Assessment of the polyphenolic composition of orange wastes from agri-food industries by HPLC-UV-MS/MS

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The industrial production of orange juices generates large amounts of wastes highly rich in polyphenolic compounds with great antioxidant properties. Hence, in the framework of circular economy, orange residues result in a excellent source of valuable by-products that can be recovered and purified to be further used in pharmaceuticals, nutraceuticals and functional foods.

In this work, orange wastes consisting of solid mixtures of skin and pulp residues have been treated with water and hydroalcoholic solutions under mechanical shaking to recover the polyphenolic components. The resulting extracts have been centrifuged and filtered, and solutions obtained have been analyzed chromatographically to try to identify the most remarkable phenolic species they contain. The analytical method relies on reversed phase (C18) liquid chromatography with UV/vis and mass spectrometric (MS) detection using 0.1% formic acid in water and acetonitrile as the components of the mobile phase. Chromatograms have been acquired with UV detection at 280, 325 and 370 nm, and MS (low and high resolution) detection with different acquisition modes, including full scan, data-dependent acquisition (DDA) and multiple reaction monitoring (MRM).

Results have confirmed the presence of astilbin, p-coumaric acid, rutin, ferulic acid, diosmin, caffeic acid, hesperetin, naringenin and hesperidin, which have also been quantified using HPLC-MS. Hesperidin is the major compound in the extract solutions, with a concentration of about 30 mg L^{-1}. Naringenin and hesperetin are found at concentrations of about 13 and 3 mg L^{-1}, respectively, and the rest of the compounds are found at concentrations below 1 mg L^{-1}.

Keywords: polyphenols, orange wastes, liquid chromatography, mass spectrometry