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## **A green strategy to improve the bioavailability of bioactive ingredients of *Sambucus ebulus* L.: Perspective of using NADES solvents from the environmental point of view**

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The use of active substances that have a certain biological activity is indispensable in many industries such as food, pharmaceutical, cosmetics, biotechnology, and many others. However, their synthesis is inevitably accompanied by the generation of significant amounts of solid, liquid and gaseous waste, with the E-factor (which is taken as a relevant indicator of process sustainability) ranging from 25 to > 100 kg waste/ kg of product. The waste that is generated can be of very complex chemical composition and largely reaches the environment. A special problem is the fact that the speed at which it is released into the environment is many times higher than the speed of its degradation and transformation, which leads to long-term negative impact on organisms and the environment. As an alternative to synthesized biomolecules, natural bioactive compounds appear. However, their extraction from natural substances requires the use of large amounts of organic (often toxic) solvents that also have side effects on both human health and the environment. In addition, they are characterized by insufficient selectivity, which leads to co-extraction of interfering components. Relying on the principles of green chemistry, the latest generation of natural solvents has been developed that fully meet the requirements for environmental maintenance, but also the efficiency of the process. In addition, it makes the process more economical and, as a rule, requires less energy consumption. These solvents are natural deep eutectic solvents (NADES). Prepared from exclusively natural components, such as: amino acids, sugars, water, etc. they are completely biodegradable, edible and absolutely harmless to the environment and humans. In the framework of this paper, several NADES solvents have been prepared with the aim of extracting bioactive principles from the plant *Sambucus ebulus* L., which can be later incorporated into functional products. The obtained extracts were characterized in terms of the chemical composition and bioactivity. The obtained results showed that the bioactive principles extracted by NADES solvents were superior to the bioactive ones obtained by organic solvents. This shows the perspective of the use of these green and safe solvents in the future, having in mind their economic profitability, the impact on the increased economy of the process, but also extremely favorable impact when it comes to environmental protection.

Keywords: NADES solvents, bioactive compounds, extraction, green and sustainable development.

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