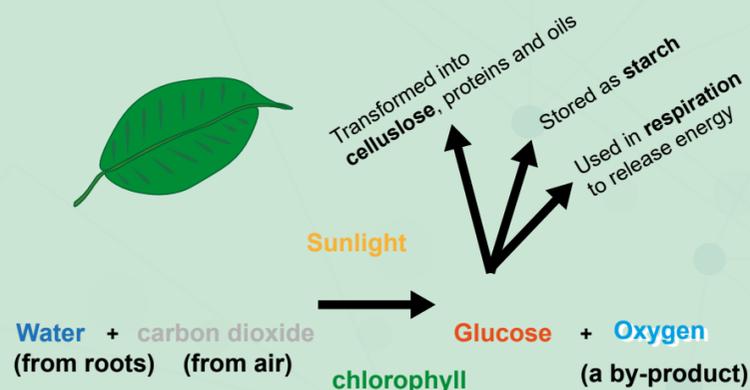


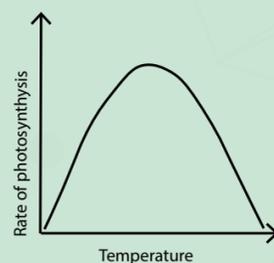
**Photosynthesis** - A series of enzyme-controlled reactions in plant cells. Chlorophyll absorbs light energy for the reaction. The leaf is the organ of photosynthesis.



### Factors affecting photosynthesis- Limiting factors

#### Temperature-

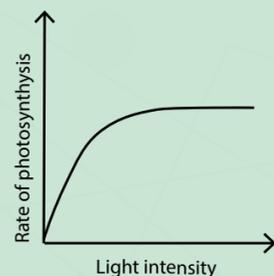
Rate of photosynthesis is usually measured by recording the volume of oxygen produced.



As photosynthesis is controlled by enzymes as the temperature increases the rate of photosynthesis increases to an optimum then decreases.

#### Light intensity-

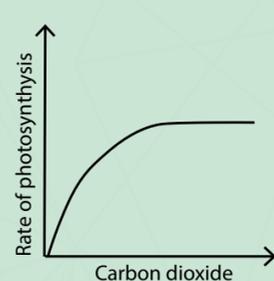
Usually investigated by moving a plant closer to a light source and recording the O<sub>2</sub> produced.



As light intensity in-creases so does the rate of photosynthesis until lack of another factor e.g. CO<sub>2</sub> limits any further increase.

#### Carbon dioxide -

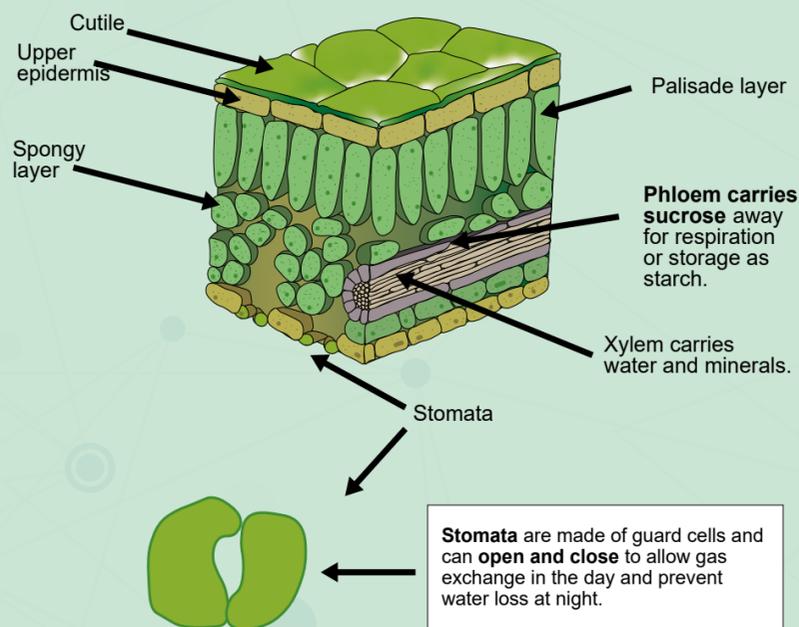
When investigating the effect of CO<sub>2</sub> on photosynthesis scientists enclose the leaf in a transparent bag/ jar with **sodium hydroxide, this chemical absorbs CO<sub>2</sub>.**



As CO<sub>2</sub> increases the rate of photosynthesis increases until another factor limits the increases e.g. light intensity.



### The leaf



**Minerals** - plants need certain minerals for healthy growth. A deficiency of certain mineral cause specific growth problems.

Deficient mineral	Growth problem
Nitrates	Poor growth
Potassium	Yellowing of leaf
Phosphates	Poor root growth

The three minerals are found in **NPK fertilisers**.

### Genetic modification

Genetic modification allows genetic material from one organism to be transferred into the DNA of another organism.

**Advantages:** Genes for **disease resistance** can be transferred to crop plants to **increase yield**.

Herbicide resistant genes can also increase yield as herbicides can be used to kill competing plants (weeds).

**Disadvantages:** Creation of super weeds if the herbicide resistance genes are taken up by weed species.

**Unknown long-term effects** of modifying genomes.

### Intensive farming

The increasing population means farming has changed to increase the yields of crops and meat produced.

This is done by:

- Using fertilisers and pesticides
- Battery farming
- Disease control

The disadvantages of these methods include:

- Excess use of antibiotics in farm animals for disease control could increase bacterial resistance and still be present in meat we eat.
- Battery methods show poor animal welfare and the duty of care to treat animals humanely.

### Organic farming

- Does not use artificial chemicals (fertilisers, pesticides etc.)
- Uses crop rotation
- Uses animal and plant manures
- Uses hand weeding and biological pest control.

### Hydroponics - Higher Tier

Hydroponics is a method of growing plants in which the soil has been replaced with a mineral solution that is pumped around the plant roots.

### Selective breeding

(sometimes called artificial selection) involves selecting the plants with desirable traits, crossing them, selecting from their offspring and repeating the process over several generations.

**Advantages of selective breeding:**

- Crops give better yields.
- Resistance to pests and diseases.
- Crops may be bred to have more nutritional value.
- Harmful traits can be bred out.

**Disadvantages of selective breeding:**

- Selective breeding can cause genetic variation to decrease. This may mean one disease will affect many crops.
- Some genes would be lost, making it more difficult to produce new varieties in the future.
- There is an increased risk of genetic disease.