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Stachys byzantina: Nutritional Value, Culinary Potential, and Sustainability of an Unconventional Food Plant

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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Systematic Review Article

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ABSTRACT

Aims: This review aims to compile and analyze the literature on *Stachys byzantina*, focusing on its nutritional value, culinary applications, and potential for sustainable agriculture.
Study Design: Systematic literature review.
Place and Duration of Study: This review encompasses studies published globally from 2000 to 2024.
Methodology: Relevant studies were identified and selected from databases including PubMed, SciELO, Google Scholar, and Web of Science. Criteria for inclusion involved empirical research on the nutritional, culinary, and environmental aspects.
Results: *Stachys byzantina* is a perennial herb native to Turkey and Iran, now recognized as an unconventional food plant (UFP). Nutritional analyses reveal it is rich in fiber, vitamins A, C, and E, and minerals such as calcium, iron, and potassium. These properties suggest it can contribute to the prevention of chronic diseases and overall health improvement. Culinary versatility is noted,

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with applications in fried dishes, salads, soups, and as a seasoning. Sustainable cultivation practices for *Stachys byzantina* are highlighted, emphasizing its low resource requirements and pest resistance, which support biodiversity and agroecological systems.
Conclusion: Non-invasive independent predictors for screening esophageal varices may decrease medical as well as financial burden, hence improving the management of cirrhotic patients. These predictors, however, need further work to validate reliability.

Keywords: Food plants; nutrition; Stachy byzantine.

1. INTRODUCTION

Unconventional food plants (UFPs) have gained prominence for their ability to diversify the human diet and promote sustainability. *Stachys byzantina*, one of these plants, is valued for both its nutritional value and culinary potential. This review article aims to compile and analyze the available literature on *Stachys byzantina*, highlighting its nutritional properties, culinary uses, and environmental benefits.

Stachys byzantina plays an important role in local ecosystems, attracting pollinators, particularly bees. Its flowers are a source of nectar, and the plant is known to support several populations of beneficial insects.

Due to their productive and nutritional characteristics, PANC's can be tools useful in promoting food sovereignty and security, despite this, reports of uses of these Food, in Brazil, is restricted to family farming and traditional communities, in these means representing economic potential and benefits for sustainability and biodiversity. Recent studies state that these plants have good nutritional quality, highlighting their composition proteins, vitamins and minerals, however, also highlighted the need for further studies that address the availability of these nutrients [1].

Stachys byzantina has a unique flavor profile similar to lambari fish, making it an innovative food option for vegetarians, vegans and plant-based diets. It can be prepared in several ways, such as breaded and fried, roasted or braised [2].

Stachys byzantina is characterized by its soft, velvety leaves, densely covered with fine hairs. The plant typically grows to a height of 20 to 40 cm and produces small, light purple flowers during late spring and early summer. These flowers are arranged in tall spikes, making the plant visually appealing in garden settings [2-6].

The plant's functional properties, including antioxidant, antibacterial and anti-inflammatory effects, along with its iron, potassium, calcium and fiber content, make it a promising addition to a healthy diet. Regular consumption can contribute to well-being and help control chronic non-communicable diseases (NCDs) [7-10]. However, there is a lack of awareness and information about this PANC among the general population. More scientific studies and dissemination through various communication channels are needed to promote the inclusion of goldfish and other unconventional vegetables in people's diets [2].

2. METHODOLOGY

This review was conducted using a systematic approach to identify and select relevant studies on *Stachys byzantina*. Databases used included PubMed, SciELO, Google Scholar, and Web of Science. Inclusion criteria involved studies published between 2000 and 2024, addressing nutritional, culinary, and environmental aspects of *Stachys byzantina*. Articles lacking empirical data or non-systematic reviews were excluded.

3. RESULTS AND DISCUSSION

Stachys byzantina, commonly known as lamb's ear or garden fish, is an unconventional food plant (PANC) that belongs to the *Lamiaceae* family. Recent studies have highlighted its nutritional profile and potential health benefits:

- The leaves are rich in dietary fiber (48.8%), proteins (19.2%), carbohydrates (10.13%), potassium (1900.5 mg/100g) and iron (0.48 mg/100g).
- The amino acid composition, including threonine, tryptophan, phenylalanine, tyrosine and sulfur amino acids, meets FAO requirements for children and adults.
- Little fish has a high content of vitamin C (7.08 mg/100g) and antioxidants, with a total phenolic content of 438.92 µg gallic acid equivalent/g dry weight.

Its leaves stand out in terms of protein content, which makes them have a good potential for

application as a protein element in diets free from products of animal origin, as is the case, for example, of the strict vegetarian. Furthermore, the proteins present in the leaves could also be used for the development of protein formulas of plant origin, which have. The advantage is the absence of cholesterol. Regarding bioactive compounds, the samples showed high antioxidant activity and high amounts of phenolics total, which may contribute to its high resistance to pests, together with the great thickness and hairiness of the leaves [11].

Botanical classification:

- Kingdom: Plantae
- Phylum: Tracheophyta
- Class: Magnoliopsida
- Order: Lamiales
- Family: Lamiaceae
- Genre: Stachys
- Species: Stachys byzantina

The leaves of *Stachys byzantina* are edible and have been recognized for their unique flavor, often compared to that of lamb. They can be used in a variety of culinary applications, including salads, soups, and as a garnish. The plant is also known for its nutritional value, containing significant amounts of dietary fiber, vitamins and minerals.

S. byzantina can be prepared in different ways, such as:

- Empanadas and fries
- Roasts
- Sautéed
- In similar fillings

These preparation techniques enhance the plant's peculiar flavor and make it even more attractive for consumption [12].

The goldfish has an interesting functional potential, as it contains bioactive compounds such as phenolics and carotenoids. Studies indicate that it has antioxidant, antibacterial and anti-inflammatory properties.Furthermore, it is rich in iron, potassium, calcium and fiber. Regular consumption of this unconventional food plant (PANC) may be associated with well-being and the improvement of chronic non-communicable diseases (NCDs) [12].

3.1 Antioxidant Properties

Stachys byzantina leaves contain high levels of phenolic compounds and carotenoids, which are known for their antioxidant properties. These compounds help neutralize free radicals in the body, reducing oxidative stress and potentially preventing chronic diseases such as cancer and cardiovascular disease [2].

3.2 Antibacterial Effects

Studies have shown that *Stachys byzantina* extract has antimicrobial activity, especially against resistant strains of bacteria such as *Staphylococcus aureus*. This suggests the plant may help fight infections and promote gut health [12].

3.3 Anti-inflammatory Properties

The bioactive compounds present in the plant have also demonstrated anti-inflammatory effects, which may be beneficial in reducing chronic inflammation, a contributing factor to several diseases including type 2 diabetes and heart disease [2].

3.4 Nutritional Support

Stachys byzantina is rich in essential nutrients such as iron, potassium, calcium and fiber. Including this plant in the diet can contribute to bone health, regulating blood pressure and improving digestion, as well as helping to prevent nutritional deficiencies [12].

Stachys byzantina is a perennial plant that adapts well to different climatic and soil conditions, especially in regions with a temperate climate. Its cultivation requires fewer chemical inputs, such as fertilizers and pesticides, making it a more ecological option compared to conventional crops. Furthermore, the plant can be grown in urban gardens, promoting food sovereignty and access to fresh, healthy foods.

The consumption of Stachys byzantina and other PANCs promotes a diet based on local production, reducing the need for transport and storage of food, which, in turn, reduces the carbon footprint associated with the food chain. This practice also strengthens small businesses and the local economy [13,14,15].

4. CONCLUSION

Stachys byzantina emerges as a nutritionally rich and ecologically sustainable alternative in the context of UFPs. Its inclusion in the diet can significantly contribute to food security and

culinary diversity while promoting sustainable agricultural practices. Future studies should focus on expanding knowledge of its specific health benefits and sustainable cultivation strategies.

Stachys byzantina is a nutritious and versatile food plant with culinary potential. Increased consumption can contribute to a healthier and more diverse diet, while supporting the preservation and appreciation of Brazilian socio-biodiversity.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. Botrel N, Freitas S, Fonseca MJO, Melo RAC, Madeira N. Nutritional unconventional leafy vegetables grown in The Cerrito Biome/Brazil. Brazilian Journal of Food; 2020.
2. Giannoni JA, Dos Santos KC, Do Santos Puerta GC, Farinazzi-Machado FM, Shigematsu E, Dorta C, Pardo RB, Marinelli PS. Goldfish Stachys byzantina: Assessment of population knowledge of this unconventional food plant. Brazilian Journal of Development. 2023;9(1):4341-57.
3. Benedec D, Oniga I, Hanganu D, Tiperciuc B, Nistor A, Vlase AM, Vlase L, Pușcaș C, Duma M, Login CC, Niculae M. Stachys species: Comparative evaluation of phenolic profile and antimicrobial and antioxidant potential. Antibiotics. 2023; 12(11):1644.
4. Khademian Amiri S, Aghajanzadeh TA, Afari NJ, Mahmoudi M. Antioxidative compounds, enzymes activity and nutrient elements in Stachys byzantina are altered by climate conditions not by soil parameters. Caspian Journal of Environmental Sciences. 2022;20(5):1099-115.
5. Kiashi F, Hadjiakhoondi A, Tofighi Z, Khanavi M, Ajani Y, Ahmadi Koulaei S. Compositions of essential oils and some biological properties of Stachys laxa Boiss. & Buhse and S. byzantina K. Koch. Research Journal of Pharmacognosy. 2021;8(2):5-15.
6. Yousefbeyk F, Dabirian S, Ghanbarzadeh S, Eghbali Koohi D, Yazdizadeh P, Ghasemi S. Green synthesis of silver nanoparticles from Stachys byzantina K. Koch: characterization, antioxidant, antibacterial, and cytotoxic activity. Particulate Science and Technology. 2022;40(2):219-32.
7. Sarikurkcu C, Kocak MS, Uren MC, Calapoglu M, Tepe AS. Potential sources for the management global health problems and oxidative stress: Stachys byzantina and S. iberica subsp. iberica var. densipilosa. European Journal of Integrative Medicine. 2016;8(5):631-7.
8. Morteza-Semnani K, Akbarzadeh M, Changizi S. Essential oils composition of Stachys byzantina, S. inflata, S. lavandulifolia and S. laxa from Iran. Flavour and fragrance journal. 2006;21(2):300-3.
9. Toplan GG, Taşkin T, Kara EM, Genç GE. Antioxidant and antimicrobial activities of various extracts from Stachys cretica subsp. bulgarica Rech. f., Stachys byzantina K. Koch and Stachys thirkei K. Koch. Istanbul Journal of Pharmacy. 2021;51(3):341-7.
10. Demirtas I, Gecibesler IH, Yaglioglu AS. Antiproliferative activities of isolated flavone glycosides and fatty acids from Stachys byzantina. Phytochemistry letters. 2013;6(2):209-14.
11. Hajimehdipoor H, Gohari AR, Ajani Y, Saeidnia S. Comparative study of the total phenol content and antioxidant activity of some medicinal herbal extracts. Research Journal of Pharmacognosy. 2014;1(3):21-25.
12. Puerta Gilmara Cristina Faria dos Santos, Santos Kellen Cristina Barboza dos. Stachys byzantina fish: Assessment of population knowledge of this unconventional food plant. Advisor: Juliana Audi Giannoni. 2022. 23 f. Course completion work (Food Technology Higher Education Course) – Fatec Student Rafael Almeida Camarinha, Marília, SP; 2022
13. Lashgargahi Z, Shafaghat A. Volatile constituents of essential oils isolated from fresh and dried stachys lavandulifolia vahl. and Stachys byzantina C. Koch. Two

Lamiaceae from North-West Iran. Journal of Essential Oil Bearing Plants. 2017; 20(5):1302-9.

14. Yousefbeyk F, Dabirian S, Ghanbarzadeh S, Eghbali Koohi D, Yazdizadeh P, Ghasemi S. Green synthesis of silver nanoparticles from Stachys byzantina K. Koch: characterization, antioxidant, antibacterial, and cytotoxic activity. Particulate Science and Technology. 2022;40(2):219-32.

15. Giannoni JA, Dos Santos KCB, Puerta GCF, Do S, Farinazzi-Machado FMV, Shigematsu E, Dorta C, Pardo RB, Marinelli PS. Minnow Stachys byzantina: Assessment of population knowledge of this unconventional food plant. Brazilian Journal of Development. 2023;9(1):4341–4357.
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