WHICH LEAF PRODUCES MOST OXYGEN BUBBLES UNDER SUNLIGHT?

NATIONAL SCIENCE FAIR RESEARCH PLAN

LEVEL : PRIMARY LEVEL

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SUBMITTED BY

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Abstract

Project Title	:	WHICH LEAF PRODUCES MOST OXYGEN BUBBLES UNDER SUN LIGHT?
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Photosynthesis is an essential biological process in which plants use sunlight to produce food and release oxygen. This study investigates how different leaves—Spinach, Jasmine, and Hibiscus—vary in their rate of oxygen bubble production when exposed to sunlight. Oxygen bubbles serve as a visible indicator of photosynthetic activity.

Fresh leaves of equal size were placed in identical water-filled containers under sunlight, and the bubbles released per minute were counted. The experiment was repeated to ensure accuracy.

Results showed that Spinach produced the highest number of bubbles, followed by Jasmine, while Hibiscus produced the fewest.

These findings indicate that leaf structure, chlorophyll concentration, and surface area influence the rate of photosynthesis. The study highlights the importance of green leafy plants in oxygen production and environmental balance.

Introduction

Photosynthesis is a vital life process through which green plants convert sunlight, water, and carbon dioxide into glucose and oxygen. The oxygen released is essential for sustaining all living organisms.

Different plants produce different amounts of oxygen due to variations in leaf design, chlorophyll level, thickness, and light absorption ability. Studying these differences helps us understand which plants are more efficient in producing oxygen.

Spinach, Jasmine, and Hibiscus leaves were selected for this investigation because they vary greatly in texture, structure, and chlorophyll content. By measuring the number of oxygen bubbles they release under sunlight, this project attempts to scientifically compare their photosynthetic efficiency.

Hypothesis

If some leaves have higher chlorophyll content, larger surface area, or thinner structure, then they will produce more oxygen bubbles under sunlight compared to others

Methodology

Sample Selection:

Three leaves—Spinach, Jasmine, and Hibiscus—were collected fresh and kept equal in size for fairness.

Experimental Setup:

Each leaf was placed in a transparent glass container.

Containers were filled with the same amount of clean water.

All three containers were kept under direct sunlight at the same place and time.

Procedure

- Collect fresh leaves of equal size from all three plants.
- Place each leaf in a glass container filled with equal amounts of water.
- Expose all containers to direct sunlight at the same time.
- Count and record the number of oxygen bubbles produced in 10 minutes.
- Repeat the process three times to ensure accuracy.
- Calculate the average bubble count per minute for each leaf.
- Record results and compare the three leaves.

Control and Variables

Independent Variable:

Type of leaf (Spinach, Jasmine, Hibiscus)

Dependent Variable:

Number of oxygen bubbles produced per minute

Controlled Variables:

- Amount of water
- Size of leaves
- Sunlight exposure time
- Distance from sunlight
- Temperature
- Containers used

Result based on Tabulation

Table 1 – Direct Observation

Sl.No	Leaf Type	No. of O_2 Bubbles / min	Rank (Most to Least)
1	Spinach	48	1
2	Jasmine	33	2
3	Hibiscus	22	4

Graph 1: Direct observation

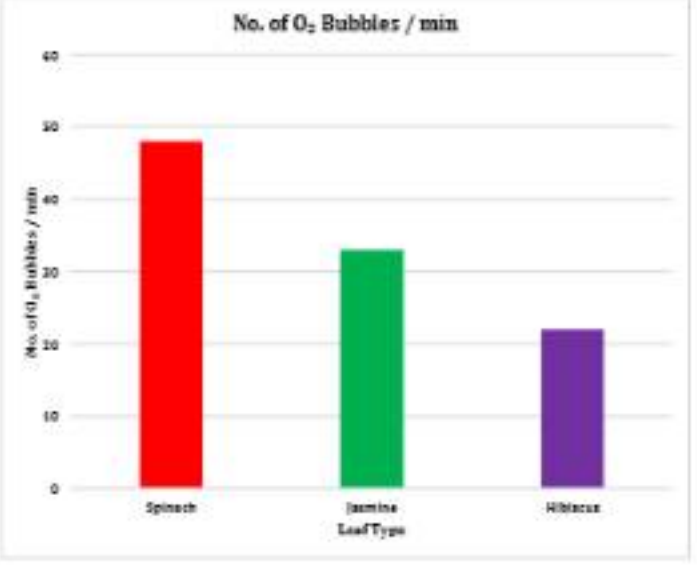


Table 2 – Relative Photosynthetic Efficiency

Sl. No	Leaf Type	O_2 Bubble Production (%)	Efficiency Level	Remark
1	Spinach	100%	Very High	Excellent photosynthesis rate
2	Jasmine	69%	High	Moderate efficiency
3	Hibiscus	46%	Low	Slow photosynthesis

Graph 2: Relative Photosynthetic Efficiency

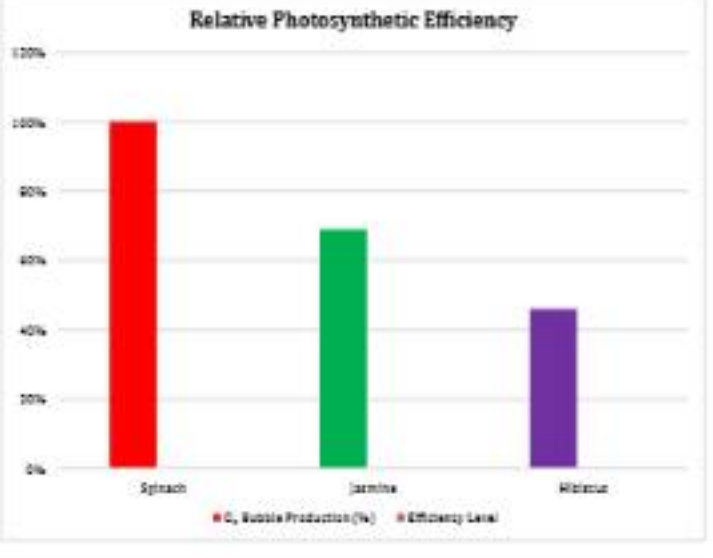


Table 3 – Sunlight Intensity vs Bubble Count

Sl.No	Leaf Type	Bubbles in Dim Light	Bubbles in Bright Light	Difference
1	Spinach	20	48	28
2	Jasmine	14	33	19
3	Hibiscus	8	22	14

Graph 3 : – Sunlight Intensity vs Bubble Count

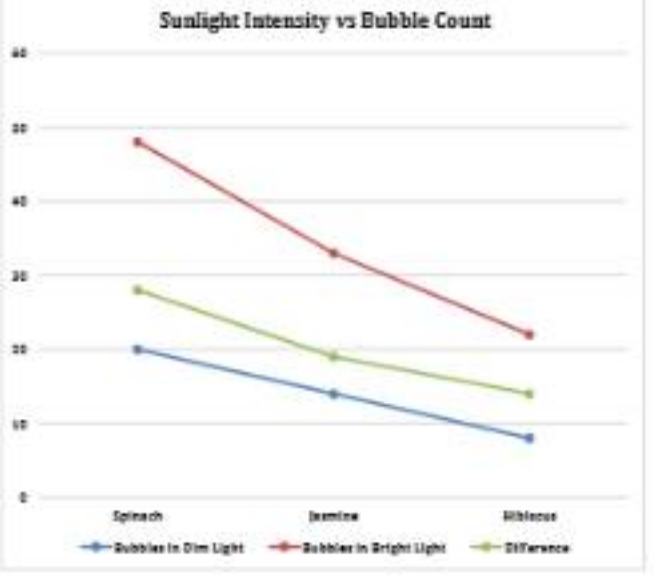
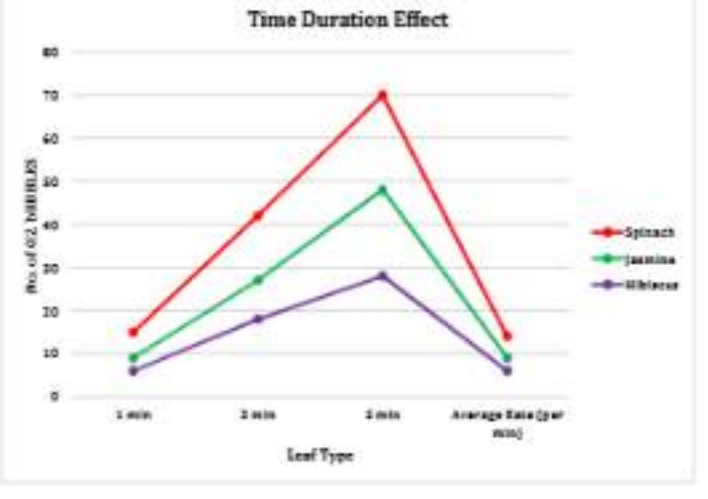


Table 4 – Time Duration Effect

Sl.No	Leaf Type	1 min	3 min	5 min	Average Rate (per min)
1	Spinach	15	42	70	14
2	Jasmine	9	27	48	9
3	Hibiscus	6	18	28	6

Graph 4 : – Time Duration Effect



Collection of data - **Photographs**

Materials Setup – Spinach, Jasmine, and Hibiscus leaves with containers and water.

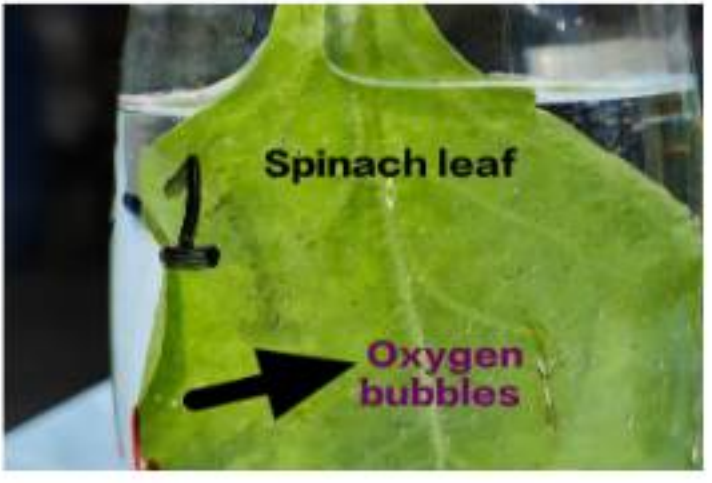
Glass filled with water

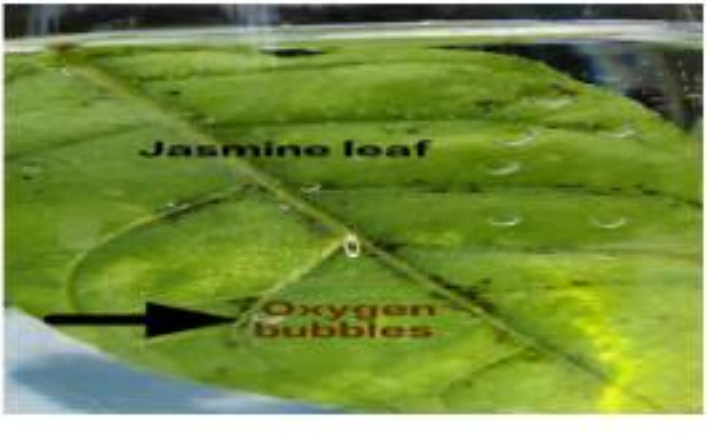
Placing leaves in glass containers with equal water level


Jasmine leaf

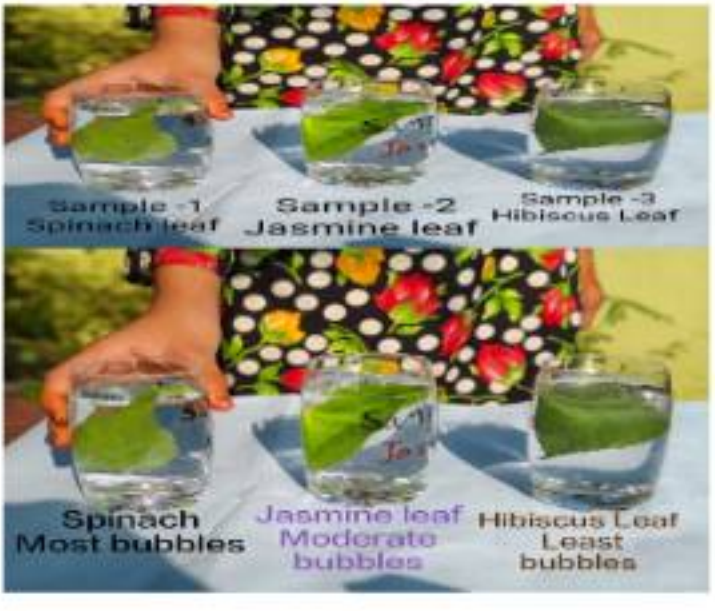

Hibiscus
Leaf

Containers under sunlight for photosynthesis observation





FINAL COMPARISON



RESULTS

- The experiment compared oxygen bubble production in Spinach, Neem, and Hibiscus leaves under sunlight. The Spinach leaf produced the highest number of bubbles (48 per minute), showing a very high rate of photosynthesis. Neem produced 35 bubbles per minute, indicating moderate efficiency, while Hibiscus produced only 22 bubbles per minute, showing the lowest rate.

- The bubble count increased significantly when the leaves were exposed to brighter sunlight, proving that light intensity plays a major role in photosynthetic activity. Spinach consistently ranked first across all conditions.

Discussion

- The results indicate that **Spinach leaves produced the highest number of oxygen bubbles**, showing the greatest rate of photosynthesis. This could be due to their **large surface area, higher chlorophyll content**, and **thin leaf structure**, allowing efficient light absorption and gas exchange.
- Neem leaves performed moderately well, while Hibiscus showed lower oxygen output, possibly due to thicker or waxy surfaces that limit sunlight penetration.The results also confirm that **brighter sunlight significantly increases the rate of photosynthesis**, as seen from Table 3. The experiment supports the hypothesis that leaves with greater chlorophyll and better light exposure produce more oxygen.

Conclusion

- It is concluded that Spinach leaf has the highest photosynthetic rate, producing the maximum number of oxygen bubbles among the three types tested. This confirms that leaf structure and chlorophyll content strongly influence oxygen output.
- The study highlights the importance of green leafy plants as oxygen producers, essential for maintaining atmospheric balance and supporting all living organisms.

Application

- Environmental Studies: Helps identify plants that release more oxygen, useful for urban and indoor plantation.
- Educational Demonstration: Visually shows photosynthesis through bubble formation—ideal for school experiments.
- Agricultural Application: Assists in selecting high-efficiency plants for better yield and sustainability.
- Environmental Awareness: Encourages tree plantation and protection of green leafy plants to purify the air and sustain life.

References

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