

❖ **FOOD CHEMISTRY, OENOLOGY AND BIOTECHNOLOGIES IN THE FOOD INDUSTRY**

Novel integrated bioprocess system for producing organic acids from food by-products

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Abstract

The transition from a linear to a circular economy implies a shift in the population's mentality and requires the adoption of an eco-friendly economy. The utilization of bio-based materials and products has imperative importance. The aim of the current work proposed to utilize food by-products through an integrated process of solid-state (SsF) and submerged fermentation (SmF) with the purpose of obtaining the target compound itaconic acid (IA). Initially, this process was applied to glucose as substrate, which was also considered a control experiment. Through SsF with *Aspergillus awamori*, the production of hydrolytic enzymes (cellulase and glucoamylase) was obtained, and these were applied in SmF with *A. terreus* to produce IA. IA is a 5-C unsaturated organic acid highly used in producing biopolymers and with several positive qualities. After glucose, apple pomace was used as a food by-product in SsF. After the fermentation optimisations were performed, the whole process was upscaled into bioreactors, and with the help of enzymes, substrate hydrolysis was obtained. After this step through SmF with *A. terreus*, IA was quantified with the help of HPLC. The obtained solution is proposed to be applied in downstream processing to obtain an economically feasible method for IA extraction and purification.

Keywords: Solid-state fermentation, Submerged fermentation, *Aspergillus*, Itaconic acid, Enzymes

Funding: This research was funded by two projects from the Ministry of Research and Innovation (no. PN-III-P1-1.1-PD-2021-0672 and PN-III-P1-1.1-TE-2021-1052).