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NATURAL DEEP EUTECTIC SOLVENTS FOR SUSTAINABLE EXTRACTION OF LIGNANS FROM BURDOCK SEEDS

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Burdock (*Arctium lappa L.*, Asteraceae) is a herbaceous biennial plant widely distributed in temperate regions of Europe and Asia. Apart from its status as a nutritive and healthy food, the burdock enjoys a longstanding use in traditional medicine. In terms of therapeutic potential, burdock roots, leaves and seeds stand out in particular. Burdock seeds have been commonly used for the treatment of sore throat, urinary tract complaints and various dermatological conditions. In addition, they are recognized as promising antidiabetic and anticancer agents. It is believed that the main contributors to these medicinal properties are lignans – arctigenin (aglycone) and arctiin (glycoside). Moreover, it has been suggested that the predominance of one of these two compounds, which is dependent on glycoside stability, significantly influences pharmacological activities. The present work aimed to examine the effect of green solvents, natural deep eutectic solvents (NaDESs), on the extraction of arctigenin and arctiin from burdock seeds, considering their impact on arctiin to arctigenin conversion. Eight different NaDESs, composed of betaine or proline as a hydrogen bond donor, and organic acids (lactic and citric) or polyols (sorbitol and glycerol) as hydrogen bond acceptor, were used for the ultrasound-assisted extraction of arctigenin and arctiin from burdock seeds, and further compared with the conventional solvents (water, 70% ethanol and 70% methanol). Based on the results obtained by the HPLC analysis, two groups of burdock seed extracts were separated – arctiin (betaine/organic acids; proline/organic acids; 70% ethanol and 70% methanol) and arctigenin (betaine/polyols; proline/polyols and water) rich extracts. Proline/lactic acid showed the highest extraction capacity for arctiin (27.8 mg/g dry seed), whereas proline/glycerol mixture proved to be the most efficient extraction solvent for arctigenin (20.4 mg/g dry seed). On the other hand, the amount of analysed lignans was approximately 4-fold lower in extracts prepared with conventional solvents. It seems that the extraction, as well as the transformation of arctiin to arctigenin, could be connected with physicochemical characteristics of the solvent. Overall, these results highlight the potential of NaDESs for obtaining burdock seed extracts with a favourable chemical composition that can be used in the field of the cosmetic or pharmaceutical industry.

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