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Optimization of single cell protein bioproduction by marine fungi using seaweed biomass

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In the last two decades, interest in biotechnology has focused on obtaining products of commercial importance from low-value residual biomass. Seaweed and waste from the algae industry has a high concentration of alginate, cellulose, and a low content of hemicellulose and lignin [1, 2]. The use of seaweeds to produce biofuels such as biogas and bioethanol has been studied [1, 3]. However, there are no studies that have been carried out to evaluate the feasibility of taking algal industry waste or algae as material to obtain Single Cell Protein (SCP). This SCP would serve for feeding farm animals. The marine fungi are a diverse group of opportunistic and obligate organisms isolated from marine environments. These fungi are often included in screening for new metabolites, and their ability to assimilate complex polymers such as alginate, cellulose, and hemicellulose [4]. In this study, the growth of 10 strains of marine filamentous fungi, in alginate and cellulose, was preliminarily evaluated. The protein concentration of the pre-selected fungi was evaluated in two different wastes from the algal industry (Waste A and B) and Macrocystis pyrifera. The highest concentrations of protein were obtained with Asteromyces cruciatus and Dendryphiella salina. The productivity found for A. cruciatus was 12.7, 1.9 and 5.0 mg/g day, using M. pyrifera, waste A and B respectively. The productivity found for D. salina was 7.9, 3.3 and 2.6 mg/g day using M. pyrifera, waste A and B respectively. The Box- Behken design (BBD) allows us to optimize the growth conditions (temperature, salinity and pH) for the treatment of seaweed biomass using D. salina and A. cruciatus. With the optimal values given by BBD the protein can be increased, 2.1, 2 and 4 fold, using M. pyrifera with A. cruciatus, M. pyrifera with D. salina and Waste B with D. salina respectively. This indicates that alginate and cellulose, from waste from the algal industry, can be assimilated by filamentous marine fungi. Thus, these microorganisms could be excellent sources of bioproducts, which can be used in the food industry.

Biography

Catalina Landeta Salgado is a Biologist from the Catholic University of Ecuador, has a magister in Environmental Management and Auditing from the Polytechnic University of Catalonia, Spain, a magister in Energy Engineering, mentioning biofuels from the Catholic University of Chile. She is currently a PhD candidate in Chemical Engineering and Biotechnology at the University of Chile. She has worked for more than four years in nationally recognized research projects in Ecuador. The achievements in their results could help the development of the only bioethanol pilot plant, from agroindustrial waste, in Ecuador.

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