Biological extraction of bromelain from pineapple byproducts

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Isolation and purification of valuable compounds are very important processes to valorize agro-food byproducts. Currently, protein extraction and development of environmentally friendly technologies are industrially relevant topics [1]. Among the extracted proteins from byproducts proteases are a relevant group for industrial applications. These enzymes are a class of hydrolytic enzymes capable of cleaving the peptide bonds of proteins chains and are essential in physiological processes [2].

Bromelain (BR) is a proteolytic enzyme belonging to the cysteine peptidase family. This protease can be found in the tissue of plants of the Bromeliaceae family, and pineapple (*Ananas comosus*) is its main source [3].

The several biotechnological and clinical applications of BR increase the importance of developing a viable extraction and purification method for this enzyme. Also, these byproducts (peels and cylinders) are not yet used and have no appropriate destination [1]. A new method of purification and isolation of BR was developed, using a natural polysaccharide (carrageenan). Carrageenan (Carr) is non-toxic, water soluble and currently used in food industry. Previous reports have demonstrated the use of this polysaccharide to isolate and immobilize other enzymes [4].

A liquid crude extract was produced from each part of the byproducts (peels and cylinders). The BR activity in the extracts was measured using LNPE (z-l-lys-onp hydrochloride) as substrate for all the conditions tested, and the specific activity was determined. Thus, an optimal complex of BR-Carr was developed, obtaining a high yield of enzymatic extraction.

Based on this new BR purification method via complexation with Carr, it was possible to separate and precipitate BR from an aqueous extract maintaining its activity. Although it was possible to obtain a first step in the purification of this enzyme in the future other successive steps will be evaluated to increase the purity.

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