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Evaluation of Electro-Flocculation for Biomass Production of Marine Microalgae Phaodactylum tricornutum

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Abstract : The commercial production of biodiesel using microalgae demands a high-energy input for harvesting biomass, making production economically unfeasible. Methods currently used involve mechanical, chemical, and biological procedures. In this work, a flocculation system is presented as a cost and energy effective process to increase biomass production of Phaeodactylum tricornutum. This diatom is the only species of the genus that present fast growth and lipid accumulation ability that are of great interest for biofuel production. The algae, selected from the Bank of Microalgae, Institute of Biology, Federal University of Bahia (Brazil), have been bred in tubular reactor with photoperiod of 12 h (clear/dark), providing luminance of about 35 μmol photons m⁻²s⁻¹, and temperature of 22 °C. The medium used for growing cells was the Conway medium, with addition of silica. The seaweed growth curve was accompanied by cell count in Neubauer camera and by optical density in spectrophotometer, at 680 nm. The precipitation occurred at the end of the stationary phase of growth, 21 days after inoculation, using two methods: centrifugation at 5000 rpm for 5 min, and electro-flocculation at 19 EPD and 95 W. After precipitation, cells were frozen at -20 °C and, subsequently, lyophilized. Biomass obtained by electro-flocculation was approximately four times greater than the one achieved by centrifugation. The benefits of this method are that no addition of chemical flocculants is necessary and similar cultivation conditions can be used for the biodiesel production and pharmacological purposes. The results may contribute to improve biodiesel production costs using marine microalgae.

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