

Hydrophobic Menthol–Dodecanoic Acid Deep Eutectic Solvent as a Sustainable Extractant for Phenolic Compounds from Lamiaceae Herbal Drugs

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INTRODUCTION & AIM

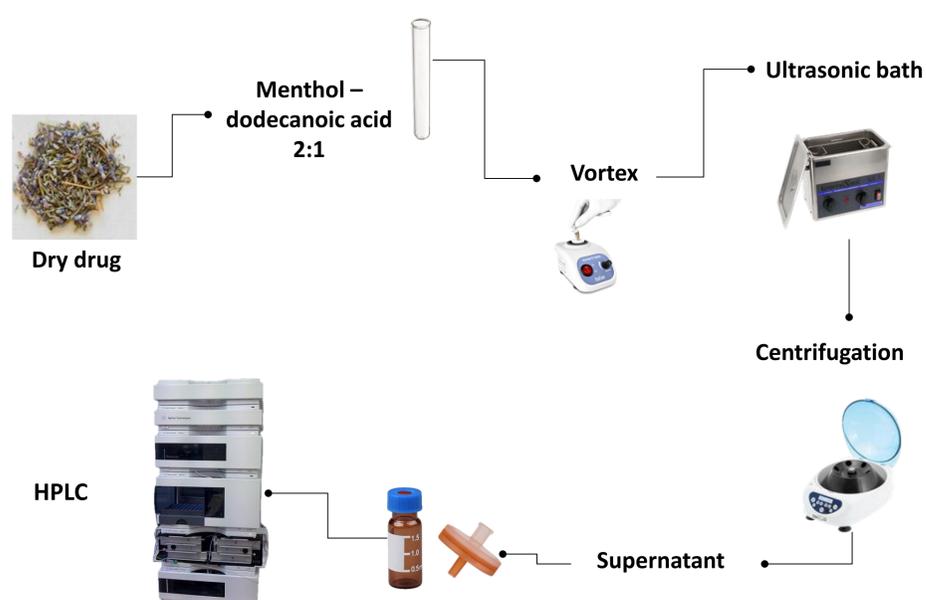
Green extraction techniques are essential for reducing the environmental impact of natural product isolation and advancing circular bioeconomy strategies. Hydrophobic deep eutectic solvents (DES), particularly menthol-based systems, have emerged as biodegradable, low-toxicity alternatives to conventional organic solvents. This study evaluates a menthol–dodecanoic acid DES

as a sustainable medium for extracting phenolic acids and flavonoids from commonly used Lamiaceae herbal drugs.



METHOD

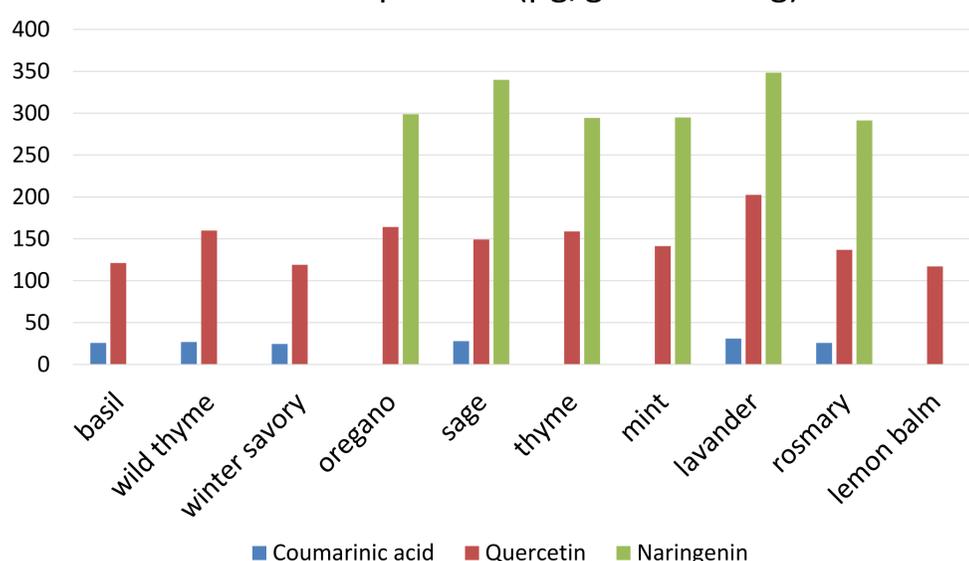
Ten monocomponent herbal drug samples (basil, thyme, savory, oregano, sage, mint, lavender, rosemary, lemon balm, and additional thyme sample) produced at the Institute for Medicinal Plant Research “Dr Josif Pančić” were examined. Extractions were carried out using a hydrophobic DES composed of menthol and dodecanoic acid (2:1). Phenolic profiles were determined by high-performance liquid chromatography (HPLC), focusing on representative phenolic acids and flavonoids.



RESULTS & DISCUSSION

The DES demonstrated effective solubilization of compounds with different structural characteristics. Coumaric acid was detected in concentrations ranging from 0.0244 to 0.0308 mg/g drug, quercetin from 0.1189 to 0.2025 mg/g drug, and naringenin from 0.2912 to 0.3483 mg/g drug. In lavender extract, cinnamic acid was additionally quantified at 0.0177 mg/g drug. These findings confirm that the menthol–dodecanoic acid DES enables successful extraction of both phenolic acids and flavonoids without relying on volatile or hazardous solvents.

Content of phenols ($\mu\text{g/g}$ crude drug)



CONCLUSION

The menthol–dodecanoic acid DES represents an environmentally friendly, economical, and efficient extractant for selected phytochemicals from Lamiaceae plants. Its performance supports broader implementation of hydrophobic DES within sustainable extraction platforms aimed at reducing ecological burden and improving the selectivity and safety of natural product processing.

FUTURE WORK / REFERENCES

Branislava Teofilović, Emilia Gligorić, Martina Ninić, Saša Vukmirović, Žarko Gagić, Nebojša Mandić-Kovačević, Biljana Tubić, Đorđe Đukanović, Nevena Grujić-Letić. Green Extraction Combined with Chemometric Approach: Profiling Phytochemicals and Antioxidant Properties of Ten Species of the Lamiaceae Family. *Separations* 2025, 12(6), 155.