Submerged fermentation of combined induced media for the production of fungal enzymes with fucoidan degradation potential

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Fucoidans are highly sulfated polysaccharides of brown algae widely used in fields as food and beverage, pharmacy, health medicine and cosmetics, due to their important biological properties as antitumoral, anticoagulant and antiviral activities. Enzymes with known specificities that catalyze the degradation of fucoidan are important tool for studying the relation between structure and biological role of this class of polysaccharide; however, there are few published reports on this topic. T

he aim of the present work was produce fungal enzymes with specific activity towards fucoidan sulfated matrix by submerged fermentation using combined induction media. Fermentation assays were performed with *Aspergillus niger* PSH, microorganism previously shown to have potential for fucoidan degradation.

The tested media were Czapek Dox and Pontecorvo, supplemented with two carbon sources: A primary source composed by fucoidan *Laminaria japonica* (10 gL^{-1}) and a secondary source composed by glucose, sucrose, lactose, fructose or sodium acetate, (5 gL^{-1}) urea (5 gL^{-1}) was used as nitrogen supply. The experiments were carried out in 100 mL Erlenmeyer flasks at 140 rpm, 30 ºC, and 1 x 10^6 spores ml^{-1} of conidial concentration. Biomass production, substrate consumption, extracellular and intracellular activity and protein content were evaluated. Kinetic parameters adjusted to Velhurst-Pearl and Luedeking y Piret models were estimated. Fungal growth was highest with sucrose in Czapek and Pontecorvo media (5.04 and 3.62 gL^{-1}, respectively); the degradation of fucoidan was highest in Czapek media (1gL^{-1}), also in this media with sucrose and fructose sources the consumption reached were 80%. Fucoidan hydrolytic enzymes were expressed only with sucrose (9.4 UL^{-1}) and lactose (6.6 UL^{-1}) in Czapek media. Intracellular activity was not detected. The present study demonstrated that the used fungal strain is able to synthesize fucoidan hydrolytic enzymes.

These are the first results describing the production of enzymes from terrestrial fungus with ability to degrade fucoidan.