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By-products of apple processing as a source of bioactive compounds

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The recent research trends reveal that the innovations on the waste valorization and recovery of biologically active compounds from natural sources represent one of the most important challenges that concern the scientific world. In this respect, the by-products resulted from apple juice processing was analyzed regarding the volatile aroma compounds, fatty acids profile, and screened for their antioxidant and antiproliferative activities. The skin and pomace by-products resulted from apple juice extraction were dried, finely milled and kept protected from light and humidity. The volatile profile was determined by ITEX/GC-MS technique using a GCMS QP-2010. The total lipids of the samples were extracted using a chloroform/methanol mixture and the fatty acid methyl esters were determined by gas chromatography-mass spectrometry, using a PerkinElmer Clarus 600 T GC-MS. The *in vitro* evaluation of polyphenols antiproliferative proprieties was tested on two cell lines models (human cancer and human fibroblast). Cell proliferation was measured using the MTT (dimethylthiazol diphenyl tetrazolium bromide) assay. The quantification of total phenolic compounds was achieved by Folin-Ciocalteu method, while the flavonoids content was determined using a chromogenic system of $NaNO_2$–$AlCl_3$–NaOH. The antioxidant activity was assessed by evaluating their radical scavenging activity on DPPH radical. The obtained results revealed that apple pomace and skin comprise a wide range of aroma compounds and fatty acids with many potential applications in food industry. Regarding de antioxidant activity, the scavenging efficiency of apple skin extracts against the DPPH radical was the strongest due to their high polyphenol content. Also, the polyphenols treatment administration in different concentrations inhibits the cancer cell proliferation in a dose dependent manner. The exploitation of apple processing by-products to recover bioactive compounds represent a research direction of high interest from the perspective of food – health relation as well as from the waste management and environment protection perspectives.

Recent Publications

1. Helkar P B, Sahoo A K and Patil N J (2016) Review: food industry by-products used as a functional food ingredients. International Journal of Waste Resources, 6:248.
2. Kruczek M, Drygas B and Habryka C (2016) Pomace in fruit industry and their contemporary potential application. World Scientific News, 48:259–265.
3. Perussello C A, Zhang Z, Marzocchella A and Tiwari B K (2017) Valorization of apple pomace by extraction of valuable compounds. Comprehensive Reviews in Food Science and Food Safety, 16:776-796.
4. Socaci S A, Farcas A C, Vodnar D C and Tofana M (2017) Food wastes as valuable sources of bioactive molecules. In: Naofumi Shiomi, eds. superfood and functional food - the development of super foods and their roles as medicine. InTech, Rijeka, Croatia, 75-93.
5. Vodnar D C, Călinoiu L F, Dulf F V, Ştefănescu B E, Crişan G and Socaciu C (2017) Identification of the bioactive compounds and antioxidant, antimutagenic and antimicrobial activities of thermally processed agro-industrial waste. Food Chemistry, 231:131-140.

Biography

Anca C Farcas is currently Postdoctoral Researcher and Assistant Professor at the Faculty of Food Science and Technology in University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania. She is an active member of the Laboratory for Testing of Food Quality and Safety, having a solid background of six years in the field of food waste exploitation, extraction and analysis of bioactive compounds, development of new functional products, food authentication and quality control. She carried out the PhD research in the field of Biotechnology, having as research theme: Research regarding the identification and exploitation of biologically active compounds from brewers' spent grain by-product, granted by the PhD evaluation commission with the Excellent degree. The proposed research has an interdisciplinary dimension, continuing the previous directions in exploiting non-conventional sources of bioactive compounds using modern methods and innovative technology.

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