The science of plants

Key stage 2

Open Futures Resources
Raising attainment through bringing learning to life
More resources at www.openfutures.com

Royal Horticultural Society

growit

Science topics

Do plants need to eat, drink and breathe to grow?

Eating

Plants are unable to move to find food so they have developed a specialised system of creating their own food from sunlight, called **photosynthesis**.

Breathing

Plants take in oxygen from the soil and surrounding air, and the leaves take in carbon dioxide for photosynthesis. This is breathing but without lungs.

fact! Plants make a very large contribution to the Oxygen we breathe every day – if it wasn't for them we would all suffocate !

Drinking

Plant roots take up water from the soil which is a sort of drinking. In the water are also dissolved chemicals which the plant requires for growth but is unable to make itself. The plant has a circulatory system which carries water from the roots to all the other parts of the plant.

Why are plants green?

Sunlight is made up of a spectrum of colours – think of a rainbow.

Leaves appear green to us because as sunlight hits the leaves the red light and blue light are absorbed from the spectrum, reflecting the green.

What is chlorophyll?

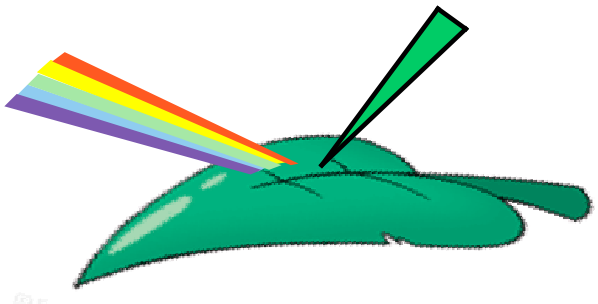
Chlorophyll is a chemical in the leaves which traps the red and blue light energy from sunlight and converts it into food (sugars and starches) for the plant to use to grow. This is the reverse of us – we take in food and break it down into energy.

This process of converting light energy into food is called **photosynthesis**.

For photosynthesis to take place the plant needs sunlight, air and water. Air is made up of different gases including **oxygen** and **carbon dioxide**. During photosynthesis the plant uses up carbon dioxide and releases oxygen into the atmosphere.

Sunlight + carbon dioxide + water + chlorophyll = food + oxygen

The food made by the plant is transported to the roots and other areas using a vascular system (have you seen veins in leaves?). Any water and minerals absorbed by the roots also travel around the plant in this system.



What else does the plant need to grow?

Warmth - Plants are sensitive to the temperature around them. If it is too cold some plants die and never grow back (annuals), others lose their leaves and appear to die but once the spring arrives they begin growing again (perennials and bulbs). If it is too hot plants can also die if they do not have sufficient water.

Growth media - Plants need a growth medium to anchor their roots. The growth medium also provides the minerals and water the plant requires.

The growth medium doesn't always have to be soil, alternatives are perlite or vermiculite. These are naturally occurring rocky materials which when heated expand and 'pop' like popcorn to look a bit like gravel; plants can be grown in these media if sufficient water and nutrients are provided.

Further work

Grow plants with different environmental factors missing and record how this affects growth. See KS1 resources for basic experiments on light, water and movement & plant experiments resources for more detailed investigations.

Can you see a plant breathing?

It is very difficult to prove that a plant is taking in air. You can however carry out an experiment to show that the plant releases air (breathes out) from the underside of its leaves, thus it must be breathing in air somewhere.

In early summer take a few large green leaves and place upside down in a tray of water (you may need to weight them down), leave the tray in a sunny place for about 30 minutes where you can view it without moving the tray. Check on the leaves. Can you see any bubbles on the leaf surface? If you can then this is the plant releasing oxygen into the environment. As a further experiment you could coat the underside of one of the leaves with Vaseline and see if this affects the number of bubbles seen.

How do plants move water from the roots to the rest of the plant?

We all know that the plant roots are very important for sucking up water and nutrients from the soil but can we show that this water is transported around the plant using a system of veins similar to ours? You can use either carnations or celery for this experiment but you can only see the veins with celery.

Coloured Celery Veins - Place a stalk of celery in a glass of water that has been coloured with food colouring. Leave for an hour. If you look at the cut end of the celery you will see how the coloured liquid has entered the veins (xylem). If you measure and slice the celery further up the stalk you can work out how far the liquid has travelled.

Coloured Carnations - Place a white carnation in a glass of coloured water. Leave overnight. When you return the flower should have started to change colour as the dye has travelled up through the carnation stem into the flower petals.

Do plants need soil to grow?

You can germinate seeds using pots of different growth media to prove that soil is not always necessary for a plant to grow. Suitable growth media include sand, cotton wool, gravel, soil etc. As an extension to this experiment you could grow the germinated seeds for a month and observe their eventual growth in this time, does one growth medium produce better plants?