

Date - 23.12.2024

Class - 9

Name of Teacher - Nidhi Rana

Subject - Biology

Chapter 5 - Transpiration

Transpiration is the loss of water in the form of water vapours from the leaves and other aerial parts of plant.

Importance of Transpiration

- (1) Creates suction force in the stem to enable the roots to absorb water and minerals
- (2) Provides cooling effect to the plant in hot weather

It is important to note that (only 2%) a very small quantity of water absorbed by the plant is used by the plant in photosynthesis and other activities. Rest of it is lost in the process of transpiration.

DEMONSTRATION OF TRANSPIRATION

EXPERIMENT 1

Take a well watered potted plant. Cover the plant with a transparent polythene bag and tie its mouth around the base of the stem. Leave it in the sunlight for sometime. Drops of water will soon appear on the inner side of the bag. These drops of water are the condensed water vapours given out during Transpiration by the plant.

Now in the Board Exams

you may be asked the related questions like -

Fig. 1

Q1 What is the aim of the experiment?

Q2 Name the process studied.



Chapter - 5 Transpiration

Class - 9

- Q3 Define the process demonstrated in the experiment.
- Q4 Why is the polythene tied at the base of the plant and not at the base of the pot itself?
- Q5 What can be the control for the experiment?
- Students are required to answer these questions in the notebook. (Assignment 1)

EXPERIMENT - 2

Arrange 3 set ups - A, B, C

Set up A - Take a well watered plant. Enclose the pot of the plant within a polythene bag and tie the mouth of the bag firmly around the base of the stem. This would prevent the escape of water vapours from the pot. Now cover the entire plant under a bell jar as in Fig 2

Set up B - Arrange another similar plant and cover it with a bell jar exactly in the same manner as the first one. Keep a dry cobalt chloride paper by the side of the plant inside the bell jar

Set up C - Take a third bell jar without the plant but still containing a similar piece of cobalt chloride paper. Now keep all the three bell jars together in the Sun.

observations -

Setup A - water vapours condensing on bell jar

Setup B - water vapours condensing on inner walls of bell jar and blue cobalt chloride paper turns pink.

Set up C - No water vapours seen. No change in cobalt chloride paper.

Blue cobalt chloride paper turns pink when exposed to moisture.

Assignment II

Chapter - 5 Transpiration

Q. Study the experimental set up given below and answer the questions that follow -

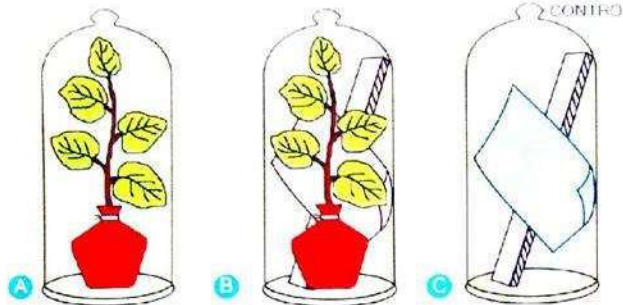


Fig. 2

- 1) What is the aim of the experiment?
 - 2) Name the phenomenon studied here and define it.
 - 3) Why do we need to tie the mouth of the polythene bag (enclosing the pot) firmly around the base of the stem?
 - 4) What is the purpose of using cobalt chloride paper?
 - 5) What is the control for the experiment?
- (Answer the above questions in your notebook).

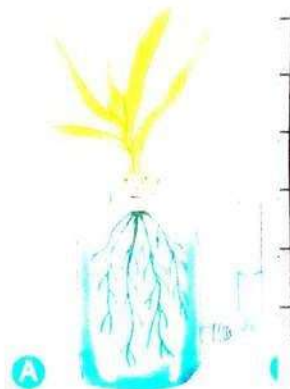
Experiment - 3

Measurement of Transpiration by weighing method -

- ① A small light weight potted plant can be weighed before and after the end of a certain period of time. The loss in weight by the plant during that time is due to the loss of water by transpiration.

An improved method includes using a glass bottle linked by a rubber to a graduated side tube filled with water as shown in Fig 3. The water level in the side tube falls to demonstrate loss of water through Transpiration from leaves.

Fig. 3



Chapter 5 Transpiration

Class - 9

This would indicate the volume of water loss that can be compared with the loss in weight with the help of weighing machine (B) or by converting cc into grams (1 cc water weighs 1g).

Assignment III (based on experiment - 3)

- Q 1) In the above experiment what is the purpose of the experiment?
- 2) Name the phenomenon studied. Define it.
- 3) What is the purpose of graduated side tube in the experiment?
- 4) What is observed as a result of the experiment and why?

(Answer the above questions in the notebook)

Experiment - 4.

Take a test tube filled with water and inserting a leafy shoot (no roots) in it and pouring some oil on the surface to prevent loss of water by evaporation. Place the test tube in a beaker and weigh them together. Remove the test tube and keep it in Test tube stand in sunlight for few hours. Weigh it again by keeping it in the beaker (same beaker). Any difference in weight will indicate loss of water by the shoot (due to transpiration).

Assignment - IV (based on experiment - 4)

- Q 1) Name the phenomenon studied in expt. 4. and define it.
- 2) What is the purpose of pouring oil on the surface of water?
- 3) What is observed as a result of the experiment and why?

Fig. 4



Experiment - 5

Class - 9

Measurement of Transpiration by Potometer method.

Potometer - is a device that measures the rate of water intake by a plant which is almost equal to the water lost by the plant through transpiration

Types of Potometer -

- 1) Ganong's - measures the rate of water intake by a plant
- 2) Darwin's - to demonstrate the suction force created due to transpiration
- 3) Garreau's - to demonstrate unequal transpiration from the two surfaces of a dorsiventral leaf.

Ganong's Potometer

A twig of some plant (eg coleus) is cut with sharp knife and fixed in Ganong's potometer. Entire apparatus is filled with ^{coloured} water so that no air spaces are present. An air bubble is introduced into the horizontal graduated capillary tube which is dipping into the beaker containing water (by lifting the bent capillary tube above the coloured water so that air may be sucked in due to suction pull and is again dipped into water. As the transpiration proceeds a suction force is set up which pulls the water from the beaker and the bubble in the capillary tube moves along. The readings on the capillary tube would give the volume of water lost in a given time. The air bubble can be brought back to its original position by releasing some water from the reservoir into the capillary tube by opening the stop cock.

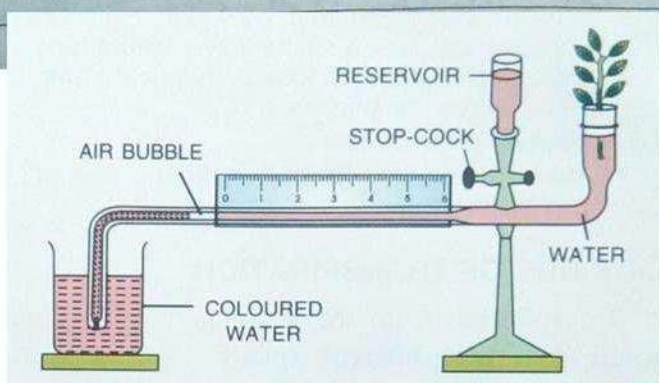


Fig. 5

Ganong's Potometer

Chapter - 5 Transpiration

Class - 9

Precautions in the use of potometer

- (1) The potometer should be made completely water-tight
- (2) The twig should be cut obliquely (to allow larger surface of water intake) also under water to avoid suction of air bubble into the twig which will stop absorption of water into the xylem.

Limitations in use of potometer

- (1) Introducing the air bubble is not very easy. Carefully introduce a single air bubble into the horizontal graduated capillary tube.
- (2) Twig may not remain fully alive for a very long time.
- (3) Change in outside air temperature may affect the position of the air bubble in the capillary tube.

Assignment V (based on experiment - 5)

- Q. 1) Name the device used in the experiment.
- (2) Name the phenomenon studied and define it.
- (3) Why is only coloured water used in the above apparatus?
- (4) What is the purpose of the reservoir in the setup?
- (5) What is the purpose of introducing air bubble in the set up?

(Answer the above questions in the notebook.)

Assignment VI

After reading the notes, students are required to go through the chapter as discussed in the text book. Also answer the questions in the 'Progress Check' Page 58 of text book (Short answer. Q1 can be done in book itself and Q2 to Q4 may be done in the notebook).