

Polygalacturonase from *Aspergillus carbonarius* - Production, Purification and its Applications in Food Industries

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ABSTRACT

The study aimed to assess the effectiveness of membrane technology in purifying *Aspergillus carbonarius* polygalacturonase (PG) obtained from submerged (SmF) and solid-state fermentation (SSF), emphasizing their strengths and comparing their efficiency with the alginate affinity purification (AAP) method. Initial evaluations revealed that SmF generated 2.7 times more PG than SSF, primarily due to the higher starch content in SmF's substrate. The research expanded into a cross-flow filtration system to improve the Integrated Membrane Process (IMP), which utilized microfiltration (MF 450 nm) and ultrafiltration (UF 50 kDa) for PG purification post-submerged fermentation. Carbohydrate removal in the cross-flow system closely matched the initial self-stirred setup, with the latter achieving 4.7-fold purity and 76% PG recovery. Although lab-scale cross-flow filtration resulted in slightly lower purity (4.1 fold) and recovery (64%), it exhibited higher normalized flux. Pilot-scale filtration demonstrated comparable purity to the self-stirred system, indicating reproducibility. Analysis indicated lower resistances in the cross-flow system, with fouling in MF and cake resistance in UF. Implementing a cross-flow system could enhance the performance of the IMP protocol. SmF-PG processed through IMP proved effective in clarifying apple juice, signifying its suitability for commercial enzyme formulation, highlighting superior performance and versatility in various applications.

Keywords: *Aspergillus carbonarius*; Polygalacturonase; Integrated membrane process

