

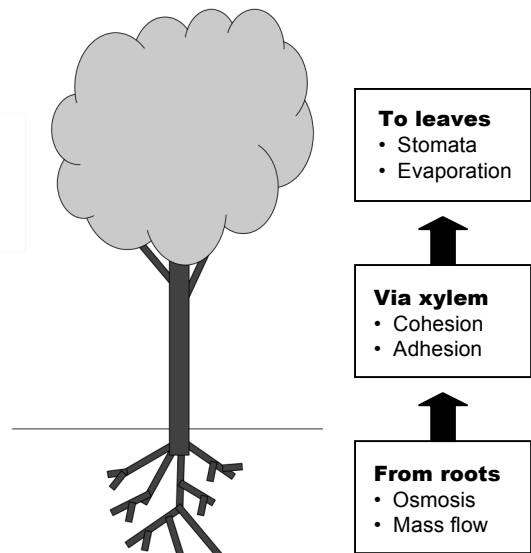
Transport in Angiospermophytes (9.2)

Structure and function of root systems (9.2.1 / 9.2.2 / 9.2.3)

- The primary function of a plant's root system is the uptake of mineral ions and water
- To increase its SA:Vol ratio, roots will be branched and also contain tiny root hairs
- There are four main ways mineral ions move into the root:
 - **Diffusion:** Minerals may move down a concentration gradient passively to enter the root
 - **Fungal hyphae:** Mutualistic fungi may exchange absorbed minerals for plant sugars
 - **Mass flow:** Absorbing water creates a negative pressure which draws water (and dissolved minerals)
 - **Active Transport:** Root cells pump out protons (H^+) which displace cations attached to negatively charged clay particles, allowing them to diffuse into the root, while anions are reabsorbed with the protons

Transpiration (9.2.5 / 9.2.6 / 9.2.7 / 9.2.8)

- Transpiration is the loss of water vapour from the leaves and stems of plants
- Evaporated water is lost through stomata and creates a negative pressure in leaves
- Water is drawn from the roots and to the leaves through the xylem via mass flow
- Xylem contains an perforated inner layer of dead cells (vessel elements) which allow water to move freely up the plant in a transpiration stream
- Water can move against gravity due to cohesion (stick together) and adhesion(stick to xylem wall)
- The rate of transpiration is regulated by abscisic acid (ABA) which regulates the opening and closing of guard cells which flank stomata



Factors affecting transpiration (9.2.9)

- Light:** Warms leaf, causes stomata to open
- Temperature:** Increases evaporation
- Wind:** Removes water vapor from leaf
- Humidity:** Increases water vapor at leaf

Plant adaptations (9.2.4)

- Terrestrial plants are supported with:
- Thickened cellulose
 - Cell turgor
 - Lignified xylem

Adaptations of xerophytes (9.2.10)

- Reduced leaves:** May be rolled or spines
- Thick cuticle:** Prevents water loss
- Less stomata:** May be in pits with hairs
- Low growth:** Less exposed to wind
- Alternative photosynthesis:** C4 / CAM

Translocation of sugars (9.2.11)

