

MICROALGAE CULTIVATION

A Mini Project Report

**In Partial Fulfilment of the Requirement for Award of Degree of
Bachelor of Technology of the 2nd Year in Chemical Engineering**

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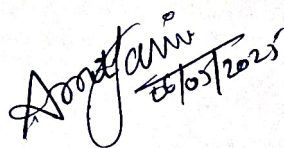


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CERTIFICATE

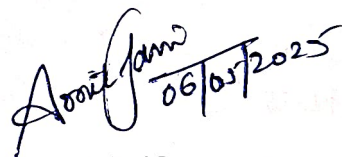
Certified that the Mini Project Report entitled "*Microalgae cultivation*" submitted by Akanksha Kumari, Dhanraj Manjhi, Mellimi Kushwanth Kumar of B.Tech. 4th Semester, in partial fulfillment of the requirements for the award of degree in Bachelor of Technology (B. Tech) in Chemical Engineering, is according to the students their own investigation carried out by them in the Department of Chemical Engineering, School of Studies of Engineering & Technology, GGV, during the session 2024-25.

Handwritten signature of Prof. Amit Jain in black ink, with the date 06/05/2025 written below it.

Prof. Amit Jain

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ABSTRACT

Microalgae have emerged as a versatile biological resource with significant potential in biofuels, nutraceuticals, pharmaceuticals, and environmental remediation. This review explores the current cultivation methods for microalgae, focusing on open and closed systems, advancements in photobioreactor designs, CO₂ sequestration capabilities, and value-added bioproduct generation. Emphasis is placed on recent case studies, technological innovations, and comparative analyses that highlight the economic and environmental trade-offs in large-scale cultivation. By synthesizing data from six peer reviewed research papers, this review aims to offer a comprehensive understanding of microalgae cultivation practices, challenges, and their future prospects in sustainable biotechnology.

Microalgae are photosynthetic microorganisms found in freshwater and marine environments. They have garnered considerable attention in recent decades due to their rapid growth, minimal land requirement, and ability to convert CO₂ into a variety of valuable bioproducts. Unlike terrestrial crops, microalgae can be cultivated year-round and have the potential to mitigate climate change by sequestering greenhouse gases. Their applications span from biofuel production to pharmaceuticals, nutraceuticals, fertilizers, and wastewater treatment. Understanding the cultivation process is critical to harnessing their full potential in sustainable development.

This review systematically examines the methods of cultivating microalgae, including open pond systems, closed photobioreactors, and hybrid approaches. Each system is evaluated based on efficiency, scalability, cost, and environmental impact. Moreover, recent innovations and research insights are integrated to highlight gaps and opportunities for improvement.