

The Effect of Light Intensity on Photosynthesis Rate in Elodea Canadensis

Abstract:

This study investigates the effect of varying light intensities on the rate of photosynthesis in *Elodea Canadensis*. Using a controlled experiment, we measured the oxygen production as an indicator of the photosynthesis rate. The results showed a direct correlation between light intensity and the rate of photosynthesis, with higher light intensities leading to increased oxygen production, up to a certain threshold.

Introduction:

Photosynthesis is a fundamental process in which plants convert light energy into chemical energy, producing oxygen as a byproduct. This experiment aims to determine how different light intensities affect the rate of photosynthesis in *Elodea Canadensis*, a common aquatic plant. Understanding this relationship can provide insights into optimizing conditions for plant growth in various environments.

Materials and Methods:

Materials:

- *Elodea Canadensis* specimens
- Beakers
- Water
- Sodium bicarbonate (NaHCO_3)
- Light source (adjustable lamp)
- Light meter
- Stopwatch
- Test tubes
- Graduated cylinder

Methods:

1. Prepare a 0.1% sodium bicarbonate solution to act as a carbon source for photosynthesis.
2. Fill a beaker with the sodium bicarbonate solution and place a healthy *Elodea* specimen inside.
3. Position the light source at a fixed distance from the beaker and measure the light intensity using a light meter.
4. Record the baseline oxygen production by counting the number of oxygen bubbles released from the cut end of the *Elodea* stem over a 5-minute period.
5. Repeat the experiment with the light source at varying distances to achieve different light intensities (e.g., 10 cm, 20 cm, 30 cm).
6. Maintain constant environmental conditions (temperature, CO_2 concentration) throughout the experiment.

- Record and analyze the data to determine the relationship between light intensity and the rate of photosynthesis.

Results:

The results showed a clear trend where the rate of photosynthesis, indicated by the number of oxygen bubbles produced, increased with higher light intensities. However, beyond a certain light intensity (around 2000 lux), the rate plateaued, suggesting that other factors may limit the photosynthesis rate at higher light intensities.

Light Intensity (lux)	Number of Oxygen Bubbles (per 5 min)
500	12
1000	24
1500	36
2000	45
2500	45

Discussion:

The experiment demonstrated that light intensity is a critical factor influencing the rate of photosynthesis in *Elodea Canadensis*. The initial increase in oxygen production with higher light intensities supports the hypothesis that light energy boosts photosynthesis. The plateau observed at higher intensities indicates that other factors, such as CO₂ availability or chlorophyll saturation, may become limiting. Future studies could explore these additional variables to gain a more comprehensive understanding of the photosynthesis process.

Conclusion:

This study confirmed that increasing light intensity enhances the rate of photosynthesis in *Elodea Canadensis* up to a certain point. These findings can help optimize growth conditions in aquatic plant cultivation and improve our understanding of plant physiology.

References:

- Taiz, L., & Zeiger, E. (2010). *Plant Physiology*. Sinauer Associates.
- Smith, A. M., & Stitt, M. (2007). Coordination of carbon supply and plant growth. *Plant, Cell & Environment*, 30(9), 1126-1149.

Appendix:

Raw data tables

Graphs of light intensity vs. photosynthesis rate
Detailed experimental setup photos

