

Unit 2. Absorption of water

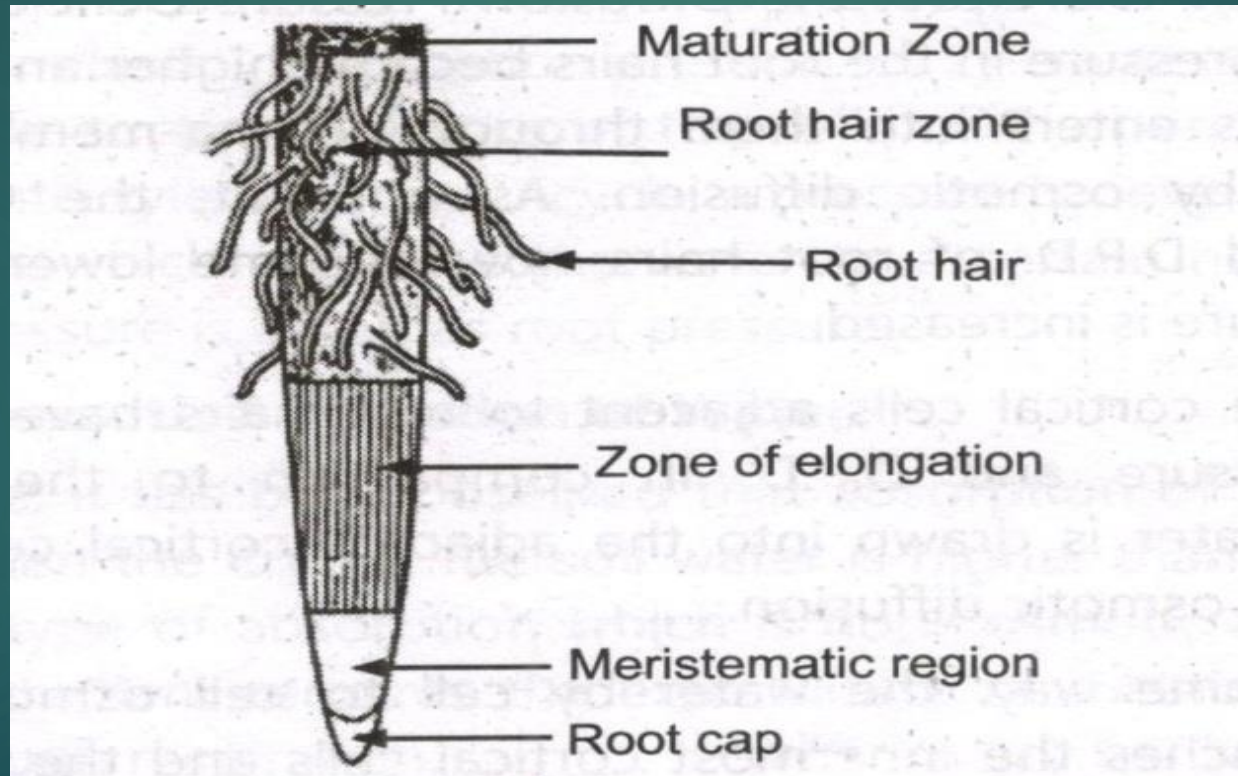
Role of water in plant

1. Role of water as a medium of fertilization in primitive plants
2. Role of water to keep root hairs and leaves in a stiff and rigid condition
3. Role of water in transporting minerals from the soil into roots
4. Role of water in transporting food materials in a plant
5. Role of water in metabolic activities of the cell
6. Role of water in opening and closing of stomata
7. Role of water in photosynthesis
8. Role of water in cooling the plant body
9. Role of water in germination of seeds

Mechanisms of water absorption

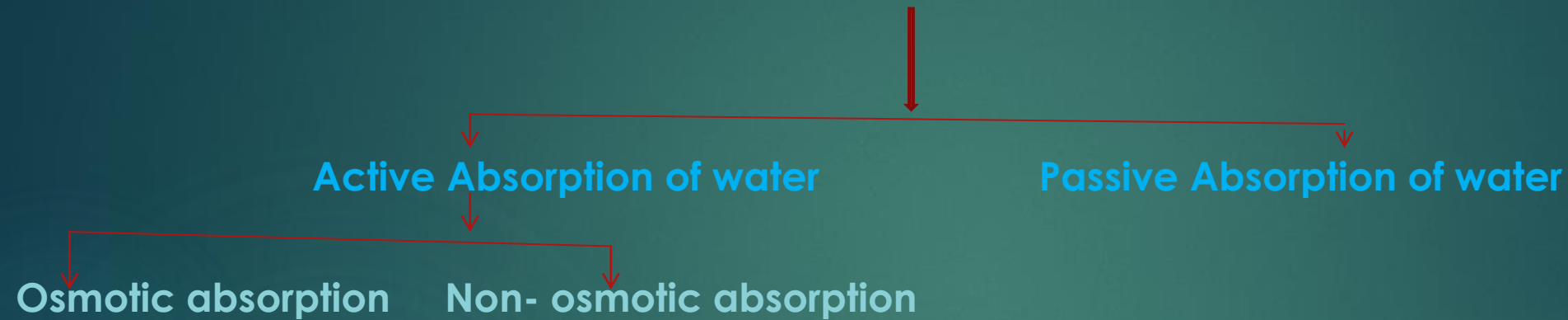
in higher plants water is absorbed through root hairs which are in contact with soil water and from a root hair zone a little behind the root tips.

The walls of root hairs are permeable and consist of pectic substances and cellulose which are strongly hydrophilic in nature. Root hairs contain vacuoles filled with cell sap.



Mechanisms of water absorption

Types

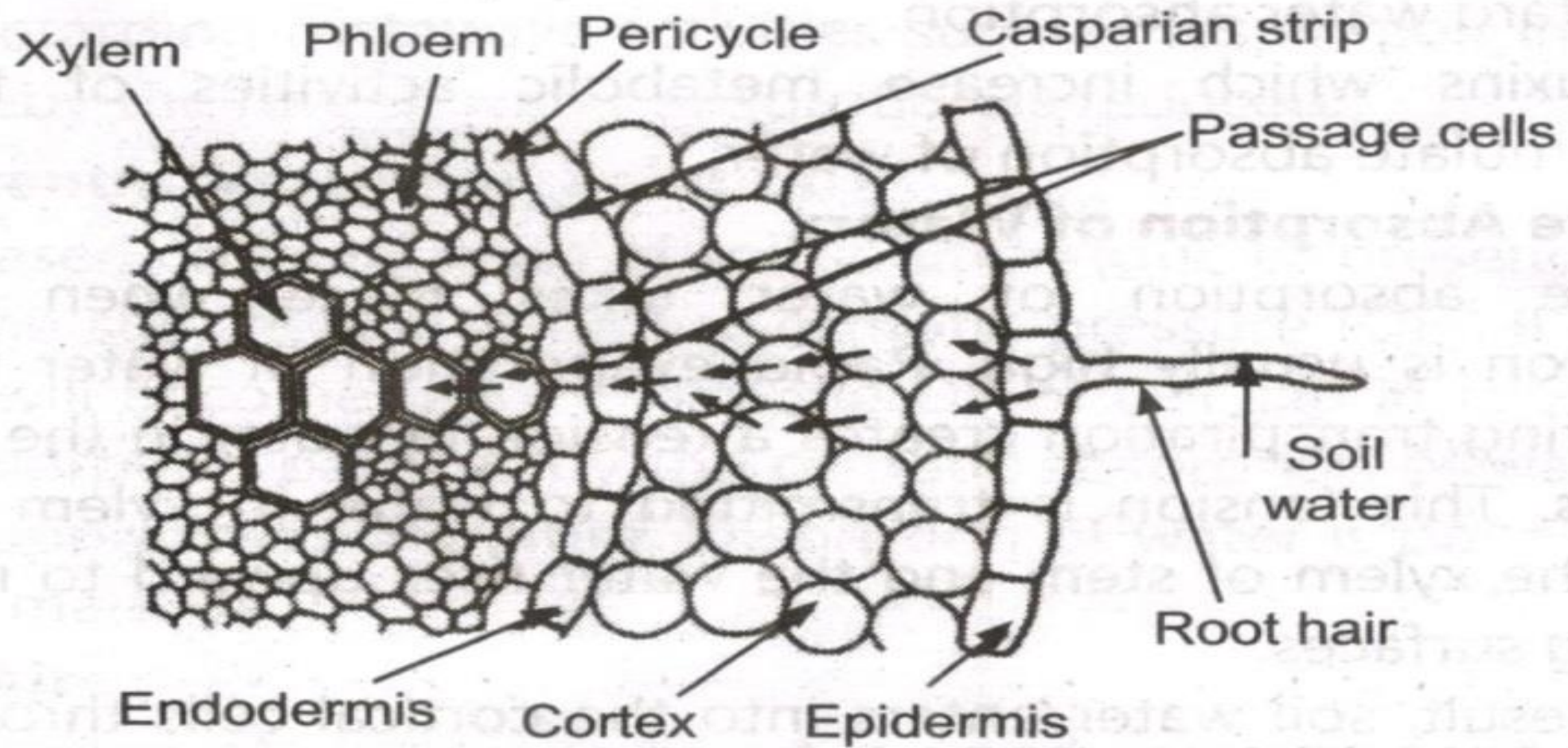


Active Absorption of water

Root cells play active role in the absorption of water and respiratory energy is consumed

1 Active osmotic absorption of water

- * The imbibition of soil water by hydrophilic cell wall of root hairs.
- * O.P. of cell-sap of root hairs is usually higher than soil water.
- * the D.P.D and S.P become higher and water from the cell walls enters in to them through P.M.



A part of T.S. of typical dicot root
(The arrows indicate the path of water)

2. Active Non-Osmotic Absorption of Water

Absorption of water takes place even when the O.P. of the soil water is higher than the O.P. of cell-sap. This type of absorption which is non-osmotic and against the osmotic gradient requires the expenditure of metabolic energy.

Support Points.

1. The factors which inhibit respiration also decrease water absorption.
2. Poisons which retard metabolic activities of the root cells also retard water absorption.
3. Auxins which increase metabolic activities of the cells stimulate absorption of water.

ii. Passive Absorption of water

Passive absorption of water takes place when rate of transpiration is usually high.

Rapid evaporation of water from the leaves during transpiration creates a tension in water in the xylem of the leaves. This tension is transmitted to water in xylem of roots through the xylem of stem and the water rises upward to reach the transpiring surfaces.

Soil water enters into the cortical cells through root hairs to reach the xylem of roots.

The roots cells remain passive during this process.

3.FACTORS AFFECTING OF WATER ABSORPTION

External Factors

- 1.Available soil water
- 2.concentration of solution
- 3.soil air
- 4.soil temperature

Internal Factors

- 1.Transpiration
- 2.Absorbing root systems
- 3.Metabolism

A close-up photograph of a field of bright yellow tulips. The flowers are in various stages of bloom, with some showing a slight red streak on their petals. The background is a clear, bright blue sky. The text "Thank You" is written in a bold, red, sans-serif font across the center of the image. A small red square is visible in the top right corner.

Thank You