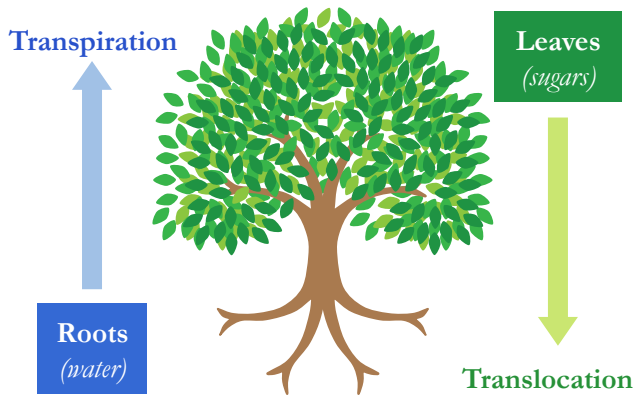


TOPIC 9.1: PLANT STRUCTURE

Structure-Function Relationship

The structure of a plant is related to its various functions:

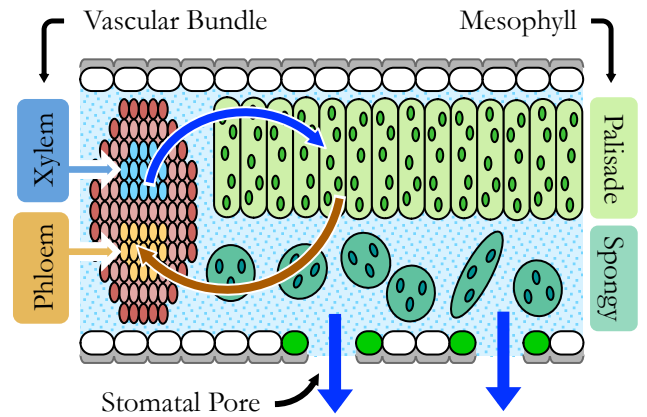
- Leaves contain chloroplasts and stomatal pores (for *photosynthesis and gas exchange respectively*)
- Roots are highly branched, with a high SA:Vol ratio (necessary for *water and mineral uptake*)
- Stems transfer essential materials in vascular bundles (transpiration of *water and translocation of nutrients*)



Leaf Tissue

A leaf possesses two layers of inner tissue:

- **Palisade mesophyll** – upper layer of tightly packed cells that are rich in chloroplasts (↑ light absorption)
- **Spongy mesophyll** – lower layer of cells interspersed by space and located near the stomata (↑ gas exchange)



Root Tissue

Root systems display extensive branching in order to maximise the available surface area for material uptake

- Fibrous (adventitious) root systems contain many branching roots that are thin and very spread out
- Tap root systems have a deeply penetrating central root (for stability) with many connected lateral branches

The root epidermis additionally may have many small extensions called root hairs (to further increase available surface area)

Vascular Bundles

In vascular plants, the vessels of xylem and phloem are arranged into bundles that extend from the roots to the shoots

- The organisation of these vascular bundles differ according to the plant section (*root vs stem*) and plant type (*monocot vs dicot*)

Roots

- Vascular bundles are *radially* arranged within a *big* stele in monocots, but are *centrally* arranged within a *small* stele in dicots

Stems

- Vascular bundles are *scattered* haphazardly in monocots, but form a *ring* around a circular cambium in dicots

