Department of biology

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((Plant Physiology))

Stage (3)

((Lecture -2-))

Importance of water to plant life

By

Asst. Lec. Zainab Nadhum Aziz

Importance of water to plant life

Life is unconceivable without water and plants are no exceptions. Water constitutes 80-95% of the total weight of growing plant tissues.

1-Water is best known solvent and provides medium for the movement of molecules within and in between the cells.

2- The structures of macromolecules such as proteins, nucleic acids, polysaccharides and other cell constituents are greatly influenced by water.

3- Water takes direct part in many biochemical reactions in the cell such as hydrolysis, hydration, and dehydration. Water is also one of the raw materials in photosynthesis.

4- Through transpiration, water plays an important role in controlling temperature of plants.

5- Contrary to animals, the plant cells contain large central vacuole filled with cell sap and develop large.

intracellular pressure called as turgor pressure. Turgor pressure is essential for many physiological processes in plants such as:

(a) - Cell enlargement.

(b) - Stomata movements.

(c) - Transport of solutes in phloem.

(d) - Transport processes in cell membranes.

(e) - Maintaining shape or form of the plant tissues.

(f) - Emergence of young seedling from the soil.

6- Water is most important factor for agricultural productivity.

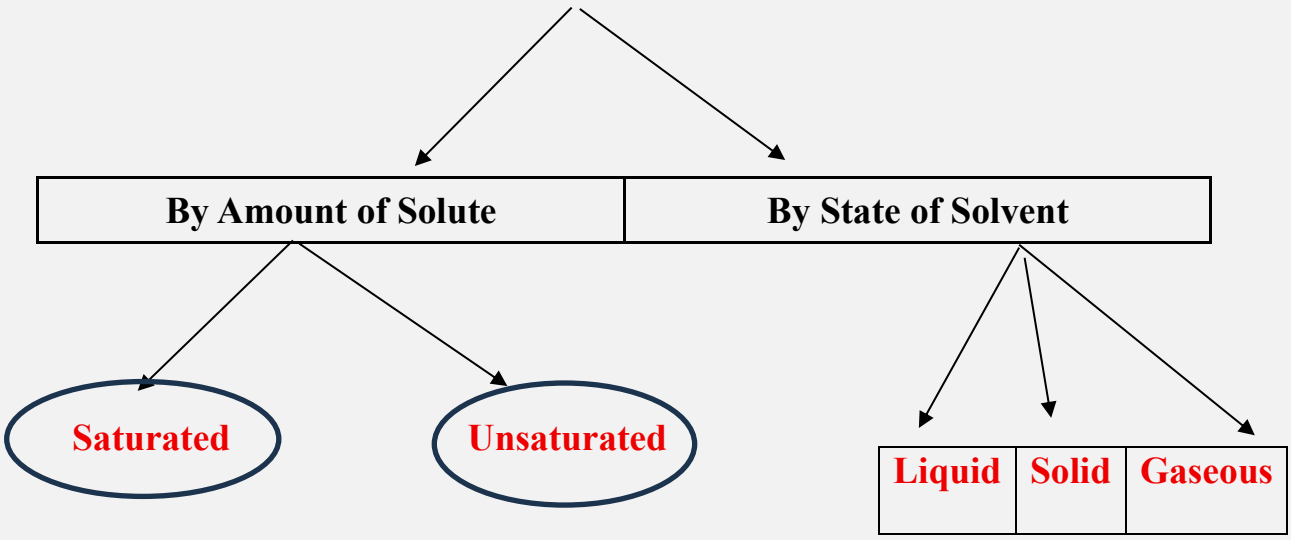
7- Water is an essential factor in completing the life cycles of lower forms of plant life and aquatic higher plants.

*** Solutions ***

It is common observation that when a little sugar or salt is dissolved in water, a homogenous and stable mixture of the two components is obtained which is called as solution. Of these two components, the one (here sugar or salt) which is present in small quantity is called as solute while the other (here water) present in larger quantity is called as solvent. The solution is homogenous because the molecules or the ions of the solute become evenly distributed throughout the solvent. It is a stable system because the molecule or ions do not settle down.

***True solution may be defined as a homogenous and stable mixture of two or more chemical substances.**

Classification of Solutions



* Types of Solutions *

Liquid	Gas	Solid

1- Solid in liquid (Sugar in Water)
2- Solid in solid (Alloys)
3- Solid in gas (Dust in the Air)
4- Liquid in liquid (Alcohol in Water)
5- Liquid in solid (Mercury in Zinc)
6- Liquid in gas (Water Vapor in the Atmosphere)
7- Gas in liquid (Oxygen in Water)
8- Gas in solid (Hydrogen in Platinum)
9-Gas in gas (Oxygen in Air)

* Suspensions *

If some fine sand is mixed with water in a beaker, the sand panicles become dispersed in water. They do not break into molecules or ions but after a very short period settle down leaving almost clear water above. Such an unstable system of a solid and liquid is called as suspension. Due to their large size, the suspended particles are visible under microscope and even with naked eyes.

* Colloidal systems *

If in place of sand, a little fine clay is mixed with water, the clay particles remain dispersed in it. They neither break into molecules or ions nor do they settle down even after long period of time. Such a heterogeneous and stable system is called as colloidal suspension or colloidal system. In the above colloidal system, the clay particles form a dispersed phase or

discontinuous phase while the water forms dispersion medium or continuous phase.

***Colloidal solution may be of two types:**

1- Lyophilic (solvent loving)

2- Lyophobic (solvent hating

***Important properties of colloidal solution ***

1- Filterability: -

The colloidal particles are unable to pass through parchment membrane.

2- Adsorption and increased surface area: -

The colloidal particles have a tendency to attract

and retain at their surfaces other particles with which they come in contact. This is called as adsorption. The adsorption is increased if the surface area of the same mass of an adsorbent is also increased. In a colloidal solution the little mass of dispersed phase is present in the form of a large number of tiny particles thus increasing its total surface areas.

The adsorption and the large surface area offered by the colloidal particles help to carry on many complex biochemical reactions in the protoplasm.

3- Tyndall effect: -

If a strong beam of light is passed through a colloidal solution and viewed from the side, the path of the beam is illuminated by a bluish light cone. This phenomenon is called as faraday- tyndall phenomenon or tyndall effect and results due to the scattering or diffraction of light by the colloidal particles.

4- Brownian movement: - In a colloidal solution the suspended particles are in continuous and rapid zigzag motion called as Brownian movement.

5- Electric properties

6- Coagulation