Plants and photosynthesis

Photosynthesis

This is a **chemical reaction** and so can be written as a **word equation**:

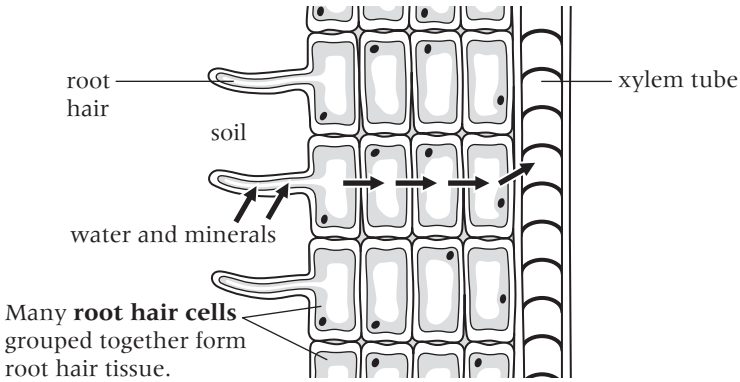
water + carbon dioxide (+ light energy) → glucose + oxygen

reactants (light is not a substance and so is not a reactant) products

Light energy and **chlorophyll** are needed for photosynthesis to happen. The light energy is changed into chemical energy which is stored in the glucose that is made.

Getting the water

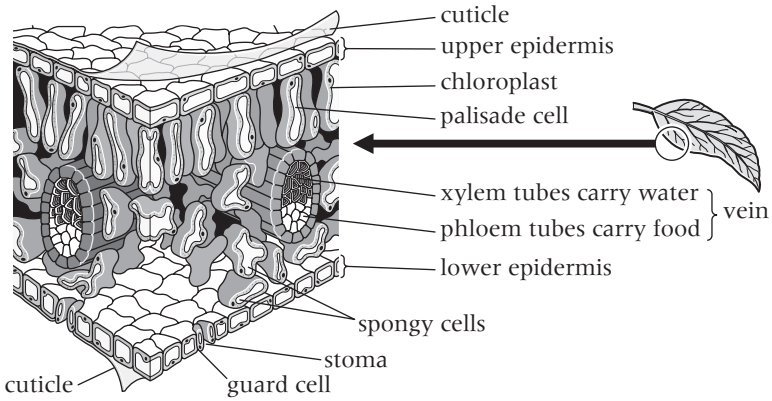
Water is taken out of the soil by the roots. Roots are branched and spread out to help them **absorb** water from a large volume of soil. They also have **root hair cells** which are **adapted** to their **function** – they have a large surface area to help them absorb water quickly. The water flows up **xylem tubes** (made of hollow cells) to the leaf.



Water is also needed because **mineral salts are** dissolved in it, which are needed to keep plants healthy. Water also stops plants wilting and can keep their leaves cool.

Getting the carbon dioxide

Air, containing carbon dioxide, **diffuses** into leaves through small holes called **stomata**. Leaves are thin so that the carbon dioxide does not need to go very far before reaching the cells that need it. Photosynthesis can often be speeded up by increasing the amount of carbon dioxide around a plant.



Getting the light

Many leaves are wide so that they have a big surface area to trap as much sunlight as possible. Most photosynthesis happens in the **palisade cells** which are found near the upper surface of leaves. Palisade cells are packed with **chloroplasts**. Chloroplasts contain **chlorophyll** which absorbs light energy. Photosynthesis can often be speeded up by increasing the amount of light.

Respiration

Plant cells release the energy stored in glucose using **aerobic respiration** (another chemical reaction):

glucose + **oxygen** ⟶ **carbon dioxide** + **water** (+ **energy**)

All living cells need energy and so all living cells respire. Respiration happens all the time but photosynthesis can only happen when there is light.

Uses of glucose

Glucose is a type of sugar. It is used for three things:

- respiration
- making other substances that act as stores of energy (eg starch)
- making new materials for growth.

Glucose is turned into cellulose (for cell walls), fats and proteins. To make proteins, mineral salts called **nitrates** are needed.

New substances made by a plant are carried around the plant in **phloem tubes**. New substances help to build up a plant's **biomass** (the mass of all the materials in the plant except water).