

Identification of Bioactive Substances of *Opuntia ficus-indica* By-Products

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Abstract : The first economic importance of *Opuntia ficus-indica* relies on the production of edible fruits. This food transformation generates a large amount of by-products (seeds and peels) in addition to cladodes produced by the plant. Several studies showed the richness of these products with bioactive substances like phenolics that have potential applications. Indeed, phenolics have been associated with protection against oxidation and several biological activities responsible of different pathologies. Consequently, there has been a growing interest in identifying natural antioxidants from plants. This study falls within the framework of the industrial exploitation of by-products of the plant. The study aims to investigate the metabolic profile of three by-products (cladodes, peel seeds) regarding total phenolic content by liquid chromatography coupled to mass spectrometry approach (LC-MSn). The byproducts were first washed, crushed and stored at negative temperature. The total phenolic compounds were then extracted by aqueous-ethanolic solvent in order to be quantified and characterized by LC-MS. According to the results obtained, the peel extract was the richest in phenolic compounds (1512.58 mg GAE/100 g DM) followed by the cladode extract (629.23 GAE/100 g DM) and finally by the seed extract (88.82 GAE/100 g DM) which is mainly used for its oil. The LC-MS analysis revealed diversity in phenolics in the three extracts and allowed the identification of hydroxybenzoic acids, hydroxycinnamic acids and flavonoids. The highest complexity was observed in the seed phenolic composition; more than twenty compounds were detected that belong to acids esters among which three feruloyl sucrose isomers. Sixteen compounds belonging to hydroxybenzoic acids, hydroxycinnamic acids and flavonoids were identified in the peel extract, whereas, only nine compounds were found in the cladode extract. It is interesting to highlight that the phenolic composition of the cladode extract was closer to that of the peel exact. However, from a quantitative viewpoint, the peel extract presented the highest amounts. Piscidic and eucomic acids were the two most concentrated molecules, corresponding to 271.3 and 121.6 mg GAE/ 100g DM respectively. The identified compounds were known to have high antioxidant and antiradical potential with the ability to inhibit lipid peroxidation and to exhibit a wide range of biological and therapeutic properties. The findings highlight the importance of using the *Opuntia ficus-indica* by-products.

Keywords : characterization, LC-MSn analysis, *Opuntia ficus-indica*, phenolics

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