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Chemical Composition and Biological Importance of *Mespilus germanica* L. Leaves

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Abstract

Mespilus germanica L. (Rosaceae) is an underutilized species whose leaves represent a promising source of bioactive compounds, particularly phenolic acids and flavonoids. Recent studies indicate that leaf extracts contain elevated concentrations of chlorogenic acid and epicatechin compared with fruits and stem bark. Experimental investigations have demonstrated antioxidant, antibacterial, and anti-inflammatory activities, including inhibitory effects against Staphylococcus aureus. Traditionally, medlar leaves have been used as infusions and tinctures for digestive, respiratory, and inflammatory conditions, as well as for blood glucose regulation. These findings suggest potential applications of medlar leaves in functional foods, herbal preparations, and nutraceutical products. However, further research is required to establish their safety, efficacy, and potential clinical relevance.

Keywords: *medlar; chemical composition; phytochemical composition; nutritional value, antibacterial activity;*

• Introduction

Mespilus germanica L. (*Rosaceae*), commonly known as medlar, is an underutilized species whose leaves have attracted increasing scientific interest due to their phytochemical composition and potential biological activities. Although research has primarily focused on the fruits, the leaves represent a less-explored plant resource requiring specific investigation [1]. Comparative studies indicate that medlar leaves contain phenolic compounds and flavonoids, with concentrations varying among plant organs [2]. Anatomically, the leaves exhibit a thick cuticle, stomata on the lower epidermis, and distinct peristomatal structures, which may contribute to protection against fungal pathogens [3]. Traditionally, medlar leaf infusions have been used to alleviate abdominal pain, as documented in ethnobotanical studies from Iran [4]. These findings highlight the importance of further investigating the chemical composition and biological potential of *M. germanica* leaves.

• Material and method

This review focuses on studies investigating Mespilus germanica L. leaves, including their chemical composition, extraction methods, and biological activities [2,5]. Scientific publications and databases were examined, with data from other plant organs included only for relevant comparisons [6,7]. Phytochemical characterization included chromatographic identification and quantification of individual phenolic compounds, as well as total phenolic and flavonoid content determination. Antioxidant and antibacterial activities were evaluated based on the analytical methods, extract types, and experimental models reported in the literature [8,9]. Traditional uses, including infusions and tinctures, and microscopic observations of leaf surfaces were also considered.

• Results and discussions

Phenolic compounds and flavonoids are among the most extensively investigated bioactive constituents of *Mespilus germanica* L. leaves. Comparative analyses of *M. germanica* and *M. canescens* reveal significant variations in phenolic composition depending on species, plant organ, and extraction conditions [2].

The highest total phenolic content (Figure 1) was reported in *M. canescens* leaves (14.73 mg/g dry matter), followed by *M. germanica* seeds (13.70 mg/g dry matter). Total flavonoid content was highest in *M. germanica* fruits from northern Iran (0.90 mg/g dry matter), followed by *M. canescens* leaves (0.53 mg/g dry matter) [2]. Chlorogenic acid and epicatechin are highlighted among the relevant phenolic compounds, although their distribution requires confirmation through organ-specific chromatographic analyses. These findings emphasize the importance of plant organ identification, extraction methodology, and consistent reporting units when comparing phytochemical data.

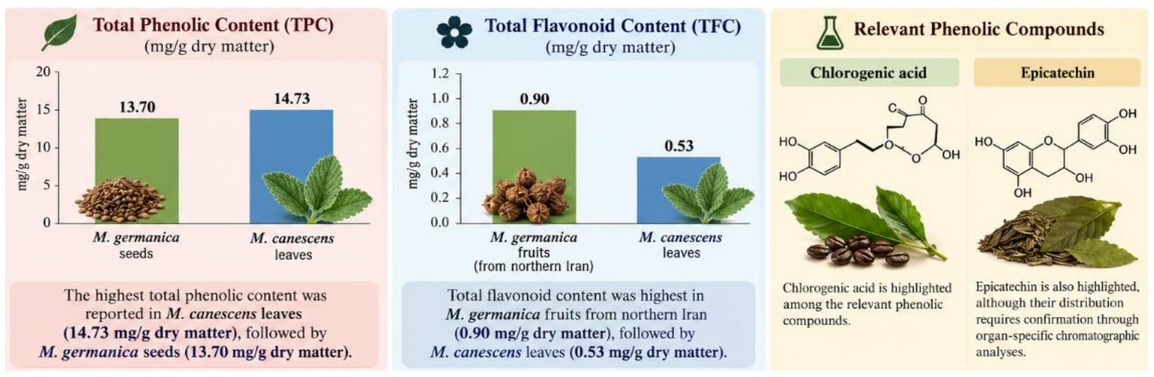


Figure 1 Comparative Phenolic and Flavonoid Profiles of *Mespilus germanica and Mespilus canescens*: Plant Organ Variability and Key Bioactive Compounds (created with the help of Open AI-ChatGPT)

• Conclusions

The leaves of *Mespilus germanica* L. hold potential for use that warrants further research, aimed at providing a detailed characterization of their phytochemical composition and functional properties. Existing studies generally highlight the presence of phenolic compounds and flavonoids, as well as antioxidant and antibacterial activity observed under laboratory conditions. Ethnobotanical data confirm the traditional use of infusions prepared from these leaves, while microscopic analyses help clarify their anatomical characteristics and their role in the plant's defense mechanisms.

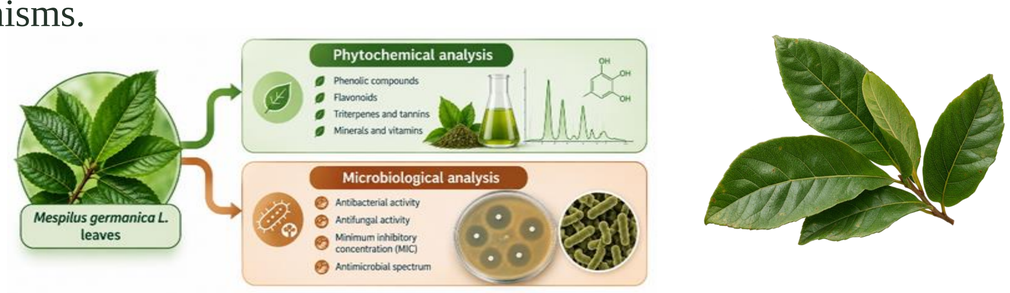


Figure 2. Schematic classification of the evidence considered for *Mespilus germanica L.* leaves. Conceptual synthesis based on published leaf-focused studies (created with the help of OpenAI-ChatGPT.)

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