

# B.Sc. II Semester

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Unit II

**Dr. Madhulika Singh**

# Mineral Transport

**Different areas of root absorb different mineral ions**

**Nutrient availability influences root growth.**

**Mycorrhizal fungi facilitate nutrient uptake by roots. Nutrient move  
From mycorrhizal fungi to root cells.**

# Nutrient Movement in Soil

Within the soil, nutrient can move to the root surface by

## Bulk Flow

Nutrients are carried by water moving through the soil toward the root.

## Diffusion

Mineral nutrients move from a region of higher concentration to a region of lower concentration.

**Nutrients uptake by roots lowers the concentrations of nutrients at the root surface, generating concentration gradient in the soil solution surrounding the root.**

**Diffusion of nutrients down their concentration gradients along with bulk flow resulting from transpiration can increase nutrient availability at the root surface**

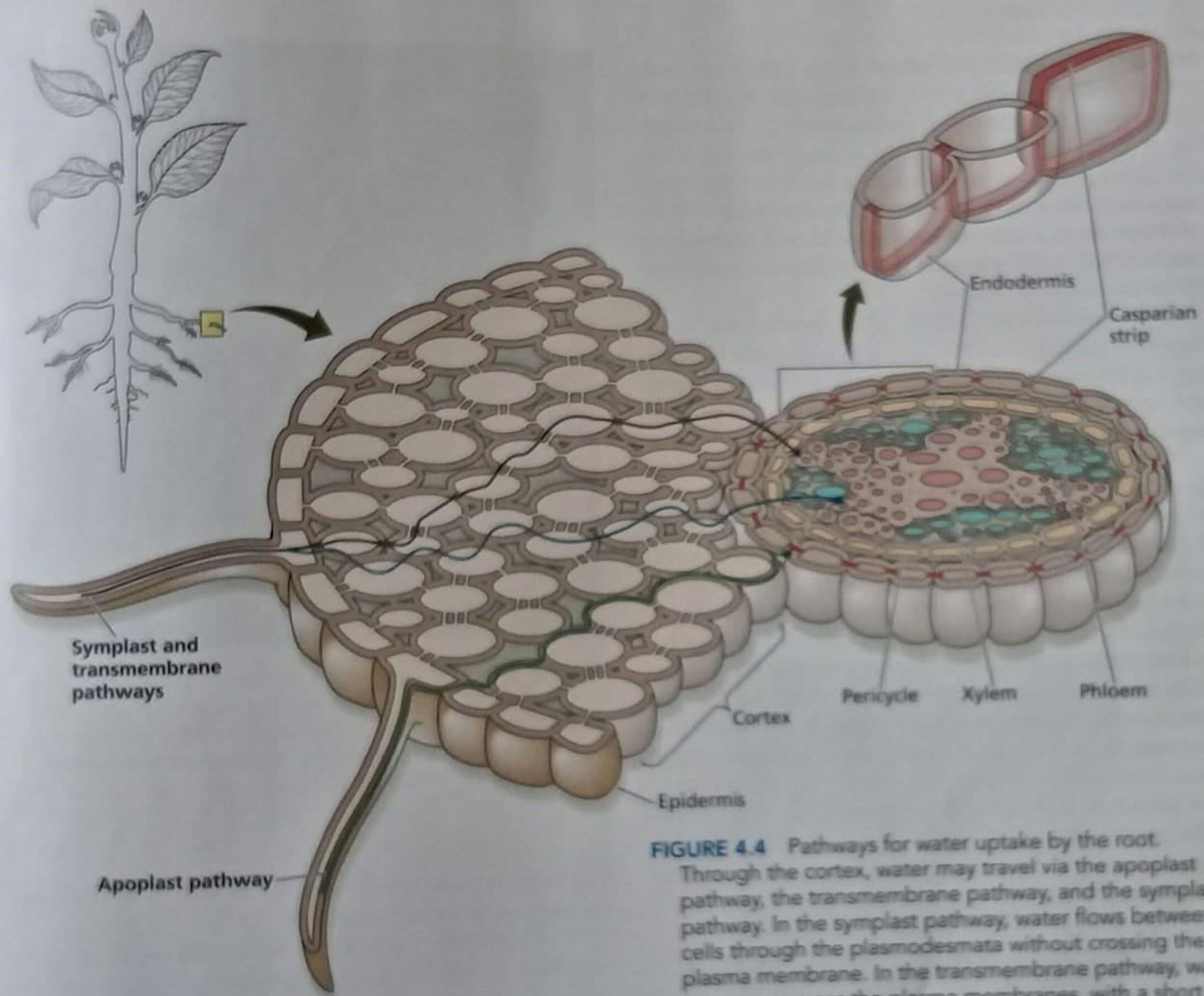
# Ion Transport in Roots

Mineral nutrients absorbed by the root are carried to the shoot by transpiration stream moving through the xylem.

Ion transport across the root obeys the same biophysical laws that govern the cellular transport.

Ions cross both symplast and apoplast.

Xylem parenchyma cells participate in xylem loading.

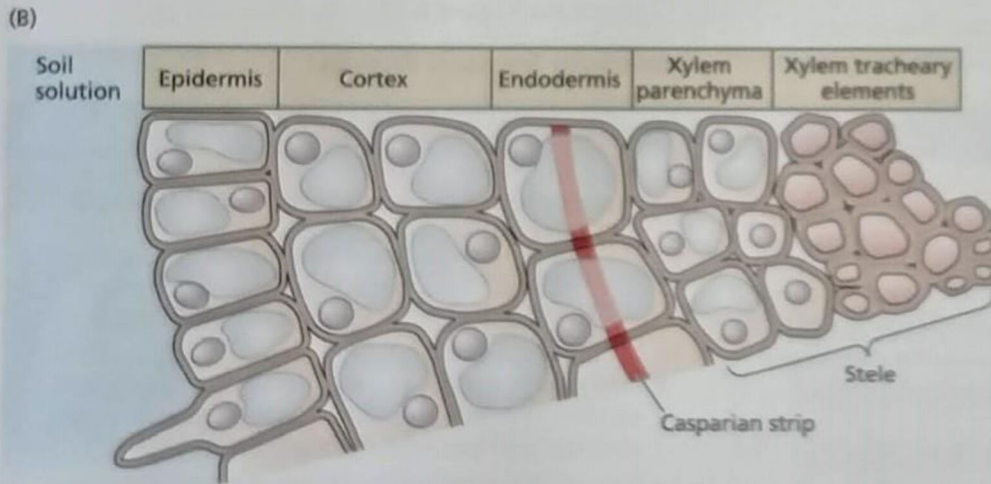


**FIGURE 4.4** Pathways for water uptake by the root. Through the cortex, water may travel via the apoplast pathway, the transmembrane pathway, and the symplast pathway. In the symplast pathway, water flows between cells through the plasmodesmata without crossing the plasma membrane. In the transmembrane pathway, water moves across the plasma membranes, with a short visit to the cell wall space. At the endodermis, the apoplast pathway is blocked by the Casparian strip.

Source: Plant Physiology by L. Taiz and E. Zeiger



**FIGURE 6.20** Tissue organization in roots. (A) Cross section through a root of carnation flower (genus *Smilax*), a monocot, showing the epidermis, cortex parenchyma, endodermis, xylem, and phloem. (B) Schematic diagram of a root cross section, illustrating the cell layers through which solutes pass from the soil solution to the xylem tracheary elements. (A  $\times 30$ , ©Biodisc/Visuals Unlimited/Alamy; B after Dunlop and Bowling 1971.)



Thanks and follow next lecture on Solute transport