

Chapter 49

Nutritional and antioxidant property of non-conventional food plants (PANCs) and use in eating habits: review

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ABSTRACT

Considering the nutritional potential and antioxidants of non-conventional food plants (PANCs) and seeking to minimize the environmental impact caused by waste residues of fruits and vegetables. The present study aimed to demonstrate its nutritional potential

while inserted in the diet as a function of its nutritional and antioxidant constituents that, as a rule, are dumped by food industries on the planet. After analysis of the results of the research referenced in this review article, the information of four species (*Portulaca oleracea* L., *Basella alba* L. Syn and *B. rubra*; *Lanata Stachys*; *Xanthosoma saggitifolium*) of unconventional food plants (PANCs), being a documentary analysis research. According to the results obtained by the aforementioned researchers, *Basella alba* L. Syn and *B. rubra*; *Portulaca oleracea* L.; *Stachys lanata*, and *Xanthosoma saggitifolium* keep medicinal use, cytotoxicity and toxicity and food use of these species. Therefore, it should be concluded that non-conventional food plants (PANCs) should be significantly used.

Keywords: Unconventional food plants, Nutritional property and antioxidants, Food use.

1 INTRODUCTION

The use of plants as food resources by man occurs since prehistoric times; in addition to food, they are used for medicinal purposes, civil construction and combustion. The use of plants for food is a subsistence alternative for rural communities and can contribute to the local and regional economy. The use of food plants, especially PANCs, is part of the culture, identity and agricultural practices of various regions of the planet (BARREIRA et al, 2015).

PANCs are among the sources of food that grow in natural environments without the need for supplies and felling of new areas. The fact that many of these plants are in areas administered by farmers becomes a fundamental strategy for strengthening the food sovereignty of many families. However, many of these plants, although available at low cost, are still unknown. And underutilized by a significant portion of the population (BARREIRA et al, 2015).

PANCs are present in certain communities or regions, where they still exert influence on the feeding of traditional populations, but have reduced economic and social expression, losing space for other products. In Brazil, several PANCs are used for the food consumption of many families, being consumed in natura, sautéed, in forms of sweets, coconut candies, among others; although there are still few studies on the use of these plants. This still unknown potential requires further research and can become an important tool in the establishment of production systems on sustainable bases, since these resources are still consumed by the rural population and are adapted to the edaphoclimatic conditions of many regions (BARREIRA et al, 2015).

It is estimated that although there are about 30,000 species of edible plants, more than half of the global energy requirement is currently met by only four crops: rice, potatoes, wheat and corn. There is therefore a gap in food biodiversity in human consumption. Food biodiversity refers to the diversity of plants, animals and other organisms that are used for food. Scientific evidence indicates that the richness of diet species, or the counting of the number of different species consumed per day, serves as an evaluator of their nutritional adequacy. Thus, it is believed that the evaluation of food biodiversity systems provides a unique opportunity to cross two critical dimensions of sustainable development - human and environmental health. However, the scarcity of data on the availability, consumption and composition of food in biodiversity acts as a major bottleneck in determining its importance for Food and Nutrition Security (RAS) (JACOB, 2020).

The lack of data of this nature is greater in the case of wild and underutilized plants, commonly called Unconventional Food Plants (PANC). PANC are defined as those plants with underexploited potential to contribute to SAN, health and nutrition, income generation and environmental integrity. Its definition depends on geographical, social, economic and time aspects and includes a wide range of wild, traditional, indigenous and local sites. PANC are food plants, exotic or native, which are not easily recognized or accessible for purchase for a given population. It is essential to emphasize that the criterion of unconventionality is always relative in terms of geography and culture. In other words, the plant itself is not conventional or conventional; it's just a plant. Depending on the region or community in relation to the plant, we can call it conventional or unconventional (CASEMIRO, VENDRAMIN, 2020).

The current and dominant development model, centered on economic growth and the relationship market, had a strong impact on the relations established between the countryside and the cities. By the year 2050, agriculture is expected to provide food to about nine billion people, according to the United Nations Food and Agriculture Organization (FAO); however, the most current projections indicate something close to ten billion people by 2050. Another challenge is to maintain the high level of productivity indefinitely, using current production systems and promoting a sustainable environment despite continuous climate change, increased competition for water resources and losses of productive land. Thus, a great ally to this end may be unconventional food plants (PANC), which have food potential and are suitable to increase the resilience of local production and strengthen nutritional security, especially among traditional rural communities. These newsletters stimulate local development and the exchange of culinary skills, value the act of cooking and appreciate food, its flavors, aromas and presentations, making the act of eating more pleasurable, nutritionally rich and healthy (CASEMIRO, VENDRAMIN, 2020).

According to data from the Organization for Agriculture and Food (FAO), 28% of the food that reaches the end of the chain is wasted, on average, in Latin American countries, and in Brazil it is estimated that the waste is approximately 26 million tons of solid waste per year. The use of organic waste has aroused the interest of industry and science, by generating a significant volume of waste and causing environmental pollution. Researchers from all over the country are investing in the development of new products from

these waste and parts of unconventional foods, contributing to the production of healthy, nutritious and less negative foods to the environment. It is known that the full use of food is a way to contribute to the search for alternatives for the supply of products from parts of foods of great nutritional value and generally discarded, and its effectiveness is proven by studies. Vegetable peels, as well as stalk and leaves, are often discarded, and can often be considered sources of vitamins and minerals that aid in the treatment and prevention of diseases - therefore, it is necessary to fully use food. (RAMOS et al 2020).

It is estimated that around 390,000 plant species are known worldwide. Despite this great wealth, man has used, throughout its history, about a thousand species for food and currently cultivates about 300 for various purposes such as food, medicine, construction and other uses. Despite the richness and potential it represents, Brazilian biodiversity is still little known and its use as food has been neglected. It can be affirmed that, in general, the native species of Brazil are not part of the most consumed food group in the country. Thus, there is an appreciation of few species, most of them exotic to the detriment of numerous native species that are occasionally consumed and influenced by regional culture. Safe food is everyone's right to regular and permanent access to sufficient quality food, without compromising access to other essential needs based on health-promoting, respecting cultural diversity and being socially, economically and environmentally sustainable (TULER; PEIXOTO; SILVA, 2019).

Seeking to expand the sources of nutrients available to the population and the promotion of sovereignty and food security, more attention has been paid to the need for diversification of the plant species consumed. So-called unconventional food plants meet this concept and can be considered essential for the consolidation of food practices that promote sovereignty and food security. Unconventional edible plants (PANC) are plants that have one or more edible parts, whether spontaneous or cultivated, native or exotic that are part of our daily menu. PANCs can still be understood as all plants that are not conventional on our menus or are not produced in conventional systems (industrial or conventional agriculture), also called agrobiodiversity food vegetables. In Brazil, several PANC's have been reported mainly in traditional communities and small family farmers occupying areas of native vegetation, where they cultivate or collect a great diversity of species for subsistence. The use of PANC, in addition to diversifying the diet, can represent an income alternative for rural communities, contributing to the local and regional economy. In addition, if carried out in a sustainable way, it can be considered a form of land use with low impact on agriculture, associated with the preservation of the environment (TULER; PEIXOTO; SILVA, 2019).

This review aimed to demonstrate the nutritional potential of these plants and establish aspects related to their nutritional and antioxidant properties.

2 METHODOLOGY

The literature review followed the precepts of the descriptive study of qualitative character through a bibliographical research in scientific articles aiming to obtain information of four species (Portulaca

oleracea L., Basella alba L. Syn and B. rubra; Lanata Stachys; Xanthosoma saggitifolium) of Unconventional Food Plants (PANCs), being a documentary analysis research.

Publications of the last ten years of research, available in electronic databases (PubMed, LILCAS, Scielo), were excluded studies that did not contemplate the theme of the present study.

For the searches performed, research titles and body of the texts of the articles were searched using the following expressions: "PANC", "Unconventional Food Plants", "Unconventional Vegetables". In addition, to expand the selection and obtain more accurate information of the species were also used searches by the popular and scientific names of some copies of PANC, according to the Manual of Unconventional Vegetables of the Ministry of Agriculture, Livestock and Supply, such as: Bertalha, Beldroega, Peixinho and Taioba.

3 RESULTS AND DISCUSSION

Basella Alba L. Syn and B. rubra, Portulaca oleracea L, Stachys lanata, and Xanthosoma saggitifolium: Use medicinal, cytotoxicity and toxicity, and food use of the species.

Basella Alba L. Syn and B. rubra (BERTALHA)

Medicinal use: Bertalha is used in the treatment of inflammatory skin diseases, and infected wounds caused by microorganisms such as Staphylococcus aureus, and is also used for the treatment of diabetes, hypertension, and sexually transmitted diseases such as gonorrhea (ALBA, 2019).

Cytotoxicity and toxicity: Bertalha has tannins in its composition that are considered antinutritional factors, because these compounds when they assume non-oxidized form can react with proteins through hydrogen bonds, and in the oxidized form become insoluble inactivating digestive enzymes, however, the consumption of these plants in the cooked form does not occur nutritional damage, as there is a reduction in the concentration of tannins leading to acceptable levels for the consumption, this occurs through heat treatment, so they can be used in braised or soufflés. (BENEVIDES et al 2011; CORREIA, 2015; SOARES, 2015).

Food Use: According to the Food Guide for the Brazilian population (BRASIL, 2006) Bertalha is included in the group of vegetables due to its possible use in cooking, easy management, acquisition and high nutritional potential. Bertalha should be consumed immediately after harvest due to deterioration with ease, being used in the form of stews, making dishes with proteins, eggs and raw salads, and can also take advantage of thick stalk and use to enrich rice and beans (TELES, 2016).

Olerace Portula Catula L. (BELDROEGA)

Medicinal use: It exhibits a wide range of pharmacological effects, including antibacterial [6], antiulcerogenic [7], anti-inflammatory [8], antioxidant [9], and wound healing [10] properties. It is listed by the World Health Organization as one of the most widely used medicinal plants, and was given the term

"global Panacea" [11]. Chinese folklore described it as "vegetable for a long life" and has been used for thousands of years in traditional Chinese medicine [12,13]. It makes nature cold and sour flavor and is used to cool the blood, swerve bleeding, light heat, and resolve toxins. The aerial part of the dry plant is indicated for the treatment of fever, dysentery, diarrhea, carbuncle, eczema and hematochezia, with a recommended dose of 9-15 g [14 of - 16] (ZHOU et al 2015).

Cytotoxicity and toxicity: Studies with this plant revealed its richness in oxalic acid and potassium salts. One should not harvest and eat the wilted leaves, using only the tender and green ones. If ingested by ruminant animals the wilted leaves can cause meteorism (accumulation of gases in the body) which eventually paralyzes the functioning of the digestive tract and can lead to death. The use not indicated in pregnant, lactating and children (CARVALHO and HARAGUCHI, 2010).

Food use: It is an important component of the green salad and its soft stem and leaves are used in raw, alone or with other greens, it is also used for cooking (UDIN et al 2014).

Stachys lanata (GOLDFISH)

Medicinal use: Therapeutic indications: lung disorders; asthma, bronchitis, pain: in the belly, body, throat; flu, cold, prostate and pneumonia (SARTORI et al, 2020). According to Rigo (2008) it has medicinal use as an appetite stimulant, diuretic and hepatoprotective.

Cytotoxicity and toxicity: No reports were found in the literature on plant toxicity analyzed.

Food use: Its leaves are very tasty when breaded and fried. They are very crispy, with texture and light flavor of fried fish. (KINUPP, 2014). They can be used to make pates (SARTORI et al 2020). Ferreira (2002) says that its leaves can be cooked together with watermelon and pumpkin seeds cooked with chicory leaves and lemon juice, for burning fevers (TEIXEIRA, 2018).

Xanthosoma saggitifolium (TAIOBA)

Medicinal use: used as a thickener in soups in the form of flour, for different medicinal purposes in the treatment of diabetes mellitus, treatment of mycosis, cough and others (SOUZA, 2018).

Cytotoxicity and toxicity: Raw taioba leaf may have a high content of oxalates, an anti-nutritional factor that should be eliminated before consumption, as it can reduce the bioavailability of minerals, cause irritation and burning sensation in the lips and throat (JACKIX et al 2015).

Food use: Dietary fiber, one of the main constituents of taioba leaf and other vegetables, is not digested by enzymes in the gastrointestinal tract of humans and therefore can pass through the large intestine intact, or undergo fermentation by the colonic microbiota. These characteristics result in positive physiological effects well documented in the literature, among them, the decrease in glycemia and cholesterol, and the modulation of the intestinal microbiota (JACKIX, 2013). They are also considered a source of vitamins such as thiamine, riboflavin, niacin, and ascorbic acid (JACKIX et al , 2015).

Table 1 presents data on botanical family, scientific name, popular name, biome, and food use of the four analyzed species.

Family	Scientific name	Popular name	Origin	Biome	Food use
Basellaceae	<i>Basella Alba L.</i> <i>Syn and B. rubra</i>	Bertalha	Southeast Asia	Regions of warm climate, with ideal temperatures for growth between 26 and 28 °C.	It is used in stew and in soups, in the same way as spinach
Portulacaceae	<i>Portulaca oleracea L.</i>	Beldroega	North Africa and/or Southern Europe	It develops in diverse climates from subtropical to tropical. The soil should be light, fertile and with good organic matter content.	It is consumed in raw salads, juices, soups and broths, giving them creamy consistency.
Lamiaceae	<i>Lanata Stachys</i>	Goldfish	Its origin is not known for sure, but it is found in the wild in mild climate regions of Europe and Asia.	South, Southeast and Midwest.	Its leaves can be used in the preparation of juices, stews, soups, omelettes, and various fillings.
Araceae	<i>Xanthosoma saggitifolium</i>	Taioba	Tropical and equatorial Brazil	Its use in the interior of Minas Gerais and Rio de Janeiro stands out	The leaf can be used sautéed, with rice, with chicken, or ground meat, in omelettes, souffles, among others. The rhizome, in the same way as the yam and the yam

Source: Brazil. Ministry of Agriculture, Livestock and Supply. Manual of unconventional vegetables / Ministry of Agriculture, Livestock and Supply.

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PRESENCE OF BIOACTIVE COMPOUNDS IN PANCS

Vegetables provide components that aid in the performance of basic functions of the organism, being a source of bioactive compounds, such as polyphenols, carotenoides and vitamins that associate disease prevention (AVELAR et al 2018).

The variety of foods inserted in a diet allows nutritional adequacy and indicates the presence of bioactive compounds. The diversification of food helps in the adequacy of the consumption of macro and micronutrients daily, which are essential for health maintenance. It is important to mention that bioactive compounds depend on the amount in intake to ensure better absorption by the body. Thus, plant consumption can help obtain these nutrients (JACOB, 2020).

Among the analyzed species it was possible to identify that there was the presence of antimicrobial and antioxidant activity in Beldroega extract, being considered a moderate source of total polyphenols, where the aforementioned research provides information for isolation and characterization of phytochemical assays of bioactive compounds for the development of phytotherapeutics (MANGOBA, 2015).

In addition, there was a scarcity of antioxidant capacity in taioba leaves, but the amounts of fiber, vitamin C, calcium and iron, being composed of a large amount of pro-vitamin A and bioavailability of beta carotene can help in the supply of the body's needs (FERNANDES, 2019).

The goldfish leaves were highlighted by the protein content, being of good potential for diets that are free of animal products, and can be used for the development of formulas of plant origin, having as advantage the lack of cholesterol. In relation to bioactive compounds, antioxidant activity and high amount of total phenolics were present (AZEVEDO, 2018).

4 CONCLUSION

Through the observations that were presented from the results of the articles developed by the researchers it was possible to demonstrate the nutritive and antioxidant properties of non-conventional food plants (PANCs) that can be used in eating habits and/or medicinal use, depending on the bioactive compounds found in them may contain elements of considerable nutritional value. On the other hand, such use would still contribute to the reduction of pollutants on the planet, considering the use of these unconventional food plants in medicinal and/or food use.

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