TERAPEUTIC EFFECTS OF THE SPECIES *MYOSOTIS SYLVATICA*

ISAC MARIA CRINA[1]

Abstract: Natural products, whether pure compounds or standardized plant extracts, offer a wide range of opportunities for alternative sources of medicines due to their exceptional chemical diversity. The forget-me-not flower is a herbaceous plant with delicate flowers, valued for both its beauty and its therapeutic properties. Used throughout history in traditional medicine, this plant is attracting increasing interest due to its beneficial health properties. Recent studies suggest positive effects on the immune system, skin and cognitive health, and experimental and clinical research continues to investigate its benefits. In this article, the therapeutic uses of *Myosotis sylvatica*, its mechanisms of action and its impact on health are reviewed, highlighting the importance of this plant in modern medicine.

Keywords: *Myosotis sylvatica*, Medicinal plants, Forget-me-not, Therapeutic effects.

INTRODUCTION

The health is one of the main concerns of every individual, and the use of natural resources for improving and maintaining health has increased in recent years. In the current context, medicinal plants have gained particular notoriety through their therapeutic benefits and their role in preventing various diseases. Among these medicinal plants, the forget-me-not flower (*Myosotis sylavtica*) is also noteworthy, a species known both for its ornamental beauty and for its medical potential (Weryszko-Chmielewska, 2003).

The forget-me-not flower is originally from Asia and Europe, it is widespread throughout the world, managing to adapt easily to different environmental conditions (Winkworth *et al*., 2002). It belongs to the Boraginaceae family and is notable for its rich content in bioactive compounds recognized for their beneficial effects on health (Ebadi *et al*., 2023). The chemical components found in this plant include flavonoids, alkaloids, phenolic acids and tannins, all of which contribute to antioxidant, antimicrobial and anti-inflammatory properties (Tunon, Olavsdotter and Bohlin, 1995).

[1] Alexandru Ioan Cuza University of Iași, Bulevardul Carol I 22, Iași 700505, e-mail: *isacmariacrina@yahoo.com*

ROM. J. BIOL. – PLANT BIOL., VOLUME **70**, Nos. 1–2, P. 129–135, BUCHAREST, 2025

DOI: 10.59277/RJB-PB.2025.1-2.10

Through treatments or consumption of foods based on forget-me-not flower, various benefits can be obtained, such as supporting the immune system, improving inflammatory reactions and protecting against immune stress. At the same time, extracts obtained from this plant have been used in traditional medicine to treat digestive and respiratory system conditions (Shinkarenko, 2008).

However, forget-me-not is not only recognized for its therapeutic effects but also for being an important source of essential minerals such as iron, calcium, magnesium and potassium, thus contribute to maintaining the nutritional balance of the body. In this context, recent specialized literature has highlighted its potential as a natural ingredient in pharmaceutical products (Braithwaite, 2021).

MATERIALS AND METHODS

In this study, all data were obtained through an extensive review of specialized articles, available in the following databases: Google Scholar, ResearchGate, PubMed, Elsevier and ScienceDirect. We used the combination of the following keywords: "*Boraginaceae*", plant species name – *Myosotis sylvatica*, "cosmetics" and "herbal medicine" for searching these databases. Chapters and books were also checked. The most representative references used were written in English. The following steps were performed: (i) development of the article outline and formulation of questions; (ii) recognition of relevant works; (iii) selection and grouping of works; (iv) data collection, summarization, organization and interpretation of available research; (v) manuscript drafting and final editing.

RESULTS AND DISCUSSIONS

PLANT MORPHOLOGY AND ANATOMY

Myosotis sylvatic (fig.1) is a plant in the *Boraginaceae* family, with small (6–10 mm), radially symmetrical flowers arranged in monochasial inflorescences. The corolla is blue, sympallate, with five yellow nectariferous guides and a tube approximately 2 mm long. The ovary is tetralobate, and above it are ligulate folds of the corolla, which protect the reproductive structures and limit the access of pollinators. The flowers are protogynous, which promotes cross-pollination, and after fertilization, the corolla changes color to purple, signaling the end of the fertile stage (Weryszko-Chmielewska, 2003).

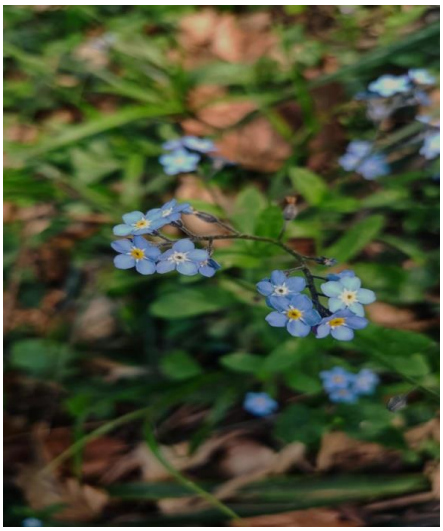

Figure 1. *Myosotis sylvatica.*

THE ROLE OF IMPORTANT CONSTITUENTS

The forget-me-not flower is composed of a wide range of compounds beneficial to human health and the prevention of serious diseases, due to its antioxidant, anti-inflammatory, regenerative and antibacterial properties. Extracts from this plant are used in various medical fields due to their rich content in allantoin, phenolic acids, flavonoids and essential oils (Tusevski *et al*., 2010). Flavonoids and phenolic acids in this plant play an important role in cellular protection and neutralize free radicals and prevent oxidative damage (Chen *et al*., 2015). These compounds contribute to slowing down the skin aging process and protect against the negative effects of pollution and UV rays. At the same time, phenolic acids have been associated with reducing the risk of cardiovascular diseases and improving cognitive functions. Allantoin, which is present in high quantities in *Myosotis* extracts, accelerates tissue regeneration, promotes wound healing and maintains skin hydration. Due to its soothing and emollient properties, allantoin is used in treatments for sensitive or irritated skin, showing beneficial effects on skin conditions such as atopic dermatitis and eczema. An important role is also played by the essential oils of *Myosotis* with a significant antimicrobial action, inhibiting the development of pathogenic bacteria and fungi (Magara *et al*., 2022). They are used in cosmetic products for the care of acne-prone skin and in natural solutions for disinfecting the skin and wounds.

In addition to all these benefits, the genus *Myosotis* contains essential minerals such as magnesium, selenium and zinc, thus contributing to maintaining a healthy nervous system, strengthening the immune system and preventing oxidative stress (Elkington, 1964). Zinc plays an important role in collagen synthesis and accelerating

the cell regeneration process, being essential in maintaining skin elasticity. Due to its rich content of active compounds, the Forget-me-not flower is recognized as having dermoprotective, antioxidant, anti-inflammatory and healing properties. It is used in various cosmetic products, including moisturizers, soothing lotions and skin care serums. In addition, recent studies suggest that extracts from *Myosotis* may have potential in preventing chronic inflammatory conditions and protecting against oxidative stress.

ANTIBACTERIAL EFFECTS

Myosotis sylvatica has demonstrated numerous therapeutic effects including significant antibacterial effects. Current studies have shown that oil extracts from the leaves of *Myosotis* species, including *M. palustris*, *M. arvensis*, *M. imitata* and *M. Krylovii*, inhibited the growth of pathogenic and opportunistic microbial species, such as *Shigella sonnei*, *Candida albicans* and *Pseudomonas aeruginosa* (Shinkarenko, 2008).

Myosotis sylvatica is known for its rich content of phenolic compounds, which play an essential role in the biological activities of plants. The high content of phenolic compounds such as salicylic acid, p-coumaric acid and ferulic acid has been associated with antibacterial potential. Analyses performed by high-performance liquid chromatography (HPLC-UV) identified nine main phenolic compounds in the species *Myosotis sylvatica*. Among them, salicylic acid (871.14 mg/kg), ferulic acid (661.69 mg/kg) and p-coumaric acid (247.84 mg/kg) were the major compounds. Salicylic acid was the most abundant compound, suggesting an important role in antibacterial activity (Ebadi *et al*., 2023).

The salicylic acid is notable for its action against pathogenic bacteria, such as *Staphylococcus aureus* and *Escherichia coli*, due to its anti-inflammatory and antimicrobial properties. At the same time, p-coumaric acid and ferulic acid have also demonstrated antibacterial effects by inhibiting bacterial growth and reducing oxidative stress at the cellular level. Phenolic compounds act by destroying bacterial cell walls, reducing oxidative stress and inhibiting enzymes essential for bacterial metabolism (Ebadi *et al*., 2023).

Thanks to all these compounds, *Myosotis sylvatica* can be used in the development of pharmaceutical products based on natural extracts for the treatment of bacterial infections. Extracts from this plant could represent a natural alternative to synthetic antibiotics, with potential in the pharmaceutical and food industries.

ANTIFUNGAL EFFECTS

Natural extracts from *Myosotis sylvatica* have shown antifungal effects on pathogenic fungi *Aspergillus niger* and *Candida albicans*. The mechanism by which *Myosotis sylvatica* shows its antifungal properties is based on its ability to interact with fungal cell membranes and this affects their structural integrity. Salicylic acid

inhibits the synthesis of ergosterol, an essential component of the fungal cell membrane, thus disrupting cellular homeostasis (Mehdiyeva, 2018). The antifungal effect of this plant is also reflected by the family (*Boraginaceae*) to which it belongs, recognized for its antifungal effects (Silva *et al*., 2024). Numerous experimental studies have demonstrated that extracts obtained from the aerial parts of *Myosotis sylvatica* act against pathogenic microorganisms (Mehdiyeva, 2018).

ANTI-INFLAMMATORY EFFECTS

Inflammation is a physiological response of the body to injury or infection, involving a series of biochemical reactions mediated by immune cells such as macrophages. These produce inflammatory mediators, such as cytokines or nitric oxide (NO), in response to stimuli such as bacterial lipopolysaccharides (LPS). One of the main factors involved in inflammation is nuclear factor kappa B (NF-κB), which stimulates the expression of enzymes such as cyclooxygenase-2 (COX-2) and inducible nitric oxide synthase (iNOS).

Numerous studies have reported on the anti-inflammatory effects that forget-me-not flower presents, effects exerted by inhibiting exocytosis induced by platelet activating factor (PAF). Experiments carried out have shown that PAF is present in a proportion of 92%, which indicates a high anti-inflammatory activity. And through this mechanism, the plant can influence inflammatory mediators, thus contributing to the reduction of inflammatory reactions (Tunon, Olavsdotter and Bohlin, 1995). The anti-inflammatory activity is also attributed to the presence of bioactive compounds such as pyrrolizidine alkaloids, secondary metabolites and flavonoids that can suppress NF-κB activation, thus reducing the production of inflammatory cytokines and oxidative stress (Janarny, Gunathilake and Ranaweera, 2021).

The anti-inflammatory activity can be attributed to the presence of bioactive compounds such as pyrrolizidine alkaloids, secondary metabolites or flavonoids. All these results suggest that this species can be used in the treatment of inflammatory conditions and thus opens the way for its use in natural therapies.

CARDIOPROTECTIVE EFFECTS

Cardiovascular diseases are one of the leading causes of mortality worldwide. Thus, the interest in medicinal plants with cardioprotective effects has increased. The active compounds in *Myosotis sylvatica* listed under anti-inflammatory effects contribute significantly to the protection of the myocardium against ischemic damage and the regulation of blood pressure. Various preclinical studies have demonstrated that extracts from edible flowers can significantly reduce the occurrence of heart attack, inhibit lipid peroxidation and increase the levels of

antioxidant enzymes, such as superoxide dismutase and catalase (Janarny, Gunathilake and Ranaweera, 2021).

DERMATOPROTECTION

Myosotis sylvatica is part of the *Boraginaceae* family and is recognized for its potential in the cosmetic industry due to its rich content in biologically active compounds. This species contains volatile oils, essential fatty acids, tannins and allantoin, all of which contribute to the health and appearance of the skin. One of the main effects of *Myosotis sylvatica* extracts are the antioxidant capacity, mainly due to flavonoids and phenolic acids (Tusevski *et al*., 2010). It protects the skin against oxidative stress, preventing premature aging caused by free radicals. At the same time, *Myosotis* extracts have anti-inflammatory properties, helping to soothe irritated skin and reduce redness. The allantoin also leads to cell simulation and regeneration and to maintaining skin elasticity, thus *Myosotis* is used as a valuable ingredient in products intended for sensitive skin care. In addition to all this, *Myosotis* contains essential oils with antiseptic and antibacterial effects, being used in products intended for the care of acne-prone or infected skin. As a result, all these properties make *Myosotis* extracts used in creams, lotions, balms and other cosmetic products with a protective and restorative role (Chrzanowska *et al*., 2024).

CONCLUSION

Myosotis sylvatica, commonly known as “Forget-me-not”, is not only a delicate ornamental plant, but also a valuable source of bioactive compounds with therapeutic effects. Studies suggest that this flower possesses anti-inflammatory, antioxidant and cardioprotective properties, thus contributing to the improvement and prevention of chronic conditions, such as cardiovascular diseases and inflammatory disorders. The flavonoids and phenolic acids in its composition play an essential role in protecting cells against oxidative stress, improving blood circulation and reducing inflammation. These benefits recommend it as a possible ingredient in the development of dietary supplements and phytotherapeutic products. This study aims to bring value to society by highlighting the therapeutic potential of this plant and to promote its use in natural medicine. Although the current results are promising, further research is needed to confirm the efficacy and safety of using *Myosotis sylvatica* in the medical field. However, its therapeutic potential makes it a valuable natural resource, worth exploring and integrating into modern healthcare strategies.

REFERENCES

1. Tunon, H., Olavsdotter, C., & Bohlin, L., 1995, Evaluation of anti-inflammatory activity of some Swedish medicinal plants. Inhibition of prostaglandin biosynthesis and PAF-induced exocytosis, *Journal of Ethnopharmacology* **48**(2), pp. 61–76.
2. Ebadi, M., Ghahraman, B., Matin, A. A., Mollaei, S., & Nikzat, S., 2023, Variation of phenolic acid compounds in the Iranian germplasm of Boraginaceae, a chemotaxonomy approach, *Journal of Medicinal plants and By-Products* **13**(1), pp. 171–177.
3. Weryszko-Chmielewska, E., 2003, Morphology and anatomy of floral nectary and corolla outgrowths of Myosotis sylvatica Hoffm.(Boraginaceae), *Acta Biologica Cracoviensia Series Botanica* **45**(1), pp. 43–48.
4. Shinkarenko, Y., 2008, Content of flavonoids in plant species of genus Myosotis L, *Chem Sustain Dev **16**,* pp. 593–598.
5. Braithwaite, M. E., 2021, Scotland's heritage of naturalised medicinal plants, *British & Irish Botany* **3**(1).
6. Mehdiyeva, N. P., 2018, Karimov VN, Alizada VM.
7. Silva, J. T. D. C., Menezes, S. A., Silva, V. B. D., Novais, M. H. G., Albuquerque, E. S., Franco, R. A., ... & Almeida-Bezerra, J. W., 2024, ADME/Tox Study, Phytochemical Analysis and In Vitro Antifungal Activity of Essential Oil from Varronia curassavica Jacq.(Boraginaceae), *Analytica* **5**(3), pp. 440–450.
8. Janarny, G., Gunathilake, K. D. P. P., & Ranaweera, K. K. D. S., 2021, Nutraceutical potential of dietary phytochemicals in edible flowers – A review, *Journal of Food Biochemistry* **45**(4), e13642.
9. Chrzanowska, E., Denisow, B., Ekiert, H., & Pietrzyk, Ł., 2024, Metabolites Obtained from Boraginaceae Plants as Potential Cosmetic Ingredients—A Review, Molecules **29**(21), pp 5088.
10. Winkworth, R. C., Grau, J., Robertson, A. W., & Lockhart, P. J., 2002, The origins and evolution of the genus Myosotis L.(Boraginaceae), *Molecular Phylogenetics and Evolution* **24**(2), pp. 180–193.
11. Weryszko-Chmielewska, E., 2003, Morphology and anatomy of floral nectary and corolla outgrowths of Myosotis sylvatica Hoffm.(Boraginaceae), Acta Biologica Cracoviensia Series Botanica **45**(1), pp. 43–48.
12. Tusevski, O., Trpevski, M., Lozanovska, I., Talevska, A., Ugurovska, D., & Gadzovska-Simic, S., 2010, Antioxidant activity of phenolic compounds in methanolic extracts of some Macedonian medicinal plants collected on Jablanica Mountain, *Bull. Biol. Stud. Res. Soc. Vol*, **4**, pp. 103–111.
13. Chen, G. L., Chen, S. G., Xie, Y. Q., Chen, F., Zhao, Y. Y., Luo, C. X., & Gao, Y. Q. ,2015, Total phenolic, flavonoid and antioxidant activity of 23 edible flowers subjected to in vitro digestion, *Journal of Functional Foods* **17**, pp. 243–259.
14. Magara, G., Prearo, M., Vercelli, C., Barbero, R., Micera, M., Botto, A., ... & Pastorino, P., 2022, Modulation of antioxidant defense in farmed rainbow trout (Oncorhynchus mykiss) fed with a diet supplemented by the waste derived from the supercritical fluid extraction of basil (Ocimum basilicum), *Antioxidants* **11**(2), pp. 415.
15. Elkington, T. T., 1964, Myosotis Alpestris FW Schmidt, *Journal of Ecology* **52**(3), pp. 709–722.