

14.3 Pathway of Water Absorbed by Roots

Once the water enters the root hairs, the concentration of water molecules in the root hair cells become more than that of the cortex_ Thus water from the root hair moves to the cortical cells by osmosis and then reaches the xylem. From there the water is transported to the stem and leaves.

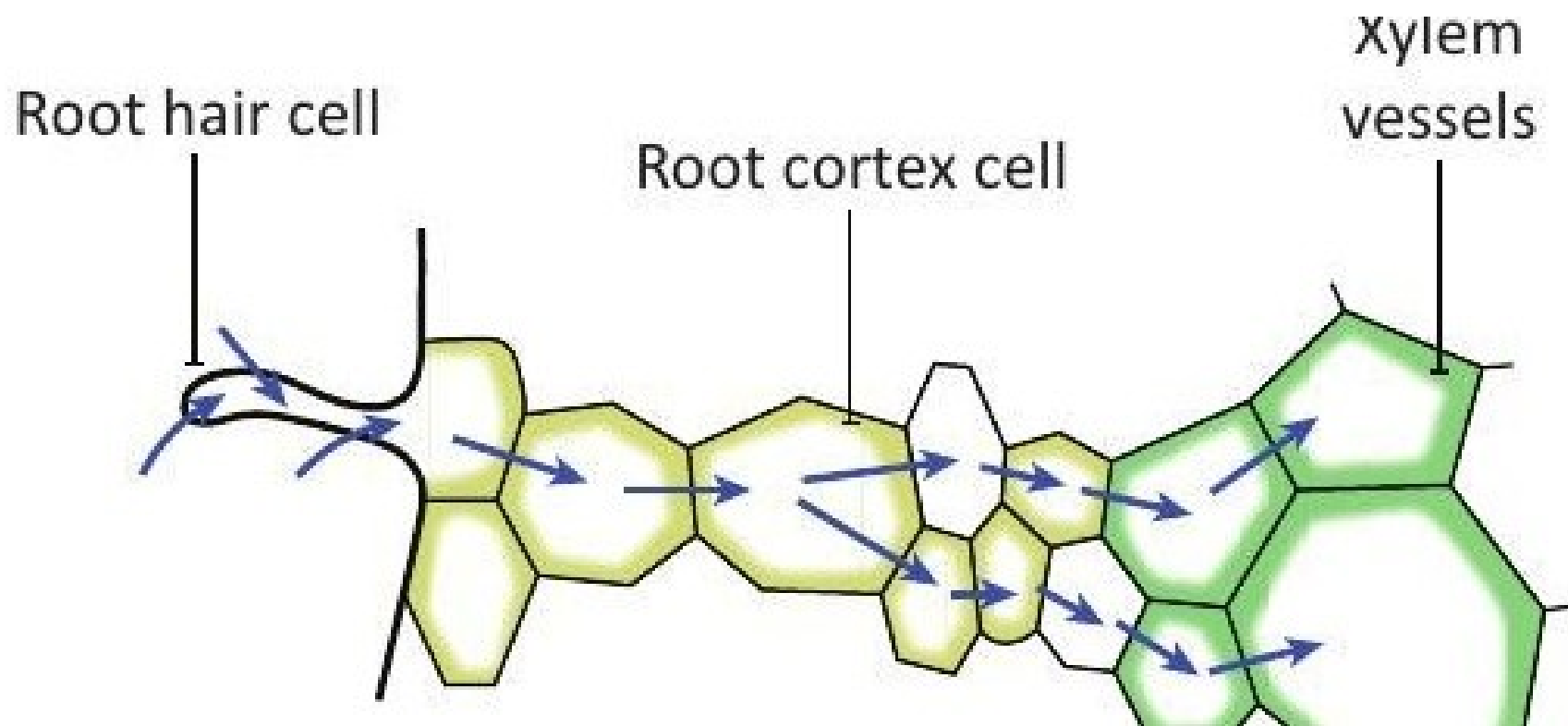


Figure 14.4 T § of the root showing movement of water from soil to xylem

14.4 Types of Movement of Water into the Root Cells

Once water is absorbed by the root hairs, it can move deeper into root layers by two distinct pathways:

Once water is absorbed by the root hairs,

Apoplast pathway Symplast pathway

14.4.1 Apoplast Pathway

The apoplastic movement of water occurs exclusively through the intercellular spaces and the walls of the cells. Apoplastic movement does not involve crossing the cell membrane. This movement is dependent on the gradient.

14.4.2 Symplast Pathway

In this method, water molecules move to the adjacent cells, through the plasma membrane, cytoplasm and plasmodesmata. This method of transport is slow as water moves through plasma membrane. It is in accordance to the concentration gradient.

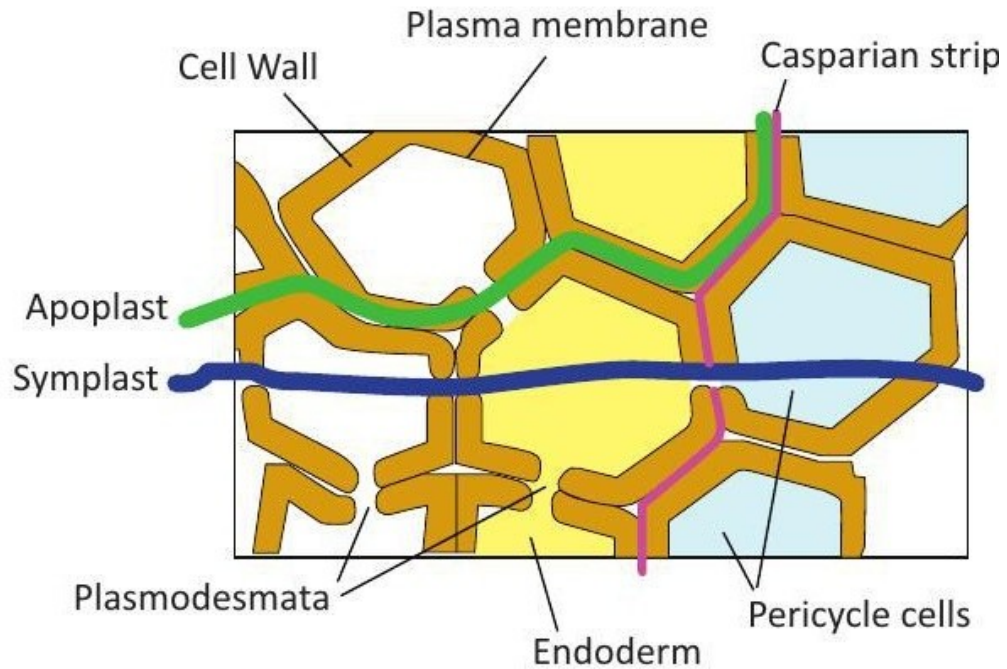


Figure 14.5 Symplastic and Apoplastic

Figure 14.5 Symplastic and Apoplastic pathways of Water

14.5 Transpiration

Transpiration is the evaporation of water from the aerial parts of the plant especially through stomata in leaves. Stomata are open in the day and closed at night. The opening and closing of the stomata is due to the change in turgidity of the guard cells. When water enters into the guard cells, they become turgid and the stoma open. When the guard cells lose water; it becomes flaccid and the stoma closes.

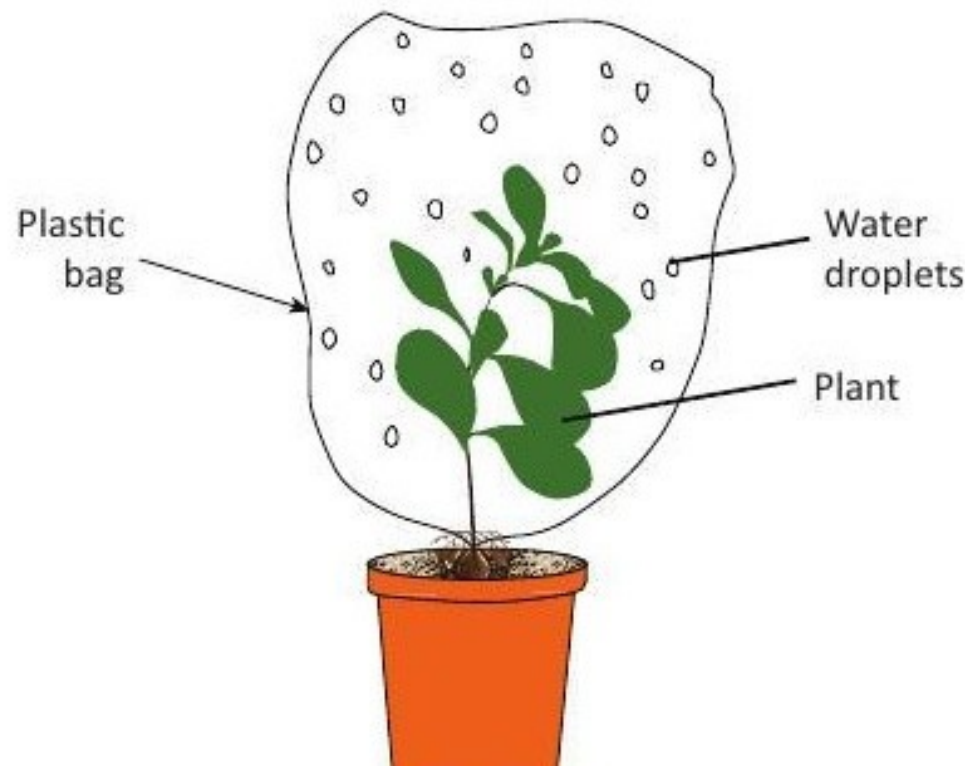


Figure. 14.6 Process of Transpiration

Water evaporates from mesophyll cells of leaves through the open stomata, this lowers water concentration in mesophyll cells. As a result; more water is drawn into these cells from the xylem present in the veins through the process of osmosis. As water is lost from the leaves, pressure is created at the top to pull more water from the xylem to the mesophyll cells, this process is called transpiration pull. This extends up to the roots causing the roots to absorb more water from the soil to ensure continuous flow of water from the roots to the leaves.