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OPTIMIZATION OF GROWTH PARAMETERS FOR BIOMASS PRODUCTIVITY USING RESPONSE SURFACE METHODOLOGY IN MARINE MICROALGAL SPECIES

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Abstract:

Global warming imposes alarming threat on human and environment due to rapid rise in the level of atmospheric CO_2. Amongst various CO_2 capture and storage technologies, biological sequestration of CO_2 through microalgae is the most environmental friendly and sustainable technology. Certain operating parameters such as temperature, light intensity, nutrients, CO_2 addition need to be optimised for the enhanced microalgal cultivation.The present study aimed to optimize the parameters such as temperature, light intensity and nutrients for the marine microalgae *Phormidiumvalderanium, Phormidiumtenue and Spirulinasusbsalsa.* Cultivation of marine microalgae is economically feasible due to its sustainability in sea water when compared to fresh water microalgal species.The experimental design for optimization was based on Face Centered Composite Design and was obtained using *Design Expert* 9.0.3.1. The independent variable studied were Temperature (25-40^{0}C), light intensity (2000-5000 lux) and ASNIII media concentration (0.2-1g/L).Optimized temperature is 35.97, 35.50 and 35.95ºC for *Phormidiumvalderanium, Phormidiumtenue and Spirulinasusbsalsa* respectively. Optimized light intensity is 3384.40, 4999.82, 3684.40 lux for *Phormidiumvalderanium, Phormidiumtennue and Spirulinasusbsalsa* respectively and the nutrient composition is 0.20 g/litre for all the three species. It was observed that the prediction values generated from the model was in agreement with experimental values having the deviation within 10% for all the three microalgal species. The dry biomass concentration under optimized operating conditions were 181, 162 and 214 mg/litre for *Phormidiumvalderanium, Phormidiumtennue and Spirulinasusbsalsa*repectively.CO_2supply to the medium may greatly enhance the productivity of the microalgal species that can be experimented further .Results inferred that all the aforesaidmicroalgal species were able to sustain in a temperature closer to outdoor conditions, whereas the effect of light intensity in the outdoor conditions on the growth of microalgal species have to be explored, coupled with nutrient and CO_2 optimization for effective microalgal cultivation.

Keywords : *Marine Microalgae; Face Centered Composite Design; Temperature; Light intensity and nutrients.*