

# EthnoHERBS: Conservation of European Biodiversity through Exploitation of Traditional Herbal Knowledge for the Development of Innovative Products

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## Abstract

EthnoHERBS is a H2020-MSCA-RISE project aiming to record and evaluate information on SE European traditional knowledge, explore in a high-throughput manner the biodiversity of Balkan Peninsula flora and elaborate cutting-edge technologies in Natural Products Chemistry to discover and develop innovative cosmeceutical products against skin disorders. Within the frame of EthnoHERBS, information on herbal traditional medicines to treat various skin disorders have been searched in: (i) scientific publications concerning ethnobotanical surveys conducted in Balkan territory and secondarily in other Mediterranean regions, whose flora has some similarities with the SE European one, (ii) ancient and byzantine texts that exist in digital libraries and databases and (iii) existing collections of manuscripts found in public institutions.

In more details, 198 ethnobotanical studies have been identified which were carried out in Balkans and South-Eastern European Countries, resulting in a wealth of data having been recorded. In addition, three ethnopharmacological surveys were carried out in small cities and villages of North Greece and Central Serbia. From review research on the traditional medical practices for the treatment of skin disorders in Albania, Cyprus, Greece and Turkey, 967 taxa belonging to 418 different genera and 111 different families were identified for the treatment of skin related problems. Literature evaluation highlighted that, the most commonly used species are *Plantago major* L. (Albania, Turkey), *Hypericum perforatum* L. (Greece, Turkey), *Sambucus nigra* L.

(Cyprus, Greece), *Ficus carica* L. (Cyprus, Turkey), *Matricaria chamomilla* L. (Cyprus, Greece) and *Urtica dioica* L. (Albania, Turkey), while many medicinal plants reported by interviewees were common in all four countries. Furthermore, more than 350 preparations of herbal and animal origin have been identified for the treatment of skin diseases in Dioscorides' work "De Materia Medica" and finally four independent databases, containing different set of ethnobotanical data, have been established. The evaluation of the aforementioned data resulted in the selection of 240 plant species, which were further investigated through in silico procedure. More specifically, the secondary metabolites that have been isolated from the selected species were searched in REAXYS database and their chemical structures were designed and converted to the appropriate form (SMILES strings) for the in silico study. Almost 210.000 ligands were docked within the experimental binding cavity of selected enzymes (tyrosinase, hyaluronidase, elastase, cyclooxygenase, lipoxygenase, collagenase and xanthinoxidase). The results of in silico scoring and the distribution of selected plant species in the Balkan Peninsula were taken into account for the determination of herbs to be collected. More than 300 extracts have been prepared using the Ultrasound Assisted Extraction and the investigation of their phytochemical profile was performed using chromatometric methods (TFC, TPC) and analytical techniques (HPTLC, HPLC, NMR). In addition, 180 extracts have been evaluated for their DPPH scavenging properties as well as their inhibitory activity against the abovementioned enzymes.

Finally, a methodology for the efficient fractionation

of the most promising herbal preparations with CPC technique, as well as a platform for the direct identification of active constituents in the extracts, have been established.

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