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Summer is Coming: How Heat and Sugar Affect Saccharomycopsis Fibuligera Biomass and Cell-Wall Fractions Production in Mussel Process Wastewaters as Culture Media?

M. Carpena, P. Garcia-Oliveira, F. Chamorro, Paz Otero, J. Simal-Gandara and M. A. Prieto

Nutrition and Bromatology Group, Analytical and Food Chemistry Department. Faculty of Food Science and Technology, University of Vigo, Ourense Campus, E-32004 Ourense, Spain

Abstract

β-glucans and oligosaccharides have been reported for their beneficial effects on human health due to certain target properties such as antitumor and immunomodulatory activity. Although these compounds can be found along the vegetal kingdom, microbial cell-walls have been reported as an excellent source of these compounds. On the other hand, wastewater is produced as a result of the mussel production industry causing harmful effects for the marine ecosystems. These effluents contain high amounts of organic matter and thus, they have been studied as culture media for microorganisms. So, different yeasts have been utilized for this purpose. Also, despite biomass production of yeasts has been object of study very frequently, less efforts have been made in the assessment of the kinetic process behind cell growth and the parameters that can affect it (*i.e.*, temperature, pH, sugar concentration). In this study, *Saccharomycopsis fibuligera* yeast strain was selected as case study for the optimization of cell-wall/biomass yield. The experiments were designed following a *response surface methodology (RSM)* to reveal the possible interactions between temperature and initial sugar concentration and predict the optimal values for the production of *S. fibuligera* biomass, cell-walls and cell-wall fractions. Once the conditions were optimized, a cell-wall/biomass yield of 63.5% was obtained and statistical analysis confirmed the validity of the optimization model proposed. Therefore, this approach could offer an eco-friendly solution for valorizing wastewater derived from mussel industry, trying to find both a sustainable solution from the economic and the environmental point of view, integrating the perspective of circular economy model.

Keywords: Saccharomycopsis fibuligera, cell-wall production, glucan-based cell-wall compounds, bioactive compounds, process optimization, response surface methodology

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