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OP - (443) - SEQUENTIAL SOLID-STATE FERMENTATION AND ENZYMATIC HYDROLYSIS OF GREEN SEAWEED TO EXTRACT ANTIOXIDANT COMPOUNDS

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Body

Nowadays, the seaweed industries are focused on the production of a single product, so they face the challenge of changing their strategies to generate multiple products from macroalgae biomass, following biorefinery concept. On the other hand, the on-site production of enzymes and sequential enzymatic hydrolysis, integrated to the biorefinery plant, is being considered as a potential strategy to avoid additional steps and reduce costs [1]. Solid-state fermentation (SSF) by filamentous fungi can produce carbohydrolases and sequentially hydrolyzes the biomass to sugars and antioxidant compounds [2]. In this form, extraction step of enzymes after SSF is avoided.

In this study, it was carried out a sequential SSF and enzymatic hydrolysis of *Ulva rigida* (green seaweed). SSF was performed by *Aspergillus ibericus* with 10 g of dry seaweed with a moisture of 75%w/w (wet basis) at 25 ºC during 5 days. After SSF, a citrate buffer was added to carried out the enzymatic hydrolysis during 72h. This second step was optimized by Box-Behnken experimental design, in which the independent variables studied were the temperature (35, 40 and 45 ºC), the load of solid (10%, 20% and 30 % w/v) and pH (4, 4.6 and 5.2). The dependent variables studied were the variation of antioxidant activity and total phenolic compounds released. The model had a good fit for antioxidant activity (R^2: 0.9947 and R^2 adjusted: 0.9850) and for phenolic compounds (R^2: 0.9528 and R^2 adjusted: 0.8679). The independent variables that have a higher significant effect ($p < 0.05$) on the increase of antioxidant activity were load of solid and pH, and the interaction of these variables had the highest effect. Intermediate or low pH and high load of solid favored the released of antioxidant compounds. The model predicted an optimum value of antioxidant activity of 344 µM Trolox equivalents at 41 ºC, 30 % w/v of solid and pH 4.7. For total phenolic compounds, the variable that had a higher significant effect ($p < 0.05$) was the temperature, the optimum conditions were 39 ºC, 30 % w/v of solid and pH 4.

The bioprocessing of seaweed by SSF and enzymatic hydrolysis allowed to extract antioxidant compounds by environmentally friendly processes without the use of organic solvents and chemical or physical pre-treatments.

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