Fungal biodegradation of pomegranate ellagitannins


1Department of Food Science and Technology. School of Chemistry. Universidad Autónoma de Coahuila. Blvd. Venustiano Carranza, col. República. Saltillo, 25280, Coahuila, México. E-mail: alberto_ascaciovaldes@uadec.edu.mx.

2Department of Food Science and Technology. Universidad Autónoma Agraria “Antonio Narro”. Buenavista, Saltillo, 25000, Coahuila, México.

3Department of Biotechnology, Universidad Autónoma Metropolitana Unidad Iztapalapa. 09340, México, D. F.

Key words: Aspergillus niger GH1, solid state culture, ellagitannins

Introduction. At this time, there is scarce information about ellagitannins biodegradation. Several authors mention that it is necessary to carry out further studies to elucidate the mechanism of ellagitannins biodegradation (Scalbert, 1991; Vivas et al. 2004). There are some studies that describe the ellagitannins biodegradation by fungal enzymes, such as, tannase enzyme (Yoshida et al. 1999), β-glucosidase (Vattem & Shetty, 2002, 2003), polyphenoloxidase (Shi et al. 2005). In 2009 Aguilera-Carbó et al. suggested the existence of an enzyme responsible for the ellagitannins degradation, produced by Aspergillus niger GH1, by solid state culture. The authors established the existence of the enzyme by electrophoresis analysis (SDS-PAGE), which had a molecular weight around 200 kDa. It is suspected that this enzyme, recently reported, is responsible for the ellagitannins degradation, however, it is necessary to generate new information in order to understand the ellagitannins degradation mechanism, therefore, the aim of this study was to associate an enzyme produced by Aspergillus niger GH1, by solid state culture, with the ellagitannins degradation and to identify the intermediate compounds of this degradation.

Methods. A solid state culture was carried out using Pontecorvo media culture (Aguilera-Carbó et al. 2009), Aspergillus niger GH1, pomegranate ellagitannins and PUF as support at 0 h to 36 h in 250 mL reactors. The enzymatic extracts were recovered with citrate buffer (pH 5.0, 50 mM) and centrifuged in Nanosep® tubes (1.5 mL) for the partial purification. After, the ellagic acid accumulation was measured by HPLC, the ellagittannase enzymatic activity was determined (Mireles-Ramírez et al. 2008), and the intermediate compounds was identified by LC/MS.

Results. The obtained results are showed in the following figures.

Conclusions. It was demonstrated that Aspergillus niger GH1, under solid state culture using ellagitannins as substrate, was able to produce an enzyme related with the pomegranate ellagitannins degradation.

Acknowledgements. This work was funded by the project: SEP-CONACYT-(51360)-2005-24348.

References.
