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Evaluation of Microalgal Biomass for Wastewater Treatment and The Production of Biomass

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Structured Abstract

Background: The escalating global concerns over water pollution and the quest for sustainable energy sources have spurred interest in microalgal wastewater treatment and biomass production. Wastewater, which contains high amount of pollutants including nitrogen, phosphorus, heavy metals and toxic compounds, poses health risks not only to humans, but also animals, plants and the environment. Microalgae exhibit remarkable capabilities to absorb and assimilate these pollutants, offering a promising solution for wastewater remediation. This study aims to comprehensively evaluate the potential of microalgal biomass in simultaneous wastewater treatment and sustainable biomass production, contributing valuable insights towards eco-friendly and economically viable wastewater management strategies.

Methods: Ten unknown microalgae samples were isolated and cultured in pill boxes and 6-well plates containing BG-11 media supplemented with antibiotics for four weeks. Then, the samples were cultured in synthetic wastewater for another four weeks. Microscopic identification were performed using samples in 6-well plates. Samples in the synthetic wastewater were then harvested for analysis of biomass yield by measuring dry weight, analysis of nitrogen and phosphorus removal using HACH chemical kits.

Results: All microalgae samples in BG-11 media showed poor growth in BG-11 media. Microscopic identification showed filamentous and round appearance. Biomass yield was the highest in microalgae number 3 followed by microalgae number 10. For the removal of nitrogen and phosphorus in wastewater, microalgae 3 showed the highest percentage removal at 78.61% and 81.08% respectively followed by microalgae 4 at 69.94% and 76.22%.

Conclusion: In conclusion, the cultivated microalgae samples were able to grow in biofilm form in BG-11 media and synthetic wastewater when supplemented with sufficient CO^2, nutrients and light. For microscopy, filamentous appearance was more dominant in sample 1, 3, 4, 6 and 8 while round appearance was more dominant in sample 2, 7, 9 and 10. Additionally, all samples were able to remove residual nitrogen and phosphorus from synthetic wastewater. For better results, it is recommended to optimize the culture media and other components of synthetic wastewater to ensure better growth and biomass production rate.

Keywords: Microalgae, Wastewater, Biomass, Lipid, Phycoremediation.

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