closure of stomata, thus it lowers down the rate of transpiration.

25. (d) The chemical substances which reduce transpiration (by increasing leaf resistance to water vapour diffusion) without affecting gaseous exchange, are called anti-transpirants.

26. (b) Because under internal water sufficiency the stomata are completely open and transpiration increases.

27. (c) Temperature and wind directly affects the transpiration. If wind and temperature is high the rate of transpiration is also high and when both are low, transpiration decreases.

28. (b) Temperature directly effects the transpiration. As the temperature rises so does the transpiration. Temperature in its turn is effected by light.

29. (b) The transpiration is regulated by opening and closing of guard cells.

30. A