

Valorization of compounds from the vini-viticulture industry

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Abstract

One of the most widespread alcoholic beverages in the world is wine, its production generating large amounts of pomace (millions of tons per year) as a by-product, which is rich in polyphenols that can be recovered through extraction. The bioactive compounds derived from pomace are substances of interest due to their beneficial effects on human health, such as anti-inflammatory, neuroprotective, antioxidant, cardioprotective, antibacterial, antiproliferative. The PhD thesis had the following objectives: (O1) development of efficient extraction processes of polyphenols from dry pomace, using Pinot Noir and Fetească Neagră varieties (Murfatlar, Romania), harvested in different years. Thus, the pomace extractions were carried out using non-toxic solvents, ethanol or ethanol-water mixture, by different methods, conventional, assisted by ultrasound or under inert gas pressure; (O2) study of the influence of extraction parameters on the chemical profile of grape pomace extracts. To improve the stability over time of the compounds present in the extract and to improve the biological properties of the extracts, the third objective, (O3), was to incorporate the selected extracts into porous carriers, such as MCM-41 or SBA-15 mesoporous silica carriers, pristine and functionalized with amine moieties, MCM-NH₂, fucoidan-coated mesoporous silica nanoparticles functionalized with amine moieties, MCM-NH₂-Fuc, titanium dioxide nanoparticles, and diatomite. The last objective (O4) was to evaluate the properties of the encapsulated extracts, such as antioxidant activity, biocompatibility or anti-inflammatory activity. In this PhD thesis, organic fertilizers were obtained using marine biomass, secondary products from the vini-viticulture industry, and their effects on four different plant crops were assessed.