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Intensification of anthocyanin extraction from *Sambucus nigra* fruits using ultrasonic probe: Effect of factors, and comparison with conventional extraction approach

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There is a growing interest in the use of plant raw materials raised by evidence concerning their potential as a reputable source of new biologically important molecules and as a high-quality dietary supplement ingredient. Elderberry (*Sambucus nigra* L.) fruit has great industrial potential due to its high content of anthocyanins – primarily cyanidin-3-sambubioside, cyanide-3-O-glucoside, cyanidin 3,5-diglucoside, and flavonoids - mainly quercetin, rutin, quercetin-3-O-glucoside.

Conventional solid-liquid extraction (SLE) is suitable for isolation of these compounds depending on the applied process parameters. The question is whether it is cost-effective concerning extraction time, required amount of solvent, and efficiency. The application of ultrasound-assisted extraction (UAE) using ultrasonic probe can intensify the extraction rate by the rupture of the cell wall due to formation of microcavities with minimal energy loss.

In this study, the effectiveness of SLE and UAE using ultrasonic probe for the isolation of phenolic compounds from dried elderberry fruits was examined. SLE with 30% ethanol was performed for 24h. During the UAE process using the same solvent, extraction time (2-6 min), and sonication amplitude (20-100%) were varied. Changes in temperature, energy consumption, and ultrasonic power were observed.

After measuring the content of total phenols and monomeric anthocyanins, it was determined that UAE has higher efficiency in comparison to SLE. The important advantage of UAE was significantly shorter extraction time. Overall, it appears that UAE using ultrasonic probe can give significant process intensification benefits and effectively be used for the extraction of valuable compounds from plant material.