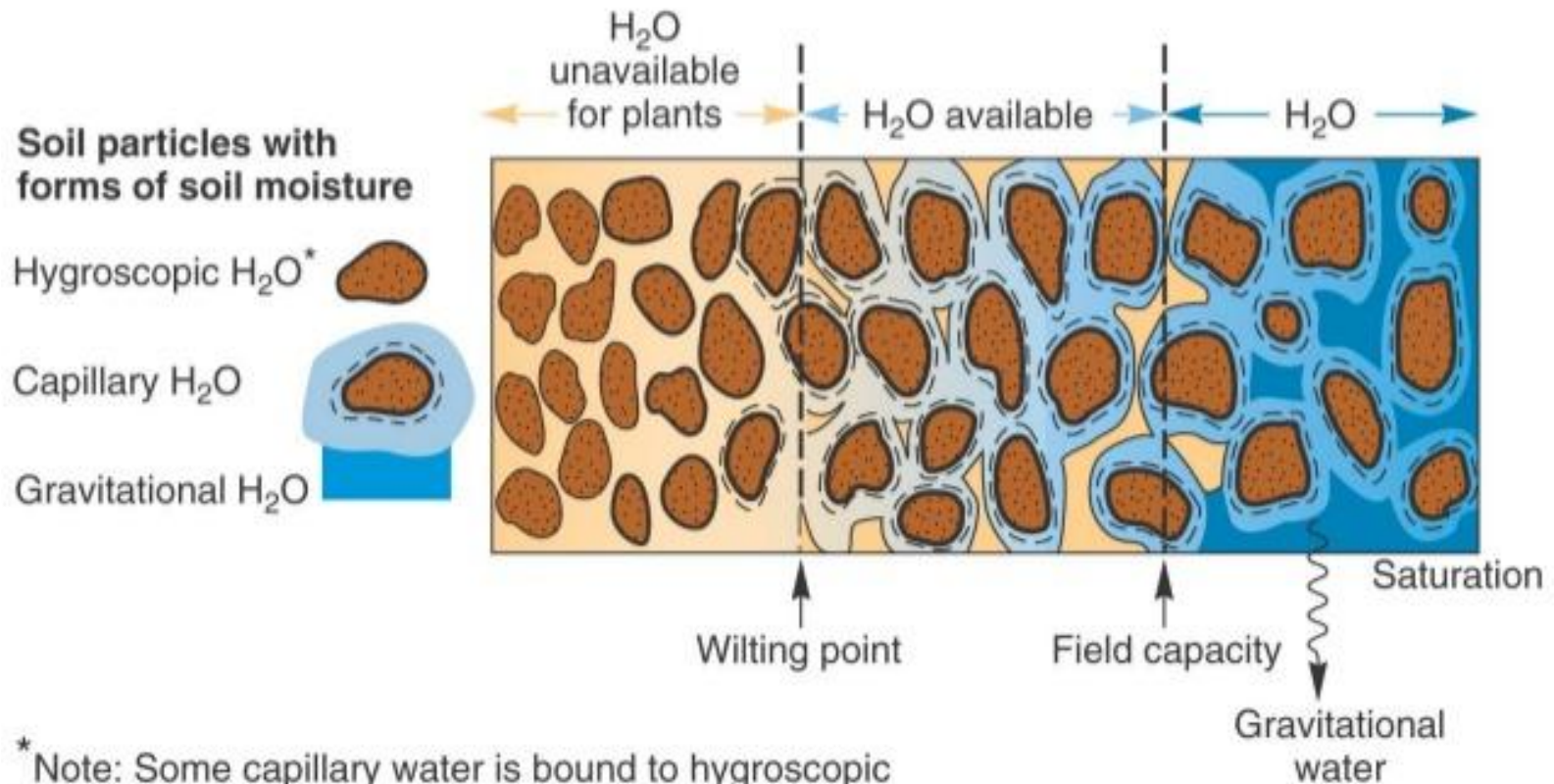


# The Role of Water in Plant Life

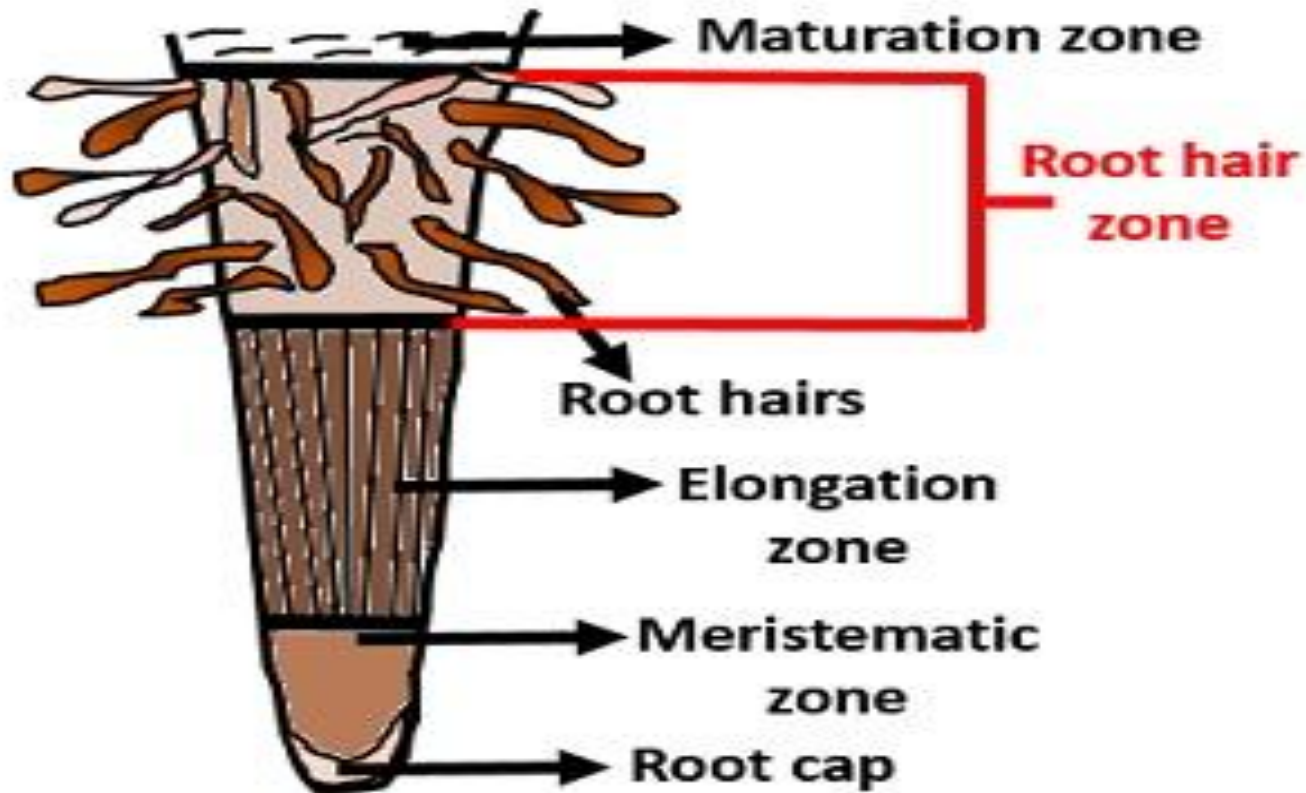
- **Soil** – the unconsolidated cover of the earth, made up of mineral and organic components, water and air and capable of supporting plant growth. Most important function: GROW PLANTS
- As a medium for plant growth, soil performs four functions:
  - Anchors roots
  - Supplies water
  - Provides air
  - Furnishes minerals for plant nutrition
- The pore space between the solids is taken up by water and air.
- Air takes up part of the pore space not occupied by water. As the water increases, the air content decreases.

# Types of Soil Moisture



\* Note: Some capillary water is bound to hygroscopic water on soil particles and is also unavailable.

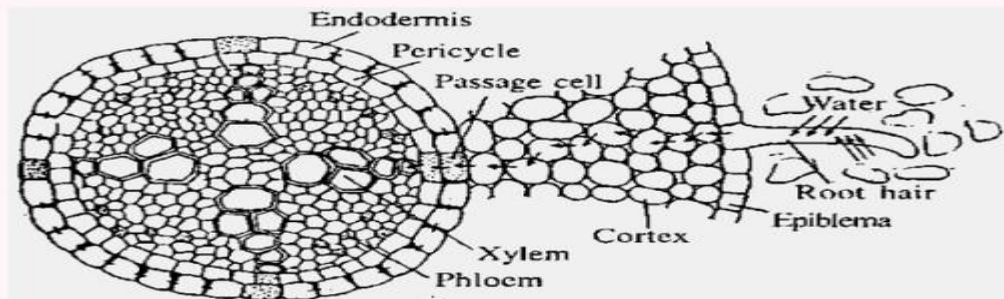
Figure 7.7



**DIAGRAM SHOWING ROOT HAIR ZONE: REGION OF WATER ABSORPTION**

In 1949, Kramer proposed that water is absorbed by two mechanisms. They are

- a) Active absorption
- b) Passive absorption



T.S. of a young dicot root showing lateral transfer of water from root hair to xylem elements across the living cells of cortex

**Active absorption:** When the roots absorb water by their own efforts, it is known as active absorption. It takes place when transpiration is low and the quantity of water in the soil is high. In this process the root cells play active role in the absorption of water.

**Passive absorption:** According to passive absorption, the root hair cells do not play any active role in the absorption of water. The root hair cells remain passive during absorption of water. It takes place, when rate of transpiration is usually high.

# Mechanism of water absorption in roots

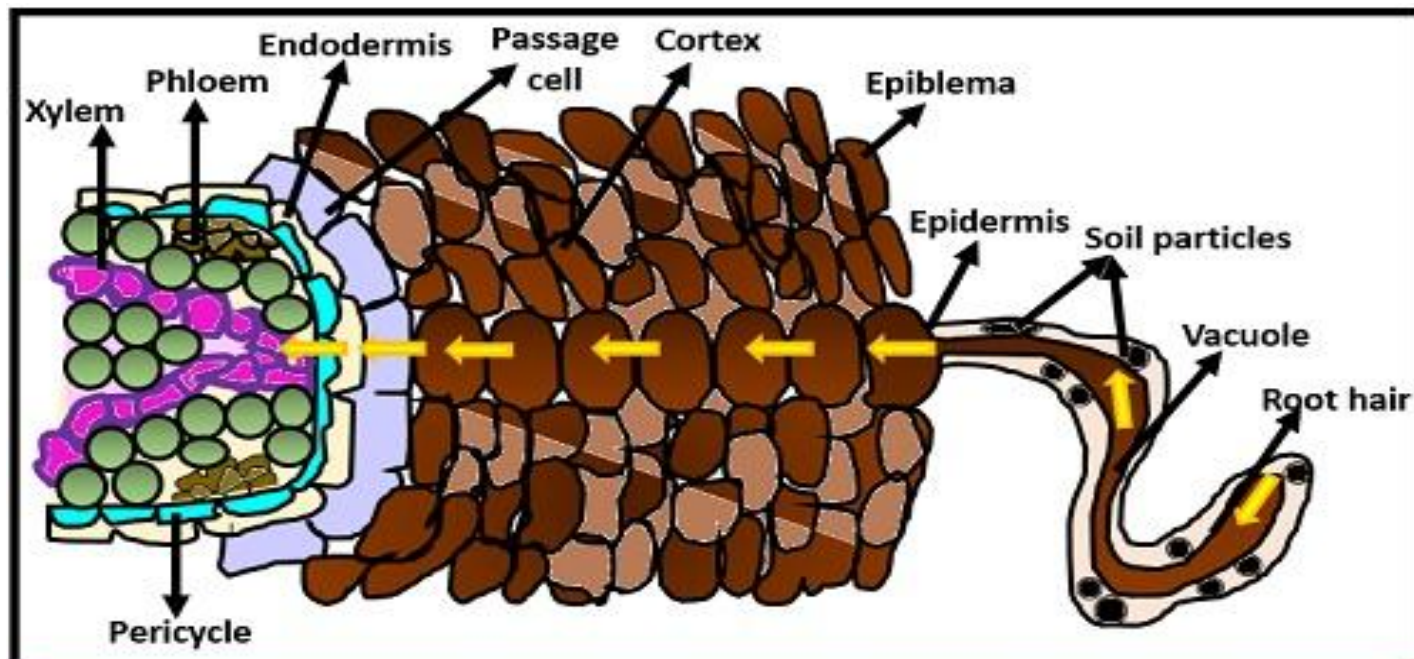
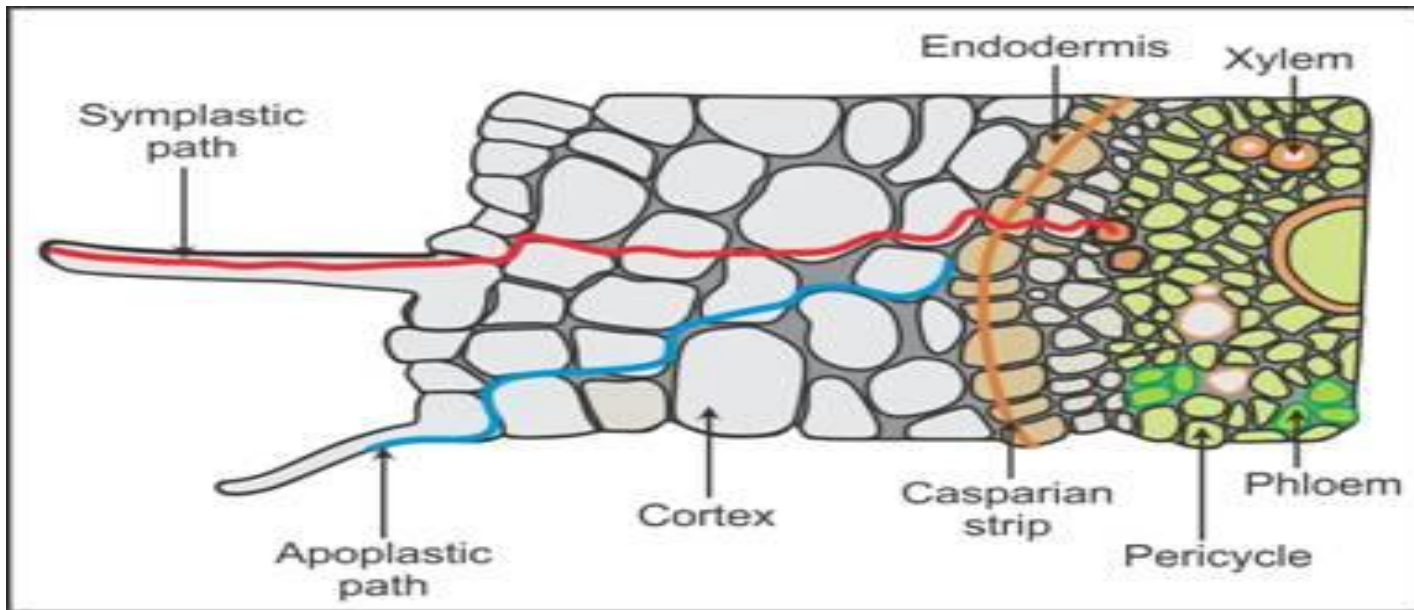
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graph TD; A[Mechanism of water absorption in roots] --> B[Active absorption]; A --> C[Passive absorption]; B --> B1[➤ In less higher transpiring plants]; B --> B2[➤ By the effort of root cells]; B --> B3[➤ Symplastic pathway of water movement]; C --> C1[➤ In higher transpiring plants]; C --> C2[➤ No role of root hairs]; C --> C3[➤ Apoplastic pathway of water movement];
```

## Active absorption

- In less higher transpiring plants
- By the effort of root cells
- Symplastic pathway of water movement

## Passive absorption

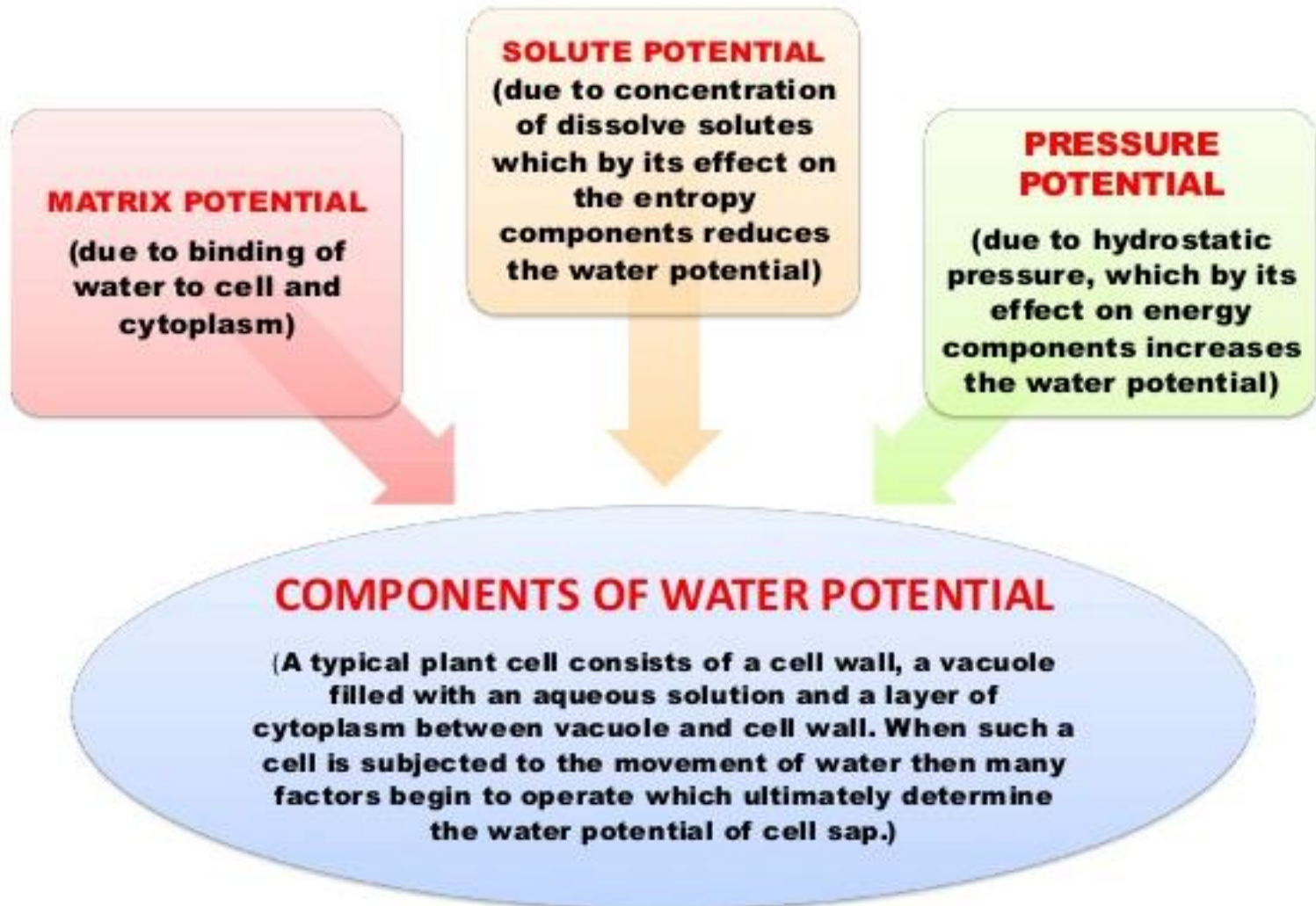
- In higher transpiring plants
- No role of root hairs
- Apoplastic pathway of water movement

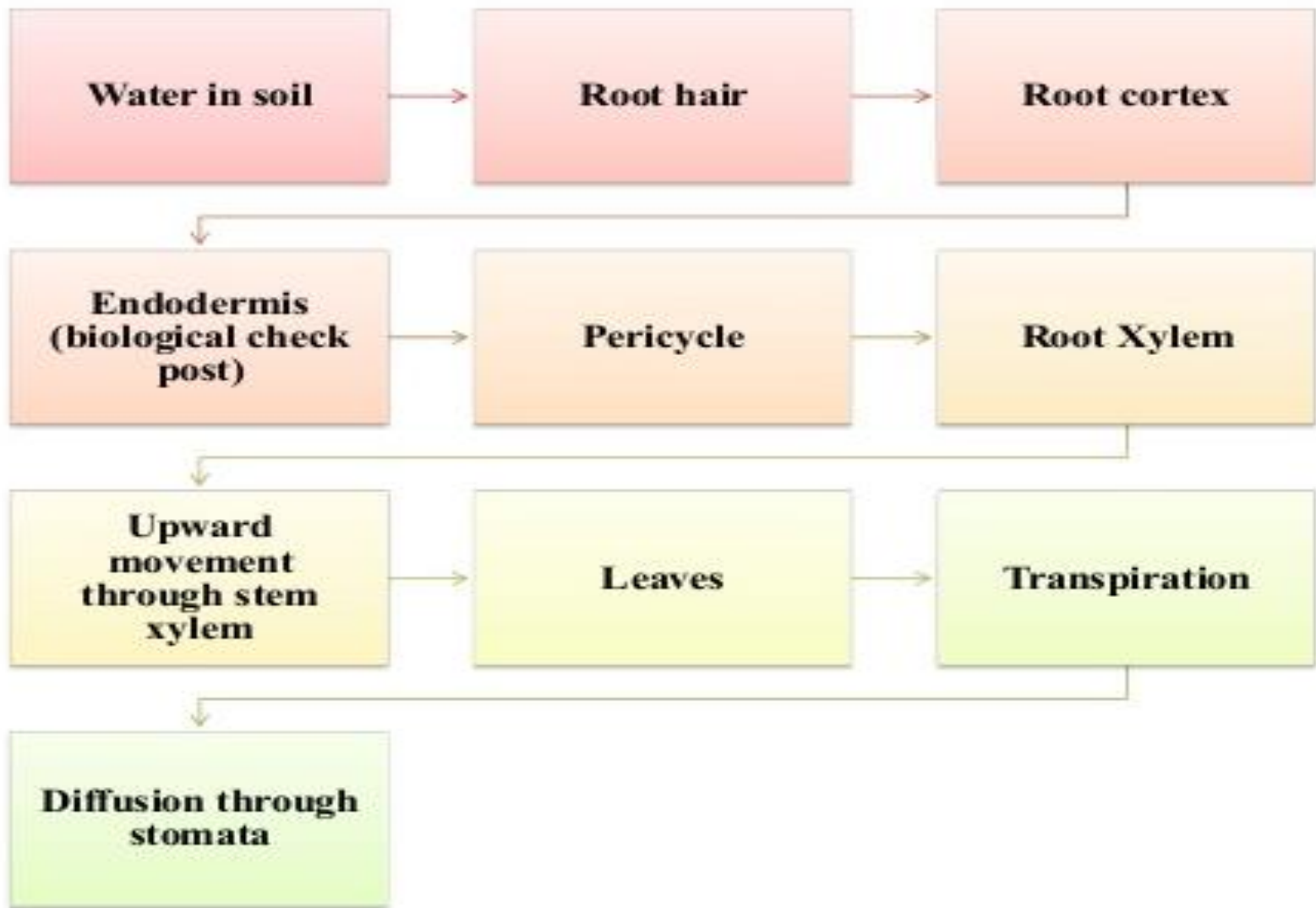


**MECHANISM OF WATER ABSORPTION IN PLANTS**

$$\Psi_w = \Psi_m + \Psi_s + \Psi_p$$

Where,  $\Psi_w$  is Water potential;  $\Psi_m$  is Matric potential;  
 $\Psi_s$  Solute potential and  $\Psi_p$  is Pressure potential







THANK YOU