UNCONVENTIONAL FOOD PLANTS AS FUNCTIONAL FOOD: LITERATURE REVIEW

PLANTAS ALIMENTÍCIAS NÃO CONVENCIONAIS COMO ALIMENTO FUNCIONAL: UMA REVISÃO BIBLIOGRÁFICA

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ABSTRACT

Introduction: Unconventional food plants (UFP), whether spontaneous, cultivated, native, or exotic, have one or more edible parts that are not included in our daily menu. **Objectives:** This study aimed to discuss UFP as a functional food for the population, disseminate knowledge of these species in food culture, and encourage their consumption. **Methods:** Data were summarized from 30 recent articles in Portuguese and English retrieved from databases (SciELO and PubMed) and books in the health field. **Results:** The UFP addressed in this study participates in several metabolic processes, including anti-inflammatory, antibacterial, wound-healing, antineoplastic, and antiscorbutic activities. Significant concentrations of calcium, iron, zinc, potassium, and magnesium were found in their compositions. The high protein and fiber content also facilitates gastrointestinal processes. **Conclusion:** UFP are still poorly known by the Brazilian population. In contrast, its composition, nutritional values, and safety in daily diet are already well known. Besides having a pleasant taste, they contain high concentrations of fiber, vitamins, and minerals, essential to maintain the body homeostasis.

Keywords: Food plants; Effects; Functional food

RESUMO

Introdução: As plantas alimentícias não convencionais (PANC) destacam-se como plantas que possuem uma ou mais partes comestíveis, sendo elas espontâneas ou cultivadas, nativas ou exóticas que não estão incluídas em nosso cardápio cotidiano. **Objetivo:** Este trabalho visa abordar as plantas alimentícias não convencionais como alimento funcional para a população, de forma a promover a disseminação do conhecimento dessas espécies na cultura alimentar e o incentivo ao seu consumo. **Métodos:** Foram sumarizados dados de 30 artigos recentes em português e inglês provenientes de bases de dados (SciELO e PubMed), cadernos de saúde e livros. **Resultados:** As PANC estudadas demonstraram atuar nos mais diversos processos metabólicos, apresentando atividades anti-inflamatórias, antibacterianas, cicatrizantes, antineoplásicas e antiescorbúticas. Além disso, constatou-se a presença de concentrações significativas de cálcio, ferro, zinco, potássio e magnésio em suas composições. Aliado a isso, tem-se o alto teor de proteínas e de fibras, servindo no auxílio de processos gastrointestinais. **Conclusão:** As plantas alimentícias não convencionais ainda são pouco conhecidas pela população brasileira. Suas composições e valores nutricionais já são bem conhecidos, bem como a segurança de seu emprego na alimentação diária. Além de sabor agradável, elas possuem altas concentrações de fibras, vitaminais e minerais, necessários na manutenção da homeostase corporal.

Palavras-chave: Plantas alimentícias; Efeitos; Alimento funcional

INTRODUCTION

Approximately 390,000 plant species are currently known worldwide.[1] However, despite the remarkable biodiversity, only about 300 species are actively used for human purposes (e.g., food production, pharmaceuticals, construction, and bioenergy).[2,3] Among these, only fifteen species account for 90% of the global food consumption, reflecting the underutilization of native species and the overreliance on exotic plants.[4]

This perspective is also observed in Brazil, which has vast biological wealth and significant agricultural potential; however, the native biodiversity remains insufficiently explored, particularly in terms of its use as food. Consequently, the Brazilian diet tends to be limited to a few staple food groups (e.g., rice, beans, and coffee) and some regionally consumed items, including cassava.[5]

Within this context, unconventional food plants (UFP) are defined as cultivated, wild, native, or exotic species that are edible in one or more parts. UFP represents viable alternatives for expanding the nutritional options available to the population and enhancing food security and autonomy.[3]

These plants typically develop in natural environments without the need for inputs or deforestation. As they are local, they are more resistant and do not require pesticides. However, despite their low cost and ecological benefits, a significant portion of the population remains unaware of these species, leading to underutilization.[3,6]

Therefore, this study aimed to explore UFP as a functional food source, promoting awareness and integration of these species into the local food culture and encouraging their consumption as part of a more sustainable and diverse diet.

METHODS

This exploratory and descriptive study summarized the recent literature available in English and Portuguese. A total of 30 scientific studies addressing UFP as a potential component of the human diet were selected from SciELO, PubMed, public health journals, and books, and analyzed.

The following keywords were used for the literature search: UFP, family farming, food security, *Rumex acetosa L.*, *Talinum paniculatum*, *Tropaeolum majus*, *Erechtites valerianifolius*, *Amaranthus viridis L.*, and *Pereskia aculeata Miller*.

DISCUSSION

The UFP is part of a group of edible species that grow in natural environments without the need for agricultural inputs or advanced cultivation techniques, making them particularly suitable for family farming. Furthermore, UFP contributes to promoting dietary diversification, which has been compromised by the increasing consumption of convenience and ultra-processed foods.[3,7]

Among the wide variety of UFP, six species were highlighted to discuss their nutritional value and culinary applications.

Azedinha

Commonly known as "*azedinha-da-horta*" in Brazil, *Rumex acetosa L.* is an herbaceous leafy vegetable from the Polygonaceae family, characterized by round green leaves and a texture similar to watercress.[8]

Although not widely known in urban centers, this vegetable is cultivated in household gardens of rural areas from the Southeast and South of Brazil and is very common in family gardens.[9] Its acidic flavor (hence the popular name) makes it suitable for use in salads and juices.

R. acetosa has a low lipid content and is rich in vitamins, dietary fibers, and essential minerals. It also contains a range of biological properties, including antioxidant, anti-inflammatory, antibacterial, wound-healing, antineoplastic, and antiscorbutic activities, and contributes to the immune system modulation. Its regular consumption may be associated with human health benefits.[7,10-12]

Beldroegão

Talinum paniculatum, an herbaceous plant from the Talinaceae family, is known in Brazil by various names (e.g., "*erva-gorda*", "*cariru*", or "*majorgomes*") and has a high nutritional potential due to the elevated protein content and significant levels of calcium, iron, zinc, potassium, and magnesium.[13]

Due to its compact size, it can be cultivated in small pots and shaded environments, yielding multiple harvests throughout the year.[13,14]

Capuchinha

Known as "*capuchinha*" in Portuguese, the *Tropaeolum majus* is a small herbaceous plant suitable for cultivation in moist and shaded areas.[14] The leaves, flowers, fruits, and stems are edible and can

be used raw in the preparation of salads. The mature seeds, which have a pungent flavor, are also used in cooking. The plant is rich in iodine, iron, potassium, and vitamin C.[1,15,16]

Capiçoba

In Brazil, known as "*cariçoba*" or "*capiçova*", the *Erechtites valerianifolius* is a member of the Asteraceae family.[17] This plant is a source of iron, zinc, phosphorus, and vitamin A[15] and is commonly consumed as a cooked ingredient in soups and sauces.[3] It is also considered a novel edible specimen that may encourage healthier dietary habits.[18]

Caruru

Commonly referred to as "*caruru*" in Portuguese, the *Amaranthus viridis L.* is also known by other local names in Brazil (e.g., "*caruru-de-cuia*", "*caruru -roxo*", "*caruru-de-mancha*", "*caruru-de-porco*", "*caruru-de-espinho*", "*bredo-de-chifre*", "*bredo-de -espinho*", "*bredo-vermelho*", or simply "*bredo*"). It is frequently found and consumed in Asia, especially Pakistan.[19]

The plant is rich in phenolic compounds, including flavonoids, vegetable tannins, and phenolic acids, which confer its antioxidant activity. It exhibits antimicrobial effects, contains high levels of vitamins from the A and B complex, and has been used for treating diarrhea, dysentery, heavy menstrual bleeding, ulcers, and intestinal hemorrhages.[7,20,21]

Ora-pro-nóbis

Pereskia aculeate Miller, commonly known as *ora-pro-nóbis*, is a native leafy vegetable from Central and South America and the southern United States.[22] In Brazil, it is found mainly in the Northeast and Southeast regions. This plant propagates easily, requires low water input, and has a low susceptibility to diseases, making it ideal for domestic cultivation as a low-cost nutritional resource.[23]

The plant is important for the human (soups, stir-fries, scrambled eggs, omelets, salads, cookies, and savory pies) and animal nutrition due to its high protein content, mucilaginous dietary fibers, and the absence of toxicity in its leaves.[24]

Ora-pro-nóbis is also present in flour, savory dishes, and pasta formulations. In the food industry, a tagliatelle-type pasta enriched with dehydrated *ora-pro-nóbis* has been developed and approved with a consumer acceptance rate over 70%.[25]

Nutritionally, this plant is distinguished by its exceptionally high iron content (14.18 mg per serving), exceeding common iron-rich foods, such as raw beetroot (1.43 mg), cooked beetroot (2.13 mg), kale (2.70 mg), spinach (4.48 mg), beef liver (12.89 mg), raw chickpeas (6.16 mg), and raw lentils (7.91 mg).[26]

Edible compounds of unconventional food plants

Table 1. Edible parts of unconventional food plants.

Author	Objective	Findings
Viana *et al*., 2015	To evaluate the phytochemical composition of plant species classified as unconventional leafy vegetables.[7]	The leaves of *Rumex acetosa* ("*Azedinha*") can be consumed raw, cooked, or as a seasoning and may be used to prepare salads, purees, and soups.[7]
Oliveira *et al*., 2019	To evaluate the production of *T. triangulare* and *T. paniculatum* in response to different doses of organic fertilizer.[27]	The leaves, stems, and sprouts of *Talinum paniculatum* (*Beldoegrão*) are commonly used in culinary preparations.[27] The leaves can be eaten raw but are preferably used in sautés and soups. These parts may also be combined with meats, fish, and shrimp.[28]
Moraes *et al*., 2008	To study the flower production of *Tropaeolum majus* and cabbage heads grown in monoculture and intercropping systems.[32]	All aerial parts of *Tropaeolum majus* ("*capuchinha*") are edible, including stems, leaves, flowers, flower buds, and unripe fruits. Its flowers and leaves are rich in vitamin C and can be used in salads.[16]
Brazil, 2008	Manual of Unconventional Leafy Vegetables	*Erechtites valerianifolius* ("*capiçoba"*) has slightly bitter leaves that are usually consumed sautéed and typically served with rice and beans.[29]
Fink *et al*., 2018	To gather knowledge through a bibliographic review	All parts of *Amaranthus viridis* ("*caruru"*) are edible. The seeds can be ground into flour, and the leaves are commonly used in salads. It is a UFP with high protein content.[30]

CONCLUSION

Numerous UFP have well-established nutritional values and can be safely incorporated in daily diets. However, they are little known and underused by the Brazilian population. Most of these plants have a pleasant flavor and high concentrations of fiber, vitamins, and minerals necessary for maintaining body homeostasis. They can also be used in various daily food preparations, whether in family meals or large gastronomic centers.

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