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Elodia Experiment

Scientific Introduction

Photosynthesis, which means putting together with light, is the process by which green plants transform light energy along with other aspects into food (glucose), which gives the plant energy.

During photosynthesis in green plants, light energy is captured and used to convert water, carbon dioxide and minerals into oxygen and energy rich organic compounds. The equation used for photosynthesis is:

$6CO_2 + 6H_2O$ light energy & chlorophyll $C_6H_{12}O_6 + 6O_2$

There are four things needed for photosynthesis to happen, these are light, chlorophyll, carbon dioxide and water, without these photosynthesis cannot take place.

The factors affecting the rate of photosynthesis are:

- Light:

The chlorophyll uses light energy to perform photosynthesis, the chlorophyll is required to power several reactions in order for this to happen. If there is an increase in light these reactions will take place faster and will produce more glucose and oxygen. This will only happen for a certain amount of time and then will go at a constant rate, where photosynthesis will be performed at the same speed.

- Carbon Dioxide:

Carbon Dioxide is a rare gas in the surrounding air, the more carbon dioxide the plant will receive the more faster photosynthesis will take place. This will happen for a certain amount of time and will then go at a constant rate.

- Temperature:

Chlorophyll works best when it is at a certain temperature, chlorophyll is like a enzyme, it will work best at sutaible conditions but will be destroyed at high temperatures which will stop the process of photosynthesis. The temperature should be kept at a rate of 25°C, if it exceeds this temperature the process of photosynthesis will slow down and will then stop.

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Analysis

I predict that as the lamp is moved closer to the plant there will be an increase in the number of bubbles, showing that there is also an increase in the rate of photosynthesis.

Looking at the evidence from the experiment I can see that the number of bubbles increase as the lamp came closer to the plant. After working out the average bubbles for each distance I worked out the difference between the distances. This shows that the number of bubbles is constant until it reaches a distance of 200mm where it starts to increase dramatically. The average number of particles have a pattern form 800mm to 300mm as it increases at a steady rate of 0.5 to 1.5 bubbles each time the distance is changed. My graph shows that there is a sudden change in the amount of bubbles when it reaches 200mm where it starts to increase by 24 bubbles.

Results

Distance	No. of bubbles in 5 minutes		Average no. of bubbles in 5 minutes	Difference in no. of bubbles	Average increase in no. of bubbles
800mm	32	34	33		4.67
700mm	36	36	36	3	
600mm	41	40	40.5	4.5	
500mm	44	47	45.5	5	
400mm	52	51	51.5	6	
300mm	56	56	56	4.5	
200mm	62	60	61	5	
100mm	84	86	85	24	23.75
0mm	108	109	108.5	23.5	

The increase in the rate of photosynthesis (bubbles) is measured at 4.67 to 23.75 at 200mm. This factor can be expressed in the following sequence: 23.75/4.67= 5.09

The results show that my prediction is right and that the closer the lamp the more bubbles are produced. The results show that light is a factor that affects the rate of photosynthesis, as the results showed that as the plant received more light the more bubbles came from the plant.

I can come up with a valid conclusion showing that the increase in light will increase the rate of photosynthesis, this conclusion supports my prediction but the experiment cannot show me how long it would take for the rate of photosynthesis to drop. Overall the experiment has proved that light is a factor that affects the rate of photosynthesis.

Evaluation

The results from the experiment are enough to support my conclusion along with the anomalies in the results.
The experiment was set up next to a window on a sunny day; this will affect the experiment as the sun is another source of light for the plant under the experiment

along with the lamp used in the experiment. Because the sun is playing a part in the experiment photosynthesis will take place quicker as it is giving light and light is one of the factors that affects photosynthesis. This will make the results unfair as the sun's light will make the plant give out more bubbles as the experiment goes on. It will also depend on what time the experiment was performed at, if the experiment was performed towards noon the results would be unfair as this is the time when the sun is at its highest peak of the day, whereas if it was performed when there is less sunlight the experiment will be more reliable than of when it is performed at noon, because we do not know what time the experiment was performed at the results can be used as reliable evidence. The experiment could have been performed in a room with not so much sunlight and with a lamp that has a variable on it so that it is easier to take down the number of bubbles from the plant.

The experiment had a beaker full of the solution Sodium Bilarbonate which supplies carbon dioxide to the plant, from looking at the experiment we cannot tell if it is supplying enough CO2 or if it is supplying too much CO2. Seeing as carbon dioxide is a factor that affects the rate of photosynthesis this can make the results less reliable.

The bubbles may not come just from the stem, which will make the results unreliable; bubbles could have come from different parts of the plant. This could be resolved by cutting the plant once it is in the solution. The glass sheet used to stop the heat may have let in heat which made the chlorophyll react faster which made the last two results higher than the others.

It would be better if the experiment was repeated again to get more accurate results, another experiment should be carried out to show how long the plant can take the light. So in conclusion the experiment cannot prove anything for me as it had many flaws and anomalies.