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Green extraction of polyphenols from whole pomegranate fruit using cyclodextrins

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ABSTRACT

Pomegranate is a source of bioactive phytochemicals. The objective of this study was the derivation of a sustainable method to exploit the whole fruit, both edible and non-edible parts, as a source of polyphenols. Pomegranate peel contains a 10-fold higher phenolic content than the pulp. The fruit was freeze-dried and the resulting dry matter was extracted with solid-liquid percolation equipment using non-toxic and eco-friendly extraction solvents: either deionized water or aqueous solutions of cyclodextrins. Cyclodextrins (CDs) are known molecular encapsulators and our results prove enhancement of the extraction of pomegranate polyphenols by 20%. In order to examine the formation of inclusion complexes between CD's and polyphenols of the extract, polyphenols were isolated using solid-phase extraction. NMR studies with the purified extracts and the individual CDs confirmed inclusion complex formation in water. Pomegranate liquid extracts may be used as raw materials for several end-users in the food, cosmetic and pharmaceutical industries.