World Academy of Science, Engineering and Technology
International Journal of Nutrition and Food Engineering
Vol:14, No:09, 2020

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

Authors : Ali Zein Aalabiden Tlais, Alessio Da Ros, Pasquale Filannino, Olimpia Vincentini, Marco Gobbetti, Raffaella Di Cagno

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
Conference Title : ICFMFCFE 2020 : International Conference on Food Microbiology, Food Chemistry and Food Engineering
Conference Location : Lisbon, Portugal
Conference Dates : September 16-17, 2020