Ultrasound Assisted Extraction and Column Chromatography Assisted Purification of Bioactive Compounds from Agricultural Waste of Apple, Almond and Orange Peels

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Agricultural waste is an abundant source of various bioactive compounds like tetracyclic triterpenoids and bioflavonoids that can be utilized in medicine as remedies against non-communicable (NCDs) diseases such as cancer, heart diseases and diabetes. The intensification of agricultural activities in Georgia has resulted in an increase of large amount of waste that can be used as raw materials thus reducing the production costs and the environmental pollution load. The aim of this study was to develop a simple, effective, eco-friendly and high-yield extraction technique to obtain ursolic acid (UA) from apple and almond processing materials and Hesperidin from orange peels, which was achieved by applying different parameters such as solvents (acetone, ethanol, isopropyl alcohol, hexane, benzene) and extraction methods (UAE, soxhlet, reflux). Column chromatography was used to acquire highly purified UA and Hesperidin. In case of UA nonpolar impurities were removed by using benzene as mobile phase and for Hesperidin - hexane. In both cases, ethyl acetate was deployed to increase polarity. In order to evaluate the effectivity of extraction and purification methods, TLC was used to monitor the progress. As a result, highly purified UA and Hesperidin were obtained and further utilized in organic synthesis, with the aim to derivatize the acquired compounds with increased water-solubility and bioactivity.