TITLE: EXOPOLYSACHARIDE PRODUCTION BY FILAMENTOUS FUNGI: EFFECT OF AGITATION AND CONCENTRATION OF SUCROSE AND PEPTONE

AUTHORS: FONSECA, M.S.; CALEGARI, G.C.; SANTOS, V.A.Q.; PECIN, S.B.; DEKKER, A.M.B.; DEKKER, R.F.H.; CUNHA, M.A.A.

INSTITUTION: UNIVERSIDADE TECNOLÓGICA FEDERAL DO PARANÁ, DEPARTAMENTO DE QUÍMICA (VIA DO CONHECIMENTO KM 01, FRARON, CEP: 85503-390, PATO BRANCO – PR, BRAZIL), UNIVERSIDADE ESTADUAL DE LONDRINA, DEPARTAMENTO DE QUÍMICA (ROD. CELSO GARCIA CID KM 380, CEP: 86051-990, LONDRINA – PR, BRAZIL), UNIVERSIDADE TECNOLÓGICA FEDERAL DO PARANÁ, DEPARTAMENTO DE ENGENHARIA AMBIENTAL (AV. PIONEIROS, 3131, CEP: 86036-370, LONDRINA – PR, BRAZIL).

ABSTRACT:
Exopolysaccharides (EPS's) are biomacromolecules produced by some bacteria and fungi, which are excreted into the culture medium when cultivated by submerged fermentation. Microbial synthesis of EPS can be influenced by different factors, such as temperature, agitation, pH, and the composition of the nutrient medium. Nutritional factors such as nitrogen and carbon sources, mineral salts and supplements like vitamins and oils can strongly influence the production of EPS's. In this context, the objective of the present study was to evaluate the influence of the initial concentrations of sucrose and peptone of the culture medium, and the agitation speed on production of a new EPS produced by filamentous fungi isolated from palm husks. A rotational central-composite design (2^3) was used to evaluate the influence of these variables on the production of EPS and mycelial growth. The nutrient medium was composed of sucrose and peptone in the concentrations defined by the experimental design and supplemented with KH_2PO_4 (2 $g.L^{-1}$) and $MgSO_4.7H_2O$ (2 $g.L^{-1}$). Fermentation was performed in Erlenmeyer flasks in an orbital incubator for 96 h at 28 °C. EPS production and fungal biomass were determined gravimetrically after drying in an oven at 60 °C. The final EPS concentrations varied from 0.16 $g.L^{-1}$ to 1.9 $g.L^{-1}$, and the fungal biomass concentration ranged from 0.62 $g.L^{-1}$ to 11.65 $g.L^{-1}$. The maximum EPS concentration of 1.9 $g.L^{-1}$ and a volumetric productivity of 0.02 $g.L^{-1}h^{-1}$ resulted when using 27.5 $g.L^{-1}$ sucrose, 1.5 $g.L^{-1}$ of peptone at an agitation speed of 25 rpm as determined by the process conditions. However, none of the variables studied showed a statistically significant effect on EPS production, considering a 95% confidence level (p <0.05). On the other hand, fungal mycelial growth was positively influenced (p <0.05) by the variable, agitation, but there appeared to be no direct correlation between mycelial growth and EPS production. Maximum content of mycelial biomass (19.7 $g.L^{-1}$) was obtained when using 50 $g.L^{-1}$sucrose, 1.5 $g.L^{-1}$ of peptone and 138 rpm of agitation. Under these conditions a production of 1.2 $g.L^{-1}$ EPS and a volumetric productivity in EPS of 0.013 $g.L^{-1}h^{-1}$ resulted.

Keywords: fungal polysaccharide, fermentation, experimental design.

Development agency: UTFPR-Pato Branco-PR and CNPq.