

## **Biotechnological Recycling of Apple By-Products: A Reservoir Model to Produce a Dietary Supplement Fortified with Biogenic Phenolic Compounds**

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**Abstract :** This study is an example of apple by-products (AP) recycling through a designed fermentation by selected autochthonous *Lactobacillus plantarum* AFI5 and *Lactobacillus fabifermentans* ALI6 used singly or as binary cultures with the selected *Saccharomyces cerevisiae* AYI7. Compared to Raw-, Unstarted- and Chemically Acidified-AP, Fermented-AP promoted the highest levels of total and insoluble dietary fibers, antioxidant activity, and free phenolics. The binary culture of *L. plantarum* AFI5 and *S. cerevisiae* AYI7 had the best effect on the bioavailability phenolic compounds as resulted by the Liquid chromatography-mass spectrometry validated method. The accumulation of phenolic acid derivatives highlighted microbial metabolism during AP fermentation. Bio-converted phenolic compounds were likely responsible for the increased antioxidant activity. The potential health-promoting effects of Fermented-AP were highlighted using Caco-2 cells. With variations among single and binary cultures, fermented-AP counteracted the inflammatory processes and the effects of oxidative stress in Caco-2 cells and preserved the integrity of tight junctions. An alternative and suitable model for food by-products recycling to manufacture a dietary supplement fortified with biogenic compounds was proposed. Highlighting the microbial metabolism of several phenolic compounds, undoubted additional value to such downstream wastes was created.

**Keywords :** apple by-products, antioxidant, fermentation, phenolic compounds

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