3. LIGHT

Light is another important factor for photosynthesis. We can conduct an experiment to show that it is essential for it.

Apparatus: a well-watered, de- starched potted plant e.g., Pelargonium or Coleus, a cork cut into 2 pieces, and a pin.

Method: The cork is pinned on one leaf of the plant. The apparatus is left in sunlight for 8 hours. The cork is removed from the leaf and the starch test is done on the leaf.

Results: Where the cork, covered the leaf, the leaf stains brown. The rest of the leaf stains blue-black.

Conclusion: Starch is produced only in areas of the leaf where light is able to reach. This experiment shows light is essential for photosynthesis.

TESTING LEAVES FOR STARCH

- Presence of starch can be tested in foods by adding a few drops of yellow-brown iodine solution to it. Iodine turns starch from yellow-brown to blue-black.
- A beaker of water is set on a tripod and gauze and heated to a boiling point.
- A leaf is removed from a plant and placed in the water for 30 seconds. This stops all chemical activities in the leaf and de waxes.
- The Bunsen burner is switched off.
- The leaf is placed in a boiling tube filled with Ethanol.
- The tube is placed in the beaker of hot water.
- It is allowed to boil for a few minutes.
- This removes the chlorophyll from the leaf.
- It will turn colorless or pale yellow.
- The leaf is removed and washed in cold water to soften it.
- It is then spread out on a tile and a few drops of iodine are added to it.
- The iodine will stain the leaf blue if starch is present in the leaf.

5. The 4 tubes are set up under a bright light for a few hours and the color of the indicator is recorded.

RESULTS

- Tube 4 was the control. The results in tubes 3 and 4 show that the leaf has to be alive for the CO2 concentration to change.
- Tubes 1,2 and 3 show the effect of increasing the light intensity. The black paper stopped light from reaching the leaf in tube 1, so only respiration could happen.
- The tissue paper stopped some of the light from reaching the leaf in tube 2 and the leaf in tube 3 received the most light.
- Photosynthesis, as well as respiration, took place in tubes 2 and 3, so there was no net absorption of CO2.
- The rate of photosynthesis was greatest in the leaf in tube 3 and it had the greatest net absorption of CO2.

A leaf is placed in a stoppered boiling tube containing some hydrogen carbonate indicator solution. the effect of light intensity can then be investigated.

The table shows some typical results:

	TUBE 1	TUBE 2	TUBE 3	TUBE 4
Light turned on	on	on	on	on
Paper on tube	black paper	tissue paper	none	none
	dark	dim light	light	light
Leaf	living	living	living	dead (boiled)
Indicator color	yellow	magenta	purple	red
CO2 concentration	highest	low	lowest	atmospheric
Respiration	yes	yes	yes	no
Photosynthesis	no	yes	yes	no