

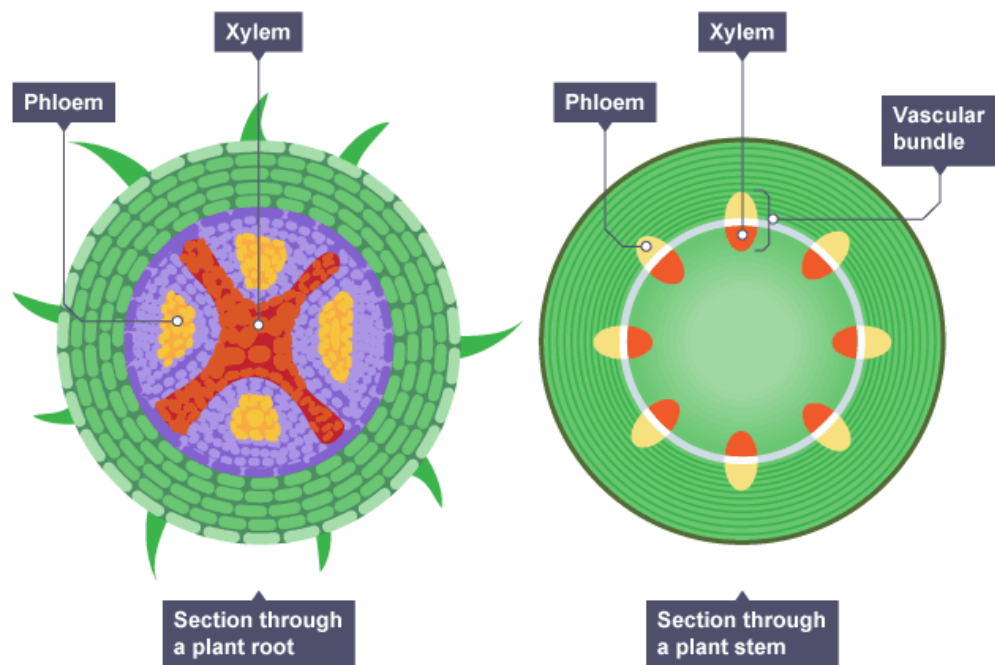
Knowledge Organiser: Plant Transport

How do substances move through a plant?

The main roles of plant **stems and roots** are to transport substances around. They have two types of transport systems - **xylem** and **phloem**. Xylem transports water and minerals. Phloem transports sugars and amino acids dissolved in water.

These are distributed differently in roots and stems. In the root, the xylem forms a central column. It forms a solid support. The phloem is towards the centre, outside the xylem.

In the stem, the transport tissues of the xylem and phloem are grouped into vascular bundles.

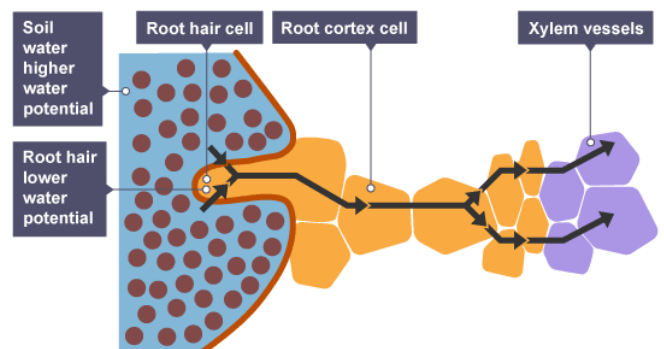


Transport of Water

The root hairs are where **most water absorption happens**.

Water passes from the soil water to the root hair cell's cytoplasm by **osmosis**. This happens because the soil water has a **higher water potential** than the root hair cell cytoplasm.

Osmosis is the movement of water molecules across a selectively permeable membrane (root cell membrane) from a region of higher water concentration to a region of lower water concentration.



Water then moves through the **xylem vessels** in a continuous **transpiration stream**:

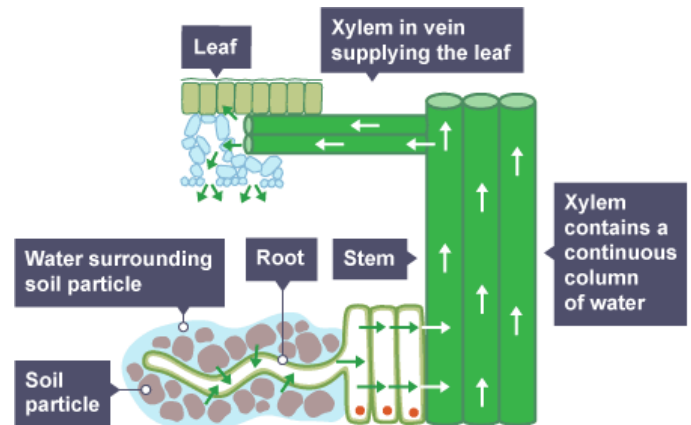
root → stem → leaf

As water travels through the xylem in the stem and leaf, it is being replaced by water taken up by the roots.

Once water reaches the leaf, only five per cent of the water taken up by the plant is used for **photosynthesis**.

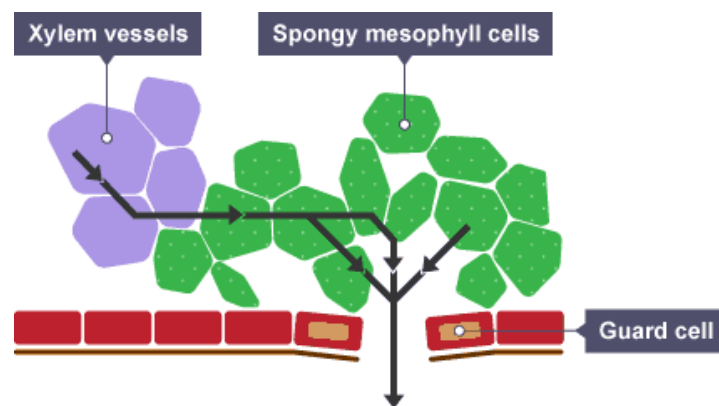
The remaining water is used to:

- transports mineral ions (from the soil).
- cool the leaf as water evaporates
- provide water that keeps the cells turgid.



Transpiration

Transpiration is the **loss of water** from leaves by evaporation through the stomata.



Transport of Glucose

Plants produce their own food (glucose) by a process known as **photosynthesis**. The word equation for photosynthesis is:



Photosynthesis takes place in the **chloroplasts** of a cell. Chloroplasts contain a green pigment called **chlorophyll**. Chlorophyll absorbs light which is needed for photosynthesis to take place.

Most photosynthesis takes place in the **palisade mesophyll layer** of a leaf as the palisade cells contain many chloroplasts.

Some of the glucose produced by photosynthesis is used for **respiration**. This releases energy for the **seven life processes**.

The glucose not used for respiration is used in the following ways (see diagram).

Translocation is the movement of glucose produced in photosynthesis to all other parts of the plant for respiration and the other processes described in the diagram. This occurs in **phloem vessels**.

Transport in the phloem takes place both **up and down the stem** - in contrast to transport in the xylem, which is just upwards.

