

Comparison of two stirring devices for NADES sequential extraction of polyphenols from soybean

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Background. Soybean (*Glycine max* L) is low cost and highly nutritional food; it has gained much attention as a protein source and also for its biocompounds content [1]. As well, the use of green solvents like Natural Deep Eutectic Solvents (NADES) for the biocompounds extraction is relevant in a world in which sustainability interest is rising because green solvents are environmentally friendly and safer alternatives that offer numerous advantages such as a lower toxicity, recyclability and biodegradability [2].

Aim. The aim of this study is to select the best method for the extraction of polyphenols from soybean using a combination of hydrophilic and hydrophobic NADES.

Methods. Isoflavone solubility prediction was performed by using the conductor-like model for real solvents (COSMO-RS) and 3 hydrophobic (Camphor: Thymol (C:T, 3:2 (molar ratio)), Caprylic acid: Lauric acid (C8:C12, 3:1) and Caprylic acid: L-Proline (C8:Pro, 2:0.5)) and 3 hydrophilic (Citric acid: Glucose (CA:Glu, 1:1), Choline Chloride: Citric acid (ChCl:CA, 1:1), Choline Chloride: Glucose (ChCl:Glu, 1:1)) NADES were selected. Heating - stirring (HS) and heating - orbital shaker (HOS) (45 ± 5 °C and 45 minutes) were compared using all hydrophobic - hydrophilic combinations. The extracts were analysed for Total Phenolic Content (TPC) using Singleton and Rossi (1965) method [3].

Results. Differences were observed between HS and HOS in hydrophilic extracts. The combination of C:T and CA:Glu was the best for the extraction of polyphenols in the hydrophilic phase. HS showed higher TPC than HOS, 23.6 ± 3.3 vs. 17.1 ± 2.3 mg GAE/g.

Conclusion. HS with C:T and CA:Glu sequential extraction of polyphenols from soybean was effective. COSMO-RS screening has facilitated the identification of the most interesting combination of NADES formulations reducing the need for extensive experimental assays.

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