Friday 18th February 2022

The Rate of Photosynthesis

Limiting Factors of Photosynthesis

Plants need warmth, light, and carbon dioxide to photosynthesis. However, if there is a small amount of one or more of these, then the amount a plant can photosynthesis is limited. These are called limiting factors.

Light

Light is the most obvious factor affecting an organism’s rate of photosynthesis. If there is plenty of light, lots of photosynthesis can take place. However if there is little of no light, no photosynthesis can take place, no matter the other conditions around the plant. For most plants, the higher the light intensity, the faster the rate of photosynthesis.

Graphical user interface

Description automatically generated with low confidence

Temperature

Temperature affects all chemical reactions, not just photosynthesis. As the temperature rises, the rate of photosynthesis increases, as the reaction speeds up. However, the rate of photosynthesis will fall dramatically when the temperature reaches around 40-50°C. This is because photosynthesis is a reaction controlled by enzymes. When the temperature becomes too high, the enzymes become denatured, stopping the reaction.

Chart, line chart

Description automatically generated

Carbon Dioxide Concentration

Plants need carbon dioxide to photosynthesise. However, the atmosphere is only about 0.04% carbon dioxide. This means the carbon dioxide concentration is often the main limiting factor for photosynthesis on a sunny day. As the carbon dioxide concentration increases, the rate of photosynthesis increases.

Graphical user interface

Description automatically generated

Chlorophyll levels in the leaf

If the amount of chlorophyll in a leaf is limited, less photosynthesis will take place. For example, the leaves of some decorative plants will have white areas which are free from chlorophyll. If a plant does not have enough minerals, especially magnesium, the plant cannot produce chlorophyll, causing it to eventually die.