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DEVELOPMENT OF BIO-BASED INGREDIENTS FROM UNDERUSED TREES AND SHRUB SPECIES FOR INDUSTRIAL APPLICATION

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Around the world, the strategies of companies and governments are increasingly converging around the concept of using biomass in industry. Besides the benefit from moving away from fossil-based raw materials, the use of natural matrices bring health properties and functionalities to the final products and is desirable from a circular economy perspective. This is leading industries like the food, cosmetic and pharmaceutical to look for bio-based ingredients to obtain these bio-based products [1].

To not compete with the current use of biomass, one strategy to obtain these natural ingredients could be the use of underutilized species cultivated in marginal lands. This research has different purposes such as the chemical characterization of selected natural matrices from Germany, Spain and Romania (*Betula pendula*, *Calluna vulgaris*, *Carpinus betulus*, *Cistus ladanifer*, *Cupressus sempervirens*, *Cytisus scoparius*, *Euonymus europaeus*, *Hippophae rhamnoides*, *Juniperus communis*, *Populus nigra*, *Robinia pseudoacacia*, *Rosmarinus officinalis*, *Rubus fruticosus*, *Spartium junceum*, *Ulmus minor* and *Ulmus pumila*) to know and improve the contents in the target compounds (triterpenoids, phenolic compounds, including flavonoids and proanthocyanidins, hydrosoluble tannins, among others). After the chemical characterization, the extraction procedures can be optimized using experimental design tools based on response surface models to obtain high yields and highly pure essential oils and polar extracts. The obtained responses will be monitored based on extraction yield and HPLC-DAD-MS analysis. The optimized extracts in the target compounds will be refined using membrane technologies in ultrafiltration processes, semi-preparative and preparative chromatography, selective precipitation and crystallization, adsorbent bed purification to obtain purified fractions or isolated compounds. To monitor the efficiency of each process and select the most adequate methodology, HPLC-DAD will be applied. From the final extracts and/or isolated compounds, a fully characterization of the bioactive potential will be done, namely through the antioxidant, antimicrobial, cytotoxic, and anti-inflammatory properties.

From these bioactive screening, each developed extract and/or isolated compound will be analyzed according to different market requirements and regulatory documents to determine their applications as nutraceuticals, plant-based medicaments, feed additives and cosmetic ingredients.

References

[1] Cho, E. J., Trinh, L. T. P., Song, Y., Lee, Y. G., & Bae, H. J. (2020). Bioconversion of biomass waste into high value chemicals. *Bioresource Technology*, 298.

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