

VALORIZATION OF BERRY POMACE BY CONSECUTIVE EXTRACTION WITH SUPERCRITICAL CARBON DIOXIDE AND PRESSURIZED LIQUIDS

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Abstract

Berries are known for their excellent flavour and abundance of healthy compounds possessing antioxidant and other beneficial properties. However, due to a rapid decay after harvesting, the majority of berry crops are processed into juice and other products. Pressing of juice results in large amounts of by-products, called pomace, press-cake or marc, which contain valuable phytochemicals such as polyphenolics and vitamins. However, berry pomace are used rather inefficiently and in many cases discarded, mainly due to a lack of scientific and technological valorization of their processing methods.

This study provides the examples of biorefining of berry pomace from several northern berry species, namely black currant, chokeberry, raspberry, cranberry, bilberry, blackberry and sea-buckthorn into high value functional ingredients by using supercritical carbon dioxide (SC-CO₂) and pressurized liquid extraction (PLE). After recovery of lipophilic substances by SC-CO₂ the residues were further extracted by PLE with the increasing polarity solvents, namely acetone, ethanol and water. Process parameters were optimized using Response Surface Methodology. The composition and antioxidant properties of the fractions were analysed by chromatography and mass spectrometry, while antioxidant properties were evaluated by the *in vitro* radical scavenging and antioxidant capacity assays.

Firstly, lipophilic fractions, consisting mainly of triacylglycerols, may be efficiently recovered by the extraction with SC-CO₂. At optimal conditions the yields of oily extracts from different berries were from 3 to 20 %. These extracts were rich in polyunsaturated fatty acids and tocopherols. Higher polarity fractions were extracted from the residues giving the yields of 15-25 %. These fractions contained various phytochemicals; most of them were strong antioxidants. In conclusion, the results indicate that the fractions isolated from berry pomace contain valuable bioactive compounds, and therefore may find application in functional foods, nutraceuticals, cosmetics and other products.

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