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UNCONVENTIONAL FOOD PLANTS (PANCs): A REVIEW

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Abstract: The non-conventional food plants (PANCs) stand out on the world stage, with an ever-increasing demand for people looking for natural, healthy products to improve their eating habits or for the need for more restrictive diets. The present work aimed to gather and spread knowledge about non-conventional food plants, through their functional and technological potential and highlight their nutritional characteristics for the development of new products. It was observed that among all Brazilian biomes, there is a very rich diversity of PANCs, easily found and consumed, either fresh, minimally processed or included in industrial scale products. It can be observed that the consumption and use of PANCs still belong to a minimum portion of the Brazilian society, even with the knowledge that PANCs can offer a healthy, rich and complete diet. Several PANCs species with high nutritional factors, often even highter than those of conventional plants. It is also highlighted the fact that PANCs are easy to grow and do not require the use of pesticides. However, the subject is little explored and disseminated, needing to deepen the knowledge about its use. It was observed through this study, the great technological and nutritional potential of these plants as viable alternatives, considering the demand from consumers who are increasingly seeking to diversify their food with non-conventional products.
Keywords: Non-conventional food plants, Technological nutritional and functional potential, Alternatives for the development of new non-conventional foods.

INTRODUCTION

It is estimated that more than three thousand species of the native flora of Brazil are characterized as non-conventional food plants (FLORA DO BRASIL, 2020). Even though they are recognized, they are still little explored in terms of their food potential, since conventional monoculture is the basis of food and the PANCs (unconventional food plants) represent a high potential for food diversification (SILVA JUNIOR, 2019; VALENTE, 2020).

According to Kelen et al. (2015), the term PANC (unconventional food plants) refers to all plants that have one or more edible parts, whether spontaneous or cultivated, native or exotic, that are not included in our daily menu. It is noteworthy that the term "unconventional" is directly linked to its geographic location, which may, for example, be unconventional in the south of Brazil, and conventional in the northeastern part of the country (JACOOB, 2020).

Despite being food sources that develop naturally, without the need for inputs, being adapted to the soil and local climate, they end up being uncompetitive and underutilized due to factors such as eating habits, non-commercialization, rural exodus, agricultural technological advances and little information about its potential (BIONDO, 2018).

These are foods that stand out in the fight against hunger, alternative and healthy consumption, capable of replacing conventional vegetables that dominate the population's dietary pattern (CASEMIRO, 2020), which can be included in the daily diet, and marketed, even generating a new source of income to the producer (LIBERATO, 2019).

NUTRITIONAL ASPECTS OF NON-CONVENTIONAL FOOD PLANTS

The vast majority of PANCs are tasty and nutritionally valuable, with a high concentration of fiber, vitamins and mineral salts, and can be used in various food preparations (SILVA JUNIOR, 2019). They stand out for their pleasant taste and content of compounds with antioxidant functions, which are often higher than in cultivated plants (VIANA, 2015).

Ziegler (2020) analyzed succulent and edible ora-pro-nóbis leaves, identifying high content of protein (22.93% dry basis) and fiber (12.64%), and a significant amount of iron and calcium. Ora-pro-nobis leaves can be used in dairy products, beverages, flour, salads, sausages, pies and pasta, as well as for the production of juices, jellies, liqueurs and ice cream or even consumed *in natura* like salads. Maciel (2019) highlights that ora-pro-nóbis leaves have potential for the development of supplementation and fortification formulation of proteins and vitamins A, B, and C, calcium, phosphorus and iron. You can consume leaves, fruits and flowers, raw or cooked.

Hardwood species such as:azedinha (*Rumex acetosa*), bertalha (*Basella alba*), capuchinha (*Tropaeolum majus*), ora-pro-nóbis (*Pereskia aculeata*), peixinho (*Stachys byzantina*), taioba (*Xanthosoma taioba*) and vinagreira (*Hibiscus sabdariffa*), have mineral contents comparable to or higher than those of conventional leafy vegetables (BOTREL, 2020).

Viana (2015) evaluated: beldroega (*Portulaca oleracea*), bertalha (*Basella rubra*), caruru (*Amaranthus viridis*) peixinho (*Stachis lanata*) and azedinha (*Rumex acetosa*) concluding that the levels of proteins, carotenoids, minerals and phenolic compounds found characterized these vegetables as having high nutritional and antioxidant potential.

In other species such as physalis (*Physalis pubescens*) there is significant content of vitamins A and C, minerals: Fe and P, in addition to flavonoids, alkaloids and phytosteroids and also a substance called physaline, which acts on the immune system. Its fruit stands out in terms of carbohydrate content (13.86%), fiber (5.8%) and energy value (52 kcal) (MORAIS, 2021). But the blackberry (*Rubus sellowii*), due to its high content of phenolic compounds (tannins and anthocyanins), it has high antioxidant potential (MARIA FILHO, 2016).

The cariru (*Talinum fruticosum*) also contains significant amounts of bioactive compounds such as carotenoids (carotene and lycopene), flavonoids (quercetin) and others. Its leaves contain considerable amounts of medium-chain fatty acids, while the flower of the guarujá (*Turnera subulata*) is related to its bioactive potential, mainly phenolic compounds and flavonoids, giving it antioxidant and anti-inflammatory activities (ACOB, 2020).

Padilha (2020) compared the proximate composition of Chinese cabbage (unconventional) with cabbage butter (conventional), and found similar levels of energy value (27.52%), moisture (93.03%), ash (0.84%), carbohydrates (4.39%) and lipids (0.60%). He compared nirá (unconventional) with chives (conventional) where nirá had higher levels of energy value (24.03%), ash (1.25%), proteins (2.66%), carbohydrates (4.12%) and lipids (0,54%).

Cereus jamacuru, better known as mandacaru is an abundantly branched columnar cactus, in which the fruits stand out for the availability of carbohydrates (16.16%), minerals (P, K, Mg, Zn and Mn), in addition to having significant amounts of vitamin C and other bioactive compounds such as carotenoids, polyphenols and flavonoids (MORAIS, 2021).

Kelen (2015) highlighted bertalha (*Anredera cordifolia*), rich in iron and a source of vitamins A, B and C and antimicrobial action. the little hood (*Tropaeolum majus*) rich in vitamin C, anthocyanin, carotenoids and flavonoids. The leaves help in digestion, in addition to serving as an anti-inflammatory. The caruru (*Amaranthus sp.*) has beta-carotene, vitamin C, magnesium, iron and potassium. Its seeds have a high content of essential amino acids, the plantain (*Plantago*

major, Plantago lanceolata, Plantago australis), has seeds that help reduce "bad" cholesterol, in addition to helping to improve intestinal transit. Its leaves are also an excellent anti-inflammatory, aids in intestinal treatment, serves as an expectorant and even helps in peptic ulcer treatments. You can consume young leaves, flowers and seeds, being raw or cooked. The picão (*Bidens pilosa*) is a source of protein, fiber, iron, magnesium and copper, in addition to being an antimalarial, bactericide, anti-inflammatory and even immunostimulant, the sawmill (*Sonchus oleraceus*) is a source of vitamins A, B and C, calcium and iron, with anti-inflammatory and diuretic effect (KELEN 2015).

The bedroega (*Portulaca oleracea*) is known as a potential vegetable for consumption on a large scale, due to its nutritional and medicinal properties, in which the content of omega 3 and omega 6 stands out, superior to all conventional cultivated vegetables. It is also rich in vitamins B and C, Mg and Zn contents, and high antioxidant potential. In addition to having the advantage of serving as an anti-inflammatory, diuretic and vermifuge. You can consume the leaves, flowers, branches and seeds, whether cooked or not (KELEN 2015; SARTORI *et al.,* 2020).

Sartori *et al.* (2020) suggested plants for inclusion in school lunches, highlighting: the almeirão do campo (*Hypochaeris chillensis (Kunth) Brittan*) with high levels of phenolic compounds, antioxidant activity, inulin, calcium, sodium, zinc, phosphorus and potassium; purple hawthorn which has leaves rich in minerals such as potassium, calcium, phosphorus, iron and also vitamins A, C and vitamins of the B complex (Riboflavin and Niacin); dandelion (*Taraxacum officinale F. H. Wigg*) which is rich in iron, potassium, zinc, vitamins A, B, C and D. Among the substances extracted, stand out those derived from terpenes, sterols, caffeic acid, pectin, tannins, carotenoids, flavonoids, citric acid, amino acids, saponins and inulin.

The jaracatiá (*Jacaratia spinosa*) is considered a low-calorie fruit, with a high moisture content and that stands out for its good concentration of fiber (4.11%) and carbohydrates (9.30%). It stands out mainly for the presence of Ca, Mg and K, whereas the vitamins deserve attention in relation to the amount of vitamin A, E and C and high content of phenolic compounds, carotenoids, lutein and zeaxanthin (MORAIS, 2021).

Gotardi *et al.* (2021) studied the pulp and the jerivá almond (*S. romanzoffiana*), as rich in dietary fiber (12.19%). It also found high content of carbohydrates (13.74%) and in its almonds, high content of proteins (8.77%) and lipids (54.3%). Industrially highlighted the potential for extracting vegetable oil and for the development of new nutritious and functional food products.

The mint leaves from the garden stand out in terms of fiber (48.8%), protein (19.2%) and carbohydrate (10.13%) content, giving them a good potential for application as a protein element in diets. free of animal products, such as the strict vegetarian diet. In addition, they can be used for the development of protein formulas of vegetable origin, with no cholesterol. Regarding bioactive compounds, they showed high antioxidant activity and high amount of total phenolics (AZEVEDO, 2018).

Santos (2021) recently rated the *Dillenia indica,* known as elephant apple, indicating that the fruit can be a food with relevant nutritional potential, to increase or complement the sources of protein in the diet.

Schinus terebinthifolius or aroeira stands out for its low moisture content, which is favorable for a longer shelf life, high carbohydrate content (36.85%) and significant values of ash (1.78%), protein (2.90%), lipids (1.54%) and fibers (4.4%). chicory (*Eryngium foetidum*)

stands out for its significant content of ash (1.71%), proteins (2.23%) and fibers (10.3%) and also has phenolic compounds (tannins and flavonoids), carotenoids, ascorbic acid and minerals such as iron. *Solanum scuticum,* athe jurubeba, has fruits that stand out for their high fiber content (23.9%) and carbohydrates (23.1%), in addition to good levels of protein (4.4%), lipids (3.9%) and ash (2%). This plant species is rich in minerals such as Ca, P and Fe, in addition to vitamin C, vitamin B1 and B2 and B3 (MORAIS, 2021).

FINAL CONSIDERATIONS

The consumption of PANCs (unconventional food plants) more actively generates several benefits considering health, hunger, the potential for income generation, care for the environment and social and cultural enrichment.

Faced with the characteristics of biodiversity, nutritional importance and cultural rescue associated with the lack of information, as well as the population's demand for healthy foods and the food industry for natural sources of antioxidants, they are a great resource that is little explored and still underutilized healthier and more natural products are growing in the current market and the PANCs are great sources of resources for this increasingly demanding public, who seek to replace traditional food with nutritious and functional and unconventional food alternatives.

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