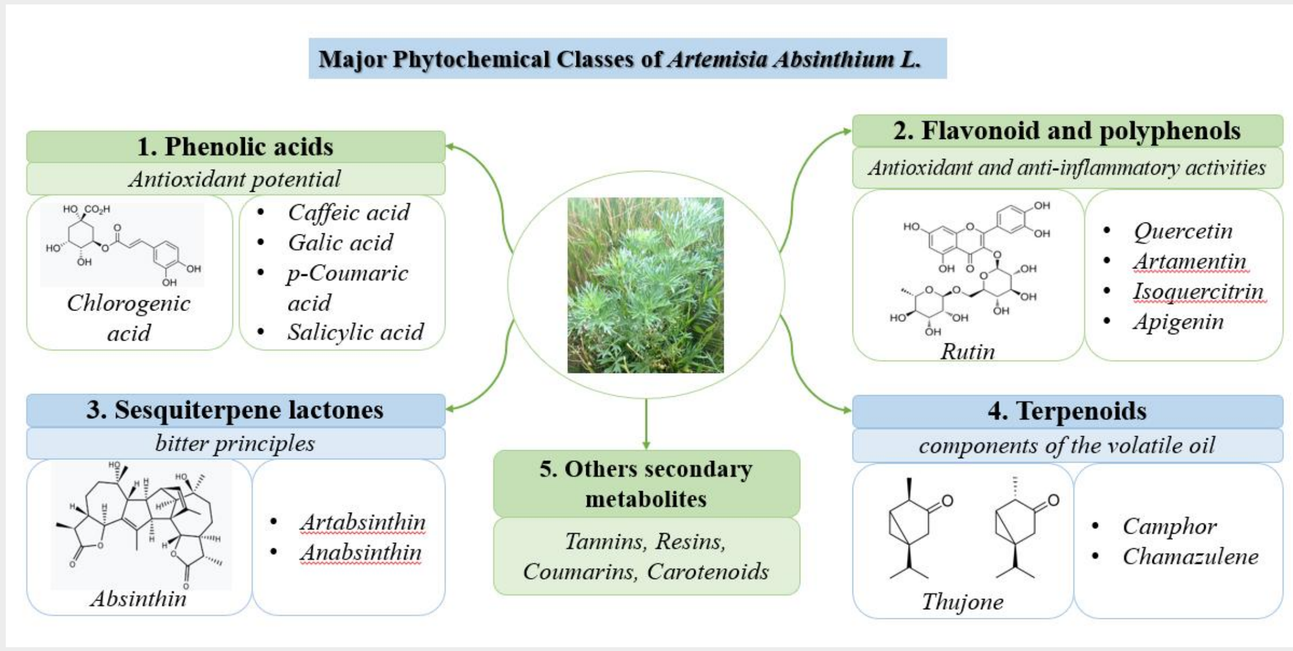
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EXPLORING THE PHYTOCHEMICAL POTENTIAL OF *ARTEMISIA ABSINTHIUM L.* FOR CUTANEOUS APPLICATIONS: LITERATURE-BASED INSIGHTS AND PRELIMINARY EXTRACT CHARACTERIZATION

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Artemisia absinthium L. is a medicinal plant known for its complex phytochemical composition, including phenolic compounds, flavonoids, sesquiterpene lactones and volatile terpenoids. Several studies have reported its biological properties, highlighting its potential as a source of bioactive compounds for pharmaceutical and cosmetic applications [1–3]. The valorisation in topical formulations remains insufficiently explored. The phytochemical profile of plant extracts is strongly influenced by extraction conditions, particularly the nature and physicochemical properties of the extraction medium. Solvent characteristics and polarity affect the recovery and selectivity of different plant constituents, resulting in extracts with distinct chemical compositions [4,5].

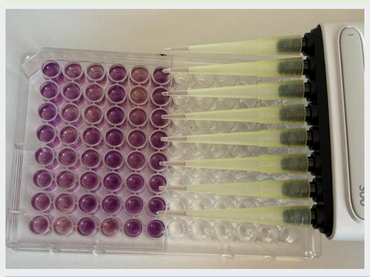


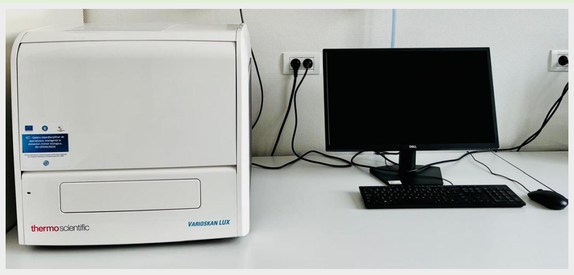
Therefore, the selection of an appropriate extraction medium is an important step in obtaining extracts with potentially relevant functional properties. Based on this rationale, the present study aimed to provide a preliminary comparative evaluation of various solvent extracts of *A. absinthium*. The investigation focused on their chemical profiles using FT-IR spectroscopy, total phenolic content and antioxidant activity assessed by the DPPH assay. We hypothesized that the extraction medium influences the phytochemical composition and antioxidant properties of the resulting extracts. This preliminary work provides a basis for further chemical characterization and assessment of their potential for topical applications.

Tabel 1. Summary of literature studies from on the cosmetic applications of Artemisia species. The literature search was conducted using the Web of Science database, with the keywords "Artemisia absinthium" and "cosmetic".

Species Artemisia	Extraction methods/ solvents used	Phytochemical characterization	Cosmetic targeting
A. ABSINTHIUM [1-11; 14-18; 20; 24; 25; 26]	Water [2; 4; 8; 17] Ethanol [2; 4; 8] Hydrodistillation [3; 7; 9; 11] Methanol [4; 10] Chloroform [4; 8] Polyorganosiloxanes [6]	TPC – Folin-Ciocalteu assay [2; 5] TFC – Folin-Ciocalteu assay [2] Antioxidant activity: DPPH [2; 7; 10; 15; 16] ORAC [2] TBARS [2] ABTS [16] Quantification of flavonoid content: HPLC [2] Analysis of volatile organic compounds: GC-MS/GC-FID [3; 7; 8; 9; 11; 15] Profiling of extracted non-volatile or medium-polarity metabolites – LC-MS [10] Determination of metal content – AAS [14]	Hydrating cleansers, serums, eye masks, and hair care products [1; 25] Cosmetic gel based on wormwood hydrosol, in the form of an emulsion [2]
A. SEROTINA ***A. NITROSA*** ***A. SUBLESSINGIANA*** ***A. PAUCIFLORA*** [2]	Water, Ethanol [2]	TPC – Folin-Ciocalteu assay [2] TFC – Folin-Ciocalteu assay [2] Antioxidant activity: DPPH [2] ORAC [2] TBARS [2] Quantification of flavonoid content: HPLC [2]	
A. ABROTANUM ***A. ANNUA*** [4; 10]	Water, Ethanol, Methanol, Chloroform [4]	Profiling of extracted non-volatile or medium-polarity metabolites – LC-MS [10] Antioxidant activity: DPPH [10]	
A. DRACUNCULUS [4; 5; 19]	Water, Ethanol, Methanol, Chloroform [4] Hydrodistillation [19]	TPC – Folin-Ciocalteu assay [5] Antioxidant activity: DPPH [19]	Moisturizing creams, shampoos, lotions, and cleansing milk [19]
A. VULGARIS [4; 5; 10; 12] ***A. ALBA TURRA*** ***A. SANTANICUM*** [5; 10] ***A. VERLOTIORUM*** [10]	Water, Methanol, Chloroform [4] Ethanol [4; 12] Hydrodistillation [12]	TPC – Folin-Ciocalteu assay [5; 12] TFC – Folin-Ciocalteu assay [12] Profiling of extracted non-volatile or medium-polarity metabolites – LC-MS [10] Antioxidant activity: DPPH [10] Analysis of volatile organic compounds: GC-MS/GC-FID [12]	
A. SCOPARIA ***A. SIEBERI*** [9]	Hydrodistillation [9]	Analysis of volatile organic compounds: GC-MS/ GC-FID [9]	
A. AUCHERI [11]	Hydrodistillation [11]	Analysis of volatile organic compounds: GC-MS/ GC-FID [11]	
A. HERBA ALBA [13]	Water [13]	Analysis of volatile organic compounds: GC-MS/ GC-FID [13] TPC – Folin-Ciocalteu assay [13] Antioxidant activity: DPPH [13]	

The extraction approaches and analytical methods used to characterize Artemisia extracts, highlight their phytochemical composition and reported biological activities. Their use in topical applications remains relatively underexplored. Therefore, comparative studies addressing the influence of extraction media on phytochemical recovery, extract composition, biological properties and suitability for topical formulations are still limited. These knowledge gaps support further research aimed at developing and characterizing standardized plant extracts with potential cosmetic applications.





Total phenolic content (TPC) and DPPH radical scavenging activity were determined using a **Thermo Scientific™ Varioskan™ LUX** multimode microplate reader, based on UV-Vis absorbance measurements.

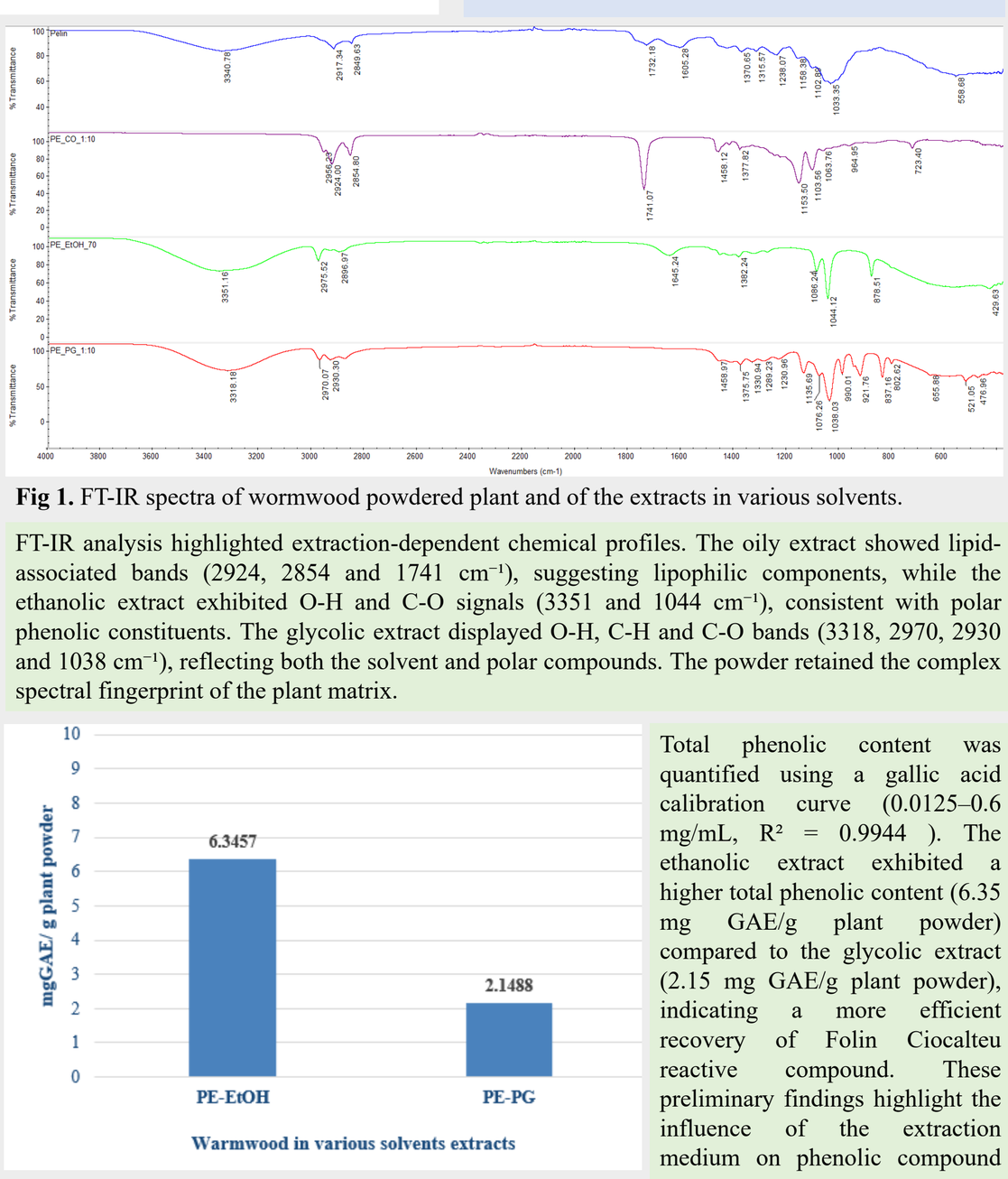


Fig 1. FT-IR spectra of wormwood powdered plant and of the extracts in various solvents.

FT-IR analysis highlighted extraction-dependent chemical profiles. The oily extract showed lipid-associated bands (2924, 2854 and 1741 cm^{-1}), suggesting lipophilic components, while the ethanolic extract exhibited O-H and C-O signals (3351 and 1044 cm^{-1}), consistent with polar phenolic constituents. The glycolic extract displayed O-H, C-H and C-O bands (3318, 2970, 2930 and 1038 cm^{-1}), reflecting both the solvent and polar compounds. The powder retained the complex spectral fingerprint of the plant matrix.

Fig 2. TPC measurements expressed in Gallic Acid Equivalents

Total phenolic content was quantified using a gallic acid calibration curve (0.0125–0.6 mg/mL, R^2 = 0.9944). The ethanolic extract exhibited a higher total phenolic content (6.35 mg GAE/g plant powder) compared to the glycolic extract (2.15 mg GAE/g plant powder), indicating a more efficient recovery of Folin Ciocalteu reactive compound. These preliminary findings highlight the influence of the extraction medium on phenolic compound recovery.

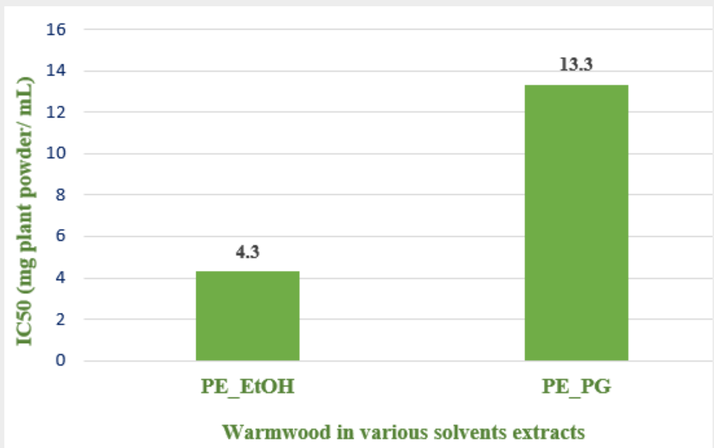


Fig 3. Antioxidant Activity – DPPH Assay

DPPH antioxidant method was determined using ascorbic acid calibration curve (0.5-10 µg/mL, R^2 = 0.9744). The ethanolic extract exhibited stronger DPPH radical-scavenging activity (IC_{50} = 4.3) compared to the glycolic extract (IC_{50} = 13.3). These results suggest a higher antioxidant potential for the ethanolic extract, which corelates with a greater content of total phenolic compounds.

Conclusions

1. **Extraction medium and phytochemical profile:** preliminary FT-IR results support the hypothesis that the extraction medium influences the chemical composition of *A. absinthium* extracts.
2. **Phenolic content and antioxidant activity:** the higher phenolic content of the ethanolic extract was accompanied by stronger antioxidant activity, suggesting a positive association between phenolic recovery and radical-scavenging capacity.
3. **Further investigations:** further studies, including LC-MS and GC-MS profiling, pH-dependent stability assessment, and antimicrobial and cytotoxicity assays, will provide a more comprehensive evaluation of the extracts and their potential for topical applications.

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