

EXTRACTION OF PHENOLIC AND FLAVONOID COMPOUNDS FROM SOLID WASTES OF GRAPE SEED OIL PRODUCTION BY COLD PRESSING

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ABSTRACT

The objective of this investigation was to assess the advantages of phenolics removal from the grape seeds cold-pressing waste in comparison with their extraction from whole seeds. Series of batch solid-liquid experiments were carried out in order to determine: (a) at two temperature levels (25 and 60°C) the most convenient solvent from seven ethanol-water mixtures in the range 0 – 95 % tested (choosing flavonoid extraction capacity as criterion) and the extraction kinetics using the best solvent; (b) the effect of liquid to solid ratio in the range 2.5 - 50 ml g⁻¹ on the total phenolic and flavonoid concentrations in the extracts from pressing waste; (c) the number of extractions necessary to attain a practically complete extraction from whole seeds and pressing waste. The data obtained from these experiments allowed to be evaluated the losses of phenolics and their flavonoid fraction in the course of the cold pressing process and their removal. The radical scavenging properties of the extracts from both sources were also investigated and correlated with the current total phenolic and flavonoid concentrations. The study has shown that the waste of grape seeds cold pressing can be classified as valuable phenol-rich resource. The fast one stage removal (within 20 min) at ambient temperature providing sufficiently high phenolic and flavonoid concentrations at reduced energy and solvent costs compensates for the losses and encourages the combination of seeds cold pressing with the liquid extraction of its solid wastes in industrial practice.

Keywords: grape seeds, cold-pressing wastes, valorisation, phenolic antioxidants, extraction kinetics.

INTRODUCTION

In recent years, there has been an increasing trend towards more efficient utilization of agro-industrial residues due to environmental and economic impacts. Among them, grape is one of the most economically important fruit crops and the processing industry transforms more than 20 % of the treated grapes into organic residues, part of which is used as compost, adsorbents, animal feed, or for biomass production [1]. Considering the growing demand for natural extracts and their derivatives, one of the most efficient options is the recovery of high value compounds suitable for use

in various food, cosmetic and pharmaceutical products or other industrial applications.

Grape seed extracts are among the most studied and marketed grape-based byproducts because of their high and very specific content of phenolic compounds, which display a broad spectrum of biological, pharmacological and protective properties against free radicals and oxidative stress. Though quantitative and qualitative variabilities of phenolics and polyphenolics have been confirmed in seeds of numerous sorts at various climate conditions, the major individual phenolics identified are usually divided into two groups: flavonoid compounds, mainly monomeric flavan-3-ols (catechin, epicatechin),