

## Chapter 11

# TRANSPORT IN PLANTS

### Long distance transport of water:

Active and passive transport mechanisms are not alone useful for transport of water and minerals for the longer distance.

Sometimes the sites of production or adsorption and sites of storage are too far from each other so special long distance transport systems become necessary to move substance across long distances and at much faster rate.

Water, minerals and food are generally moved by mass flow or bulk flow.

Mass flow is the movement of substances in bulk or en masse from one point to another as a result of pressure difference.

Bulk flow can be achieved either through a positive hydrostatic pressure gradient (Garden hose) or negative hydrostatic pressure (Suction through straw).

The bulk movement of substances is called Translocation.

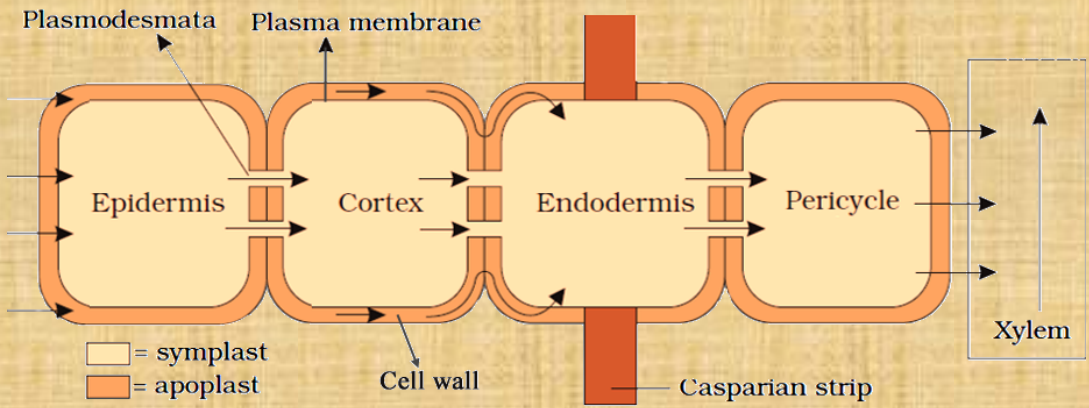
### How do plants adsorb water?

Water is absorbed along with mineral solutes by the root hairs purely by diffusion. Once water is absorbed by the root hairs, it can move deeper into root layers by two pathways.

1. Apoplastic pathway
2. Symplastic pathway

#### Apoplast:

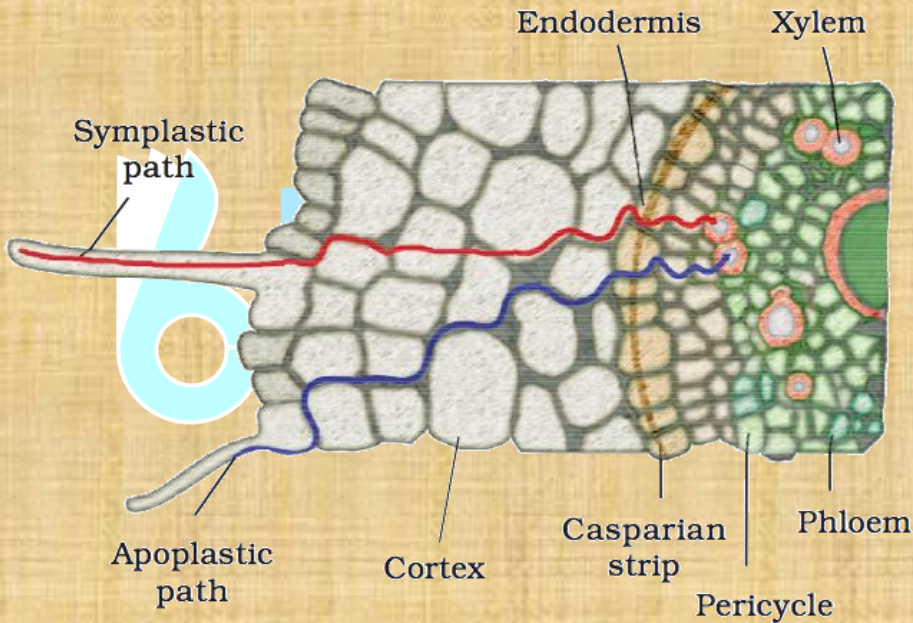
- Movements of water occurs through inter cellular space and walls of the cells.
- In Apoplast water does not cross cell membrane.
- This movement is based on gradient.
- Apoplast does not provide any barrier for water movement.



## Pathway of water movement in the root

### Symplastic path:

It occurs at endodermis because the radial and tangential walls of endodermis contain water. Impermeable suberin material in the form of casparian strips. Hence free movement will not occur.



**Fig.** Symplastic and apoplastic pathways of water and ion absorption and movement in roots

Here water needs to cross plasma membrane and need to pass through plasmodesmata and through cytoplasm, cytoplasmic streaming helps in this process.

Some plants have additional structures associated with them that help in water and mineral absorption mycorrhiza is a symbiotic association of roots of higher plants.