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## UHPLC-MS/MS profiling and biological activities of phenolic compounds from three duckweed species for the identification of potential health-promoting biomolecules

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Duckweeds have gained increasing attention as sustainable sources of bioactive compounds with promising applications in functional foods and nutraceuticals. This study comprehensively characterized the phenolic profiles of three duckweed species (*Lemna minor*, *Lemna gibba*, and *Spirodela polyrhiza*) using ultra-high-performance liquid chromatography coupled with tandem mass spectrometry (UHPLC-MS/MS). The bioactive potential of the extracts was evaluated through in vitro antioxidant, enzyme inhibitory, anti-inflammatory and ACE-inhibitory assays to assess their functional properties. Targeted UHPLC-MS/MS analysis revealed distinct species-specific phenolic profiles, with quinic acid identified as the predominant compound in all species, particularly in *L. minor* (3.99 µg/mg extract DM), followed by *L. gibba* (2.31 µg/mg extract DM) and *S. polyrhiza* (1.64 µg/mg extract DM). *S. polyrhiza* exhibited a characteristic flavonoid-rich profile, with markedly higher concentrations of luteolin-7-O-glucoside (2.11 µg/mg extract DM) and vitexin (2.13 µg/mg extract DM) compared with *L. minor* (0.47 and 0.20 µg/mg extract DM, respectively) and *L. gibba* (0.12 and 0.10 µg/mg extract DM, respectively). Apigenin was detected exclusively in *S. polyrhiza*, whereas caffeic acid was most abundant in *L. gibba* (0.49 µg/mg extract DM). Among the three species, *L. minor* demonstrated the highest total phenolic content (23.54 mg GAE/g DW), ferric reducing antioxidant power (FRAP; 43.55 mmol Fe<sup>2+</sup>/g DW). Principal component analysis revealed strong associations between specific phenolic constituents and measured biological activities, suggesting that species-specific phenolic profiles contribute to the functional properties of duckweed extracts. These findings highlight duckweed as a promising sustainable source of phenolic compounds with potential applications as functional food ingredients and health-promoting nutraceuticals.

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### Scientific Session

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### References

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