

DOSSIER

85 years of professional
nutritionist practice in Brazil

Editor

Francisco de Assis Guedes de
Vasconcelos

Conflict of interest

The authors declare that there is no
conflicts of interest.

Received

July 11, 2024







Final version

December 13, 2024

Approved

January 28, 2025

The role of nutritionist in phytotherapy, foods with claims of functional and health properties and bioactive compounds

Lilian Cardoso Vieira¹ , Jaqueline Schroeder de Souza¹ , Cândice Laís Knöner
Copetti² , Marcio Leandro Ribeiro de Souza³ , Ana Beatriz de Paiva Baptistella⁴ ,
Patricia Faria Di Pietro¹ 

¹ Universidade Federal de Santa Catarina, Centro de Ciências da Saúde, Programa de Pós-Graduação em Nutrição. Florianópolis, SC, Brasil. Correspondence to: PF DI PIETRO. E-mail: <patricia.di.pietro@ufsc.br>.

² Autonomous Researcher. Florianópolis, SC, Brasil.

³ Faculdade de Minas, Campus FAMINAS-BH, Curso de Nutrição. Belo Horizonte, MG, Brasil.

⁴ Autonomous Researcher. São Paulo, SP, Brasil.

How to cite this article: Vieira LC, Souza JS, Copetti CLK, Souza MLR, Baptistella ABP, Di Pietro PF. The role of nutritionist in phytotherapy, foods with claims of functional and health properties and bioactive compounds. Rev Nutr. 2025;38:e240109. <https://doi.org/10.1590/1678-9865202538e240109en>

ABSTRACT

Objective

This study aims to analyze the role of nutritionists in the fields of phytotherapy, Brazilian foods with claims of functional and health properties, and bioactive compounds.

Method

A narrative review was conducted based on recent scientific articles as well as resolutions and laws that regulate these practices. The study was structured into four sections. The first addressed the role of nutritionists in phytotherapy, prescription regulations, and the necessary precautions due to the toxicity of certain plants. The second explored concepts related to functional foods, highlighting the importance of prioritizing whole and natural foods to reduce the consumption of processed items and the risk of chronic diseases. The third emphasized regional and Brazilian foods, including non-conventional food plants and their bioactive compounds. Finally, the fourth section discussed the effects of bioactive compounds on health, diseases, and physical activity.

Results

A set of information was organized for nutritionists' clinical practice in the mentioned areas. A relevant legislation regarding professional activities in phytotherapy, theoretical concepts, discussions on the use of isolated compounds versus the food matrix, and a compilation of key bioactive compounds from Brazilian foods and their physiological actions, were addressed.

Conclusion

There is a significant potential to explore Brazilian data that strengthens the understanding of nutritionists' practices in these fields, in addition to encouraging the development of studies that guide safe prescriptions by professionals. With one of the richest biomes in the world, Brazil's environmental diversity can be leveraged to further improve the population's nutritional conditions.

Keywords: Diet, food, and nutrition. Functional food. Nutritionists. Phytochemicals. Phytotherapy.

INTRODUCTION

In Brazil, nutritionists have been working as professionals in the health and community sectors since the late 1930s [1]. At the same time, the first four undergraduate nutrition programs at universities in the country were improved considerably [2]. This was because of the need to produce and disseminate essential studies and works addressing the chemical composition and nutritional value of foods, characterization of consumption and eating habits, and nutritional status of Brazilians, which had been initiated by doctors a few years earlier. The education and training of nutritionists was strengthened in the mid-1970s due to the implementation of federal food and nutrition programs and the urgent need to create new academic programs. During this period, the job market expanded and diversified, beginning to explore several other niches [1-3].

With the increase in the number of professionals over the years, in 1978 the *Conselho Federal de Nutrição* (CFN, Federal Council of Nutritionists) was created by Law No. 6,583, of October 20, 1978, and regulated by Decree No. 84,444, of January 30, 1980. This entity has the mission of contributing to the continuous guarantee of the Human Right to Adequate and Healthy Food, standardizing and disciplining the professional practice of the Nutritionist and the Nutrition and Dietetics Technician, for a practice guided by ethics and committed to Food and Nutritional Security, for the benefit of society [4].

In 2002, in an analysis of the history of nutrition in Brazil, Vasconcelos discussed some achievements in the field, such as the significant expansion of the fields of professional activity achieved by a process of ascending specialization, culminating in an advance in the technical-scientific skills of nutritionists nationwide [1]. Currently, the profession is experiencing exponential growth, allowing several specificities to be explored. In the second half of 2023, there were a total of 202,903 nutritionists registered in the 11 regional councils of the country, representing an increase of approximately 94% in registrations compared to 2014 [5]. The six major areas of activity of nutrition are classified as Nutrition in Collective Food, Clinical Nutrition, Nutrition for Sport and Physical Activity, Nutrition in the Food Production Chain, in the Food Industry and Food Trade, and Nutrition in Teaching, Research, and University Extension programs/projects as detailed [6]. A survey conducted by the CFN in 2016 indicated that the nutritionist's work niches apply to: collective feeding (30.8%), clinical nutrition (30.4%), collective health (17.7%), teaching (11.4%), industry (2.6%), sports nutrition (2.5%), marketing (1.3%), and others (3.3%) [7].

Regarding the recognition of specialties by the CFN and *Conselho Regional de Nutrição* (CRN, Regional Council of Nutritionists) system, the regulation for the areas of Nutrition and Phytotherapy, and Nutrition and Functional Foods occurred in 2021 [8,9]. Therefore, phytotherapy, functional foods, and bioactive compounds have acquired increasing prominence in nutritional strategies because of their potential physiological benefits and versatility. Phytotherapy uses medicinal plants to treat and prevent diseases, while foods with claims of functional properties and health and bioactive compounds offer, in addition to their nutritional value, positive health effects noteworthy worldwide [10,11].

These facts and the high professional adherence to the area of Clinical Nutrition show the popularization of nutritional work and an interest among people in having access to a service focused on their diet to seek better health, treatment of diseases, sports performance, among other reasons. Therefore, the expansion of the job market contributed to more studies, the solidity of the profession and the exploration of new segments, paving the way for the use of several nutritional strategies such as, for example, phytotherapy and the prescription of foods with functional properties and bioactive compounds [8,9]. Nevertheless, data on the quantity of professionals engaged in

these specific areas remains limited, attributable to the recent nature of the regulatory framework governing these roles within Brazil.

Through the exploration of resolutions and laws and a bibliographic search of published works, this article characterized as a narrative review aims to analyze the performance of the nutritionist in the prescription of phytotherapeutics and in the area of Nutrition and Functional Foods, and to summarize Brazilian foods with claims of functional properties and health, their respective bioactive compounds and their physiological actions that can fit into nutritional behaviors.

METHODS

This is a narrative review, which was composed of four main sections: 1) the role of the nutritionist in the area of phytotherapy; 2) the role of the nutritionist with foods with claims of functional and health properties and bioactive compounds; 3) Brazilian and regional foods and their bioactive compounds for the nutritionist's clinical prescription; 4) effects of bioactive compounds on health, disease, and physical activity.

For sections 1, 2, and 3, bibliographic searches related to the specific topic were conducted on websites and relevant legislation of the World Health Organization (<https://www.who.int/>), the Brazilian Ministry of Health (<https://www.gov.br/saude/pt-br> and <https://bvsmis.saude.gov.br/>), and the Federal Council of Nutritionists (<https://www.cfn.org.br/>). For this purpose, search terms such as "phytotherapy", "phytotherapeutics", "functional property", "bioactive substances" and "bioactive compounds" were used, in addition to related technical synonyms and targeted keywords. Duplicate information was excluded, and the main concepts and historical milestones related to the topics in question were considered for the work, being duly contextualized and referenced throughout the sections.

In this section, some *Plantas Alimentícias Não Convencionais* (PANCs, Non-Conventional Food Plants) were described through searches in the PubMed, Scientific Electronic Library Online (SciELO), and Scopus databases with the following terms found in preliminary readings: tannia OR "Xanthosoma sagittifolium"; purslane OR "Portulaca oleracea"; bertalha OR "Basella alba"; baru OR "Dipteryx alata". The prioritized studies were the most recent intervention studies and systematic and narrative reviews, with a focus on a period of the previous five years. The bioactive compounds and potential evidence of health benefits were described.

For section 4, the search was conducted in the PubMed, SciELO, and Scopus databases. The search was conducted with a five-year period restriction and covered publications up to the time of data collection. To identify relevant studies, the bioactive compounds of Brazilian foods were identified through the following search terms: "pineapple" OR "Ananas comosus"; "açaí" OR "Euterpe oleracea"; "atemoya" OR "Annona Atemoya"; "avocado" OR "Persea americana"; "cocoa" OR "Theobroma cacao"; "camu-camu" OR "Myrciaria dubia McVaugh"; "guava" OR "Psidium guajava"; "guarana" OR "Paullinia cupana"; "juçara" OR "Euterpe edulis"; "mangaba" OR "Hancornia speciosa"; "pequi" OR "Caryocar brasiliense", as well as closely-related synonyms and keywords on the subject. Subsequently, based on the list of identified bioactive compounds, each bioactive substance was used as a reliable search term for the investigation of functional properties. The search strategies were adjusted according to the specificity of each individual database.

For inclusion in the study, preference was given to systematic reviews (with or without meta-analysis) on the effects of bioactive compounds on health, disease, and physical activity, using the filters of these study designs in the mentioned databases.

After the bioactive compounds and detailed mechanisms of action were properly identified, tables were structured in Microsoft Office Word® (v. 2019) containing the most relevant scientific information for the study, namely: popular and scientific name of the food, regions of Brazil where they are most frequently found, bioactive compounds present in the respective foods, and health effects. The health effects cited were extracted from the results and conclusions sections of the identified credible scientific articles.

The nutritionist's role in the field of phytotherapy

Phytotherapy is considered a therapy characterized by the use of medicinal plants in their various different pharmaceutical forms, without the use of pure isolated substances. The most traditional use generally preserves the original composition and integrity of the plant of origin and can be used whole or in minimally processed parts, such as leaves, flowers, rhizomes, among others [10,12]. The use of medicinal plants as phytotherapeutic drugs, traditional phytotherapeutic products, and magistral phytotherapeutic preparations, including extracts, tinctures, and oils, among others, is also widely common. In Brazil, for a medication to be considered a phytotherapeutic, it must not contain only isolated active substances, even if they are of plant origin. Bioactive substances isolated from certain edible plants are classified as food supplements and those originating from non-edible plants are considered phytopharmaceuticals, and both have different specific legislation [11-14].

Although legislation regulating the practice of phytotherapy in Brazil has emerged in the last two decades, the use of medicinal plants for therapeutic purposes is ancient. There are records of the use of therapeutic plants by ancient civilizations thousands of years ago, such as in Traditional Chinese Medicine or Ayurveda. This use has always been very present in many populations of different regions of the planet, often surrounded by knowledge of traditional popular wisdom. However, there is currently a growing number of scientific publications in the field of phytotherapy, and industry interest also accompanies this growth, with projections that this market will move billions of dollars globally in 2024 [10,13,15,16].

The use of medicinal plants in Brazil is relevant due to the vast plant diversity and the low cost of this therapy. This interest has grown since 2006, when the Ministry of Health published administrative measure No. 971, including the use of medicinal plants and phytotherapy as part of health care practices within the *Sistema Único de Saúde* (Unified Health System), through the *Política Nacional de Práticas Integrativas e Complementares à Saúde* (National Policy on Integrative and Complementary Practices). Also in 2006, the Brazilian government approved the *Política e o Programa Nacional de Plantas Medicinais e Fitoterápicos* (National Policy and Program of Medicinal Plants and Herbal Medicines), with the aim of ensuring the Brazilian population has safe access to and rational use of medicinal plants and phytotherapeutics, following the recommendations of the World Health Organization [10,16-18].

For nutritionists, the first regulation came in 2007 with Resolution No. 402 from the CFN, which regulated the prescription of phytotherapeutics by nutritionists, ensuring the right to include phytotherapeutics in their dietary prescriptions [19]. This legislation was updated in 2013, 2015, and 2021, and since these changes to the resolution began in 2013, the prescription of phytotherapeutics and magistral phytotherapeutics preparations has been allowed only by nutritionists considered qualified for this indication [20-22].

Currently, the CFN Resolution No. 680 of 2021 stipulates that the prescription of medicinal plants in their natural form and plant-derived drugs, in the form of infusions, decoctions, and

macerations in water, is permitted for all nutritionists, even those without formal specific training in phytotherapy. However, the prescription of any other substance, that is, plant-based drugs or plant derivatives in pharmaceutical forms, phytotherapeutic drugs, traditional phytotherapeutic products, and magistral phytotherapeutic preparations, is permitted only for nutritionists qualified in phytotherapy, with registration in their respective regional council. For this qualification, the nutritionist needs to have a *lato sensu* postgraduate certificate in phytotherapy from an institution accredited by the Brazilian Ministry of Education and with at least 200 hours of phytotherapy courses in the curriculum, or a specialist title in phytotherapy, such as the title awarded by examination by the *Associação Brasileira de Nutrição* (Brazilian Association of Nutrition). Once the nutritionist professional possesses this certificate, they need to register it with the CFN, and an authorization is issued, enabling them to prescribe phytotherapeutics [22].

Recent data show that there are around 1,550 nutritionists in Brazil qualified in phytotherapy, according to information obtained from the CFN in April 2024. Brazilian Association of Nutrition, responsible for awarding the title of specialist in Phytotherapy, reports that just over 100 nutritionists received the title by April 2024. This low number of qualified nutritionists is noteworthy, considering that phytotherapy is a specialty area within nutrition and is also studied and used in other fields, with applications in clinical nutrition, sports nutrition, gerontology, gastroenterology, esthetics, among others. The number of qualified professionals is small compared to the large number of academic institutions offering *lato sensu* postgraduate programs in phytotherapy, and one of the reasons may be a lack of awareness of the legislation, particularly regarding the registration of the certificate with the CFN [9,22].

The list of plants available for prescription by nutritionists is very extensive and involves plants from Brazil and other countries, provided they are authorized for sale in Brazil [12]. For industrialized products, the pharmaceutical industry can only use plants registered or notified by the *Agência Nacional de Vigilância Sanitária* (ANVISA, National Health Surveillance Agency), but prescribers still have the option to indicate phytotherapeutics in compounding pharmacies, which have a greater number of active ingredients than those used by the industry. The Ministry of Health in Brazil presents the *Relação Nacional de Plantas Medicinais de Interesse ao SUS* (Brazilian national list of medicinal plants of interest to the unified health system), which currently contains 71 species [23]. This list includes plants commonly prescribed by nutritionists, such as *Curcuma longa*, known for its strong anti-inflammatory properties and studied in various areas ranging from metabolic syndrome treatment to muscle recovery after exercise [24,25]. Other plants frequently prescribed by nutritionists are *Camellia sinensis*, *Zingiber officinale*, *Matricaria recutita*, *Melissa officinalis*, *Pimpinella anisum*, *Peumus boldus*, *Casearia sylvestri*, *Allium sativum*, *Paullinia cupana*, *Ilex paraguariensis*, among others. It is important to emphasize that such prescriptions should be based on valid scientific studies in the field. Some phytotherapeutics are poorly studied, which requires caution in prescribing, and although some plants are commonly studied, the studies may be insufficient, limiting their prescription [15].

It should be highlighted that the clinical use of phytotherapeutics by nutritionists requires careful attention. Among the general population, there is a widespread cultural belief that the use of medicinal plants poses no health risks. However, the use of phytotherapeutics needs to be scientifically based and prescribed individually [10]. Indiscriminate use of phytotherapy can compromise the function of important organs, such as the liver, kidneys, and heart, among others [26-28]. Toxicity studies demonstrate that some medicinal plants, when used in incorrect doses or over long periods, can be associated with side effects and organ overload. For nutritionists wishing to prescribe phytotherapeutics in their clinical practice, it is necessary to understand that a medicinal plant should be indicated ethically and responsibly, defining the start and end of use,

individualized doses, and attention to possible interactions between the plant and nutrients, foods, or medications used by patients [10,27,29,30]. It is important to emphasize that, due to the fact that some plants have few reliable scientific studies, especially research on interactions with other substances or plants, the care in individualizing this prescription must be reinforced. This includes use in specific populations, such as pregnant women, lactating mothers, and children [10,31]. The current legislation on phytotherapy and the Code of Ethics of the profession emphasize that the nutritionist is responsible for what they prescribe. Therefore, the indication of phytotherapeutics in their clinical practice needs to be ethical, scientifically based, and carried out when there are clear benefits to the patient, without posing risks.

The role of nutritionists in foods with claims of functional properties and health and bioactive compounds

The current Western dietary pattern is associated with an increased incidence of various diseases, including obesity, diabetes, cardiovascular diseases, and cancer. In this context, adopting a diet reduced in processed foods and with a higher availability of natural foods can have substantial positive health effects and reduce the risk of chronic diseases [32].

With the pursuit of a more natural diet and reduced consumption of ultra-processed products, functional foods stand out for their unique antioxidant and anti-inflammatory characteristics that can improve metabolic disorders [33]. These foods are characterized by providing beneficial physiological effects on health when consumed regularly as part of the habitual diet [33]. They can be natural or specifically industrial, when designed to provide specific benefits beyond basic nutritional needs [33-35].

In Brazil, legislation does not define the term functional food. According to administrative measure No. 398 of April 30, 1999, ANVISA defines functional property claims and health property claims for this type of food [36]. These claims need to be fully recognized by scientific evidence for each food or product that proves their biological actions [37]. Industrialized products must be formulated from the combination of edible products or natural foods rich in nutrients such as dietary fiber, phytochemicals, antioxidants, probiotics, bioactive compounds, among others, that exert a notable beneficial effect on the body [35,37]. Additionally, they must be registered with ANVISA, safe for human consumption, and have advanced technological characteristics that allow their inclusion in the habitual diet effectively [36,37].

According to the CFN, the specialization course in 'Nutrition and Functional Foods' is recognized in Brazil, allowing professionals to deepen their knowledge of the characteristics of foods with functional properties and apply them in practical clinical practice [9]. In this context, the nutritionist has important tools for nutritional prescription both in strategic planning of dietary therapy and in nutritional education programs to contribute to the health of the population.

Regarding bioactive compounds, the *Resolução da Diretoria Colegiada* (RDC Collegiate Board Resolution) No. 243/18 from ANVISA defines a bioactive substance as a nutrient or non-nutrient normally consumed as a specific component of food, which exerts specific metabolic or physiological action in the human body [14]. Bioactive substances may include macronutrients (carbohydrates, lipids, and proteins), micronutrients (vitamins and minerals), phytonutrients (terpenes, alkaloids, phenolics, and organosulfur compounds), and regulators of the gut microbiome (probiotics, prebiotics, synbiotics, and postbiotics) [38], which possess antioxidant, anti-inflammatory, anticancer, antibacterial, antiviral, and neuroprotective properties [39,40]. A well-balanced diet containing a variety of grains, vegetables, legumes, and fruits provides adequate sufficient micronutrients for health [38].

Nutritionists, in turn, are allowed to prescribe bioactive compounds approved by ANVISA, according to RDC Resolution No. 2, dated January 7, 2002 [41]. However, an important factor to be considered in nutritional strategies is the careful choice between prescribing isolated active compounds and whole foods for consumption, taking into account the food matrix as a nutritional strategy. The food matrix refers not only to the chemical and physical components of foods but also to their molecular relationships that affect how the food is digested and metabolized [42]. Thus, considering the food matrix as a necessary choice in nutritional interventions ensures that the food will have functionalities and mechanisms of action different from those exhibited by isolated components. Bioconversion, bioactivity, and bioefficacy are related to the biochemical transformations of food components released together from the food matrix and with specific physiological and health responses in the body [43].

Thus, the consumption of whole foods should be encouraged, as they are rich in nutrients and bioactive compounds with widely recognized health effects, contributing to a more diverse and natural diet, and reducing the risk of developing chronic diseases in the long term [42].

Brazilian and regional foods and their bioactive compounds for nutritionist prescription

Brazil's biodiversity encompasses approximately 20% of the world's total and has one of the richest biomes globally, including the Atlantic Forest, a significant part of the Amazon Rainforest, the Cerrado, the Caatinga, the Pantanal, and the Pampas [44-46]. In 2022, data from the Food and Agriculture Organization showed that Brazil was among the top 10 producers of tropical fruits (5th place) [47]. In recent years, research on the potential of various native Brazilian fruit species has increased. Some native Brazilian fruit species, their detailed bioactive composition, and their notable health benefits are listed in Table 1.

Table 1 – Bioactive compounds and health benefits of some Brazilian and regional fruits. Florianópolis (SC), Brazil, 2025.

1 of 2

Popular and scientific name	Region of Brazil	Bioactive compounds	Health effects
Pineapple (<i>Ananas comosus</i>) [48-50]	All regions	Citric acid, malic acid, ferulic acid, vitamin C and flavonoids	↓ Incidence of sinusitis, ↓ pain, ↓ secretion of inflammatory markers
Açaí (<i>Euterpe oleracea</i>) [48,51]	Amazon region	Polyphenols such as anthocyanins and other phenolic compounds	↑ serum antioxidant capacity, antioxidant enzymes, ↓ lipid peroxidation, total cholesterol and LDL-c
Atemoya (<i>Annona Atemoya</i>) [48,52]	Northeast, Southeast and South	Flavonoids, alkaloids, terpenoids, phenolic compounds	Antiangiogenic, hypolipidemic, antioxidant effect, anti-inflammatory and neuroprotective activities
Avocado (<i>Persea americana</i>) [48,53,54]	All regions	Vitamin E and phytochemicals	↓ Visceral adipose tissue, ↓ total cholesterol and LDL-c, ↑ HDL-c
Cocoa (<i>Theobroma cacao</i>) [48,55,56]	North, Northeast and Midwest	Flavonoids such as (-)-Epicatechin, (+)-catechin, procyanidin b1, procyanidin b2	Improvement in cognitive and atheroplatelet function
Camu-camu (<i>Myrciaria dubia</i> McVaugh) [57]	North and Southeast	Vitamin C, carotenoids and polyphenols, including ellagic acid and anthocyanins	↓ blood pressure, triglycerides and abdominal circumference
Guava (<i>Psidium guajava</i>) [58-61]	All regions	Polyphenols such as flavonoids and tannins; alkaloids, triterpenoids and carotenoids	Antidiarrheal effect; treatment of gingivitis and oral ulcers.
Guarana (<i>Paullinia cupana</i>) [48,62]	North, Northeast and Midwest	Polyphenols such as flavonoids (catechins and epicatechins) and pro-anthocyanidins	↑ Performance on cognitive tests
Juçara (<i>Euterpe edulis</i>) [48,51]	Bahia to Rio Grande do Sul	Protocatechuic, p-coumaric, vanillic, gallic, caffeic, ferulic, syringic, sinapic, ellagic, chlorogenic, apigenin, kaempferol, aromadendrin, catechin, epicatechin, quercetin, taxifolin, myricetin, isoquercetin, rutin, resveratrol, rutinoides, cyanidin-3-glucoside	↑ HDL-c and CAT

Table 1 – Bioactive compounds and health benefits of some Brazilian and regional fruits. Florianópolis (SC), Brazil, 2025.

2 of 2

Popular and scientific name	Region of Brazil	Bioactive compounds	Health effects
Mangaba (<i>Hancornia speciosa</i>) [63-65]	North, Northeast, Midwest and part of Southeast Brazil	Rutin, chlorogenic acid, phenolic acids, vitamin C	Anti-inflammatory, antioxidant, hypoglycemic, antimicrobial and ↓ lipid peroxidation effect
Pequi (<i>Caryocar brasiliense</i>) [48,66]	North, Northeast, Midwest and Southeast	Carotenoids and phenolic compounds	↓ hepatic lipid peroxidation, ↓ TNF-α, IL-1b, IL-6, ↑ CAT activity, ↓ lipid peroxidation, ↓ leukocyte migration, ↑ antinociceptive effect of cold

Note: Akt: Protein Kinase B; CAT: Catalase Enzyme; HDL-c: High-Density Lipoprotein Cholesterol; IL-1b: Interleukin-1beta; IL-6: Interleukin-6; LDL-c: Low-Density Lipoprotein Cholesterol; PI3K: Phosphatidylinositol 3-kinase.

Other vegetables rich in bioactive compounds, sources of sustainable food, and found in abundance in Brazil are Non-Conventional Food Plants. These do not belong to the set of commonly consumed plants and are often not part of an individual's diet because of lack of knowledge or specific other reasons. They include fruits, leaves, roots, seeds, stems, and/or flowers of species that grow spontaneously in nature and are accessible, nutritionally diverse, sustainable, high in nutritional value, and unique bioactive compounds [67].

The use of PANCs in nutrition can encourage cultural diversification, especially in family farming, as they are part of the traditional practices of various communities. Their cultivation and consumption highlight value and preserve food traditions, diversify the food supply, reduce dependence on conventional crops, strengthen food and nutritional security, and ensure the human right to adequate and healthy food. Because of these important factors, PANCs are encouraged to be part of modern innovative solutions for nutrient-rich alternatives, sustainable agriculture, and advanced industrial technologies, exploring their exceptional beneficial properties for the development of safer food products. This topic is aligned with the 2030 Agenda for Sustainable Development, driven by social, economic, and environmental factors, to eliminate world hunger and poverty [67,68].

Table 2 displays various PANCs and their bioactive compounds, along with evidence of their health benefits. This table is structured based on findings from the latest intervention studies and reviews.

Table 2 – Characteristics of four Brazilian Non-Conventional Food Plants Food Plants (PANCs) and health effects. Florianópolis (SC), Brazil, 2025.

Popular and scientific name	Region of Brazil	Bioactive compounds	Type of studies and effects on human health
Tannia (<i>Xanthosoma sagittifolium</i>) [69]	Southeast	Syringic acid, caffeic acid and quercetin	Experimental and in vitro. No proven effect
Purslane (<i>Portulaca oleracea</i>) [70,71]	Southeast	Flavonoids, alkaloids, terpenoids, carotenoids	Experimental, in vitro and clinical trials. There was a decrease in fasting blood glucose
Bertalha (<i>Basella alba</i>) [72,73]	North	Phenolic compounds and flavonoids	Experimental and in vitro. No proven effect
Baru (<i>Dipteryx alata</i>) [74,75]	Midwest	Phenolic acids and flavonoids and vitamin C	Experimental, in vitro and clinical trials. Consumption reduced serum concentrations of TC, non-HDL-c, LDL-c, blood pressure and glycemic curve

Note: LDL-c: Low-Density Lipoprotein Cholesterol; non-HDL-c: Non-High-Density Lipoprotein Cholesterol; TC: Triglycerides.

Effects of bioactive compounds on health, disease, and physical activity

As shown in Table 1, the bioactive compounds in Brazilian fruits exhibit various clinically relevant beneficial effects on human health. Among these effects are antiglycemic, anticarcinogenic, and chemopreventive activities, antioxidant activity, and reduction of oxidative stress. Certain

powerful bioactive compounds, such as those in *Persea americana*, have demonstrated improvements in lipid profile parameters, potentially contributing to a reduction in the incidence of cardiovascular diseases [53,54]. Other compounds act more directly in suppressing symptoms such as pain (*Ananas comosus*), diarrhea, gingivitis, and oral ulcers (*Psidium guajava*), which can be useful in routine clinical practice [49,50,58-61]. Antimicrobial and anti-inflammatory activities are identified in the use of some substances (such as *Annona atemoya*, *Euterpe edulis*, and *Hancornia speciosa*), which may have clinical relevance in diet therapy for various chronic pathologies [51,52,63-65].

Regarding bioactive compounds with limited unproven effects, the literature contains some initial studies revealing interesting emerging results. *Copaifera langsdorffii*, for example, appears to have a beneficial dental effect in the context of a pulpotomy of deciduous teeth in children [76]. In a randomized, double-blind, placebo-controlled study involving patients with type 2 diabetes mellitus, the administration of an herbal mixture containing *Guazuma ulmifolia* and *Tecoma stans* showed a reduction in waist circumference, fasting glucose, and HbA1c in the intervention group, which seems beneficial for improving glycemic control [77]. Desirable metabolic effects also appear to be obtained through the consumption of jaboticaba (*Myrciaria jaboticaba*) juice due to its high polyphenol content, such as a decrease in reactive oxygen species after eccentric exercise, providing protection of macro and microvascular functions under conditions of severe redox homeostasis imbalance [78].

However, there are still relatively few studies that compile the main effects of bioactive compounds from Brazilian and regional fruits, especially in the context of physical activity, reflecting the need for advancement in clinical investigations of these bioactive compounds. By expanding the understanding of the physiological impact of bioactive compounds, new research possibilities can be outlined to improve human health and performance, thus contributing to the advancement of scientific knowledge and public health initiatives.

CONCLUSION

According to the findings of this study, the integration of areas such as phytotherapy, foods with functional health claims, and bioactive compounds into nutritional practice represents an advancement in health promotion and disease prevention. However, as it is a narrative review, it presents the limitation of the inherent subjectivity of this method, because of the absence of rigorous systematic criteria. This characteristic can introduce biases both in the selection and interpretation of the analyzed works, as these processes depend directly on the authors, which may compromise the reproducibility of the results.

It is also worth noting that strengthening the scientific evidence on these topics will solidify the nutritionist's field of practice, favoring professional recognition and leading to further investigations into who the specialists are and how they operate. A robust mapping of national data revealing the scenario of nutritionists' practices in these strategic areas is essential, further expanding the reach and effectiveness of practices.

The expansion of studies on the therapeutic properties of foods has profoundly enriched scientific understanding and broadened the available nutritional strategies. This advancement is reflected in clinical practice, where the prescription of personalized diets –focusing on the food matrix as a source of bioactive compounds and functional properties, and dietary supplements when necessary – has shown significant results. Additionally, it contributes significantly to education and research, establishing a solid foundation for future innovations and discoveries. Continuous

investments in research and training are essential to ensure the safety of nutritionists' prescriptions and to fully explore the immense benefits of Brazilian natural resources.

REFERENCES

1. Vasconcelos FAG. O nutricionista no Brasil: uma análise histórica. *Rev Nutr.* 2002;15(2):127-138. doi: <https://doi.org/10.1590/S1415-52732002000200001>.
2. Vasconcelos FAG, Bricarello LP, Costa NMSC, Moraes BA, Akutsu RCCA. The 80-year history of the professional associations of nutritionists in Brazil: a historical-documentary analysis. *Rev Nutr.* 2019;32:e180160. doi: <https://doi.org/10.1590/1678-9865201932e180160>.
3. Neves J, Zanlourensi CB, Domene SMA, Batista B, Calado CL A, Vasconcelos FAG. Eighty years of undergraduate education in nutrition in Brazil: an analysis of the 2009-2018 period. *Rev Nutr.* 2019;32:e180158. doi: <https://doi.org/10.1590/1678-9865201932e180158>.
4. Figueiredo J, Macedo M. Institucional: sobre o CFN [Internet]. Brasília: Conselho Federal de Nutricionistas; 2024 [cited 2024 May 18]. Available from: <https://www.cfn.org.br/index.php/sobre-nos/>.
5. Conselho Federal de Nutricionistas (Brasil). Quadro estatístico do 2º trimestre/2023 - 01/04/2023 a 30/06/2023 - Pessoa Física [Internet]. Brasília: CFN; 2024 [cited 2024 May 18]. Available from: <https://www.cfn.org.br/>.
6. Conselho Federal de Nutricionistas (Brasil). Resolução no 600, de 25 de fevereiro de 2018. Dispõe sobre a definição das áreas de atuação do nutricionista e suas atribuições, indica parâmetros numéricos mínimos de referência no âmbito da alimentação e nutrição [Internet]. Diário Oficial da União, 2018 [cited 2024 May 18]. Available from: https://www.cfn.org.br/wp-content/uploads/resolucoes/resolucoes_old/Res_600_2018.htm.
7. Conselho Federal de Nutricionistas (Brasil). Pesquisa Inserção Profissional dos Nutricionistas no Brasil [Internet]. Brasília: CFN, 2016 [cited 2024 May 18]. Available from: <http://pesquisa.cfn.org.br/>.
8. Conselho Federal de Nutricionistas (Brasil). Resolução no 778, de 05 de junho de 2024. Altera a Resolução CFN no 689, de 4 de maio de 2021, que regulamenta o reconhecimento de especialidades em Nutrição e o registro, no âmbito do Sistema CFN/CRN, de títulos de especialista de nutricionistas [Internet]. Diário Oficial da União; 2021 [cited 2024 June 5]. Available from: <http://sisnormas.cfn.org.br:8081/viewPage.html?id=778>.
9. Conselho Federal de Nutricionistas (Brasil). Resolução no 689, de 04 de maio de 2021. Regulamenta o reconhecimento de especialidades em Nutrição e o registro, no âmbito do Sistema CFN/CRN, de títulos de especialista de nutricionistas [Internet]. Diário Oficial da União; 2021 [cited 2024 May 18]. Available from: <http://sisnormas.cfn.org.br:8081/viewPage.html?id=689>.
10. Colalto C. What phytotherapy needs: evidence-based guidelines for better clinical practice. *Phytother Res.* 2018;32(3):413-25. doi: <https://doi.org/10.1002/ptr.5977>.
11. Santos-Buelga C, González-Paramás AM, Oludemi T, Ayuda-Durán B, González-Manzano S. Plant phenolics as functional food ingredients. *Adv Food Nutr Res.* 2019;90:183-257. doi: <https://doi.org/10.1016/bs.afnr.2019.02.012>.
12. Leite PM, Camargos LM, Castilho RO. Recent progress in phytotherapy: a Brazilian perspective. *Eur J Integr Med.* 2021;41:101270. doi: <https://doi.org/10.1016/j.eujim.2020.101270>.
13. Ministério da Saúde, Agência Nacional de Vigilância Sanitária (Brasil). Memento fitoterápico da farmacopeia brasileira [Internet]. ANVISA: Brasília; 2022 [cited 2024 May 02]. Available from: <https://www.gov.br/saude/pt-br/composicao/sectics/plantas-medicinais-e-fitoterapicos/arquivos/2016/memento-fitoterapico-1a-edicao.pdf/view>.
14. Ministério da Saúde, Agência Nacional de Vigilância Sanitária (Brasil). Resolução da Diretoria Colegiada – RDC no 243, de 26 de julho de 2018. Dispõe sobre os requisitos sanitários dos suplementos alimentares [Internet]. Diário Oficial da União; 2018 [cited 2024 May 26]. Available from: https://antigo.anvisa.gov.br/documents/10181/3898888/RDC_243_2018_.pdf/0e39ed31-1da2-4456-8f4a-afb7a6340c15#:~:text=%C3%82mbito%20de%20aplica%C3%A7%C3%A3o-,Art.,de%20rotulagem%20complementar%20destes%20produtos.
15. Calixto JB. The role of natural products in modern drug discovery. *An Acad Bras Ciênc.* 2019;91(Suppl 3):e20190105. doi: <https://doi.org/10.1590/0001-3765201920190105>.

16. Ibanez B, Melero A, Montoro A, Merino-Torres JF, Soriano JM, Onofre NS. A narrative review of the herbal preparation of ayurvedic, tradicional chinese, and kampo medicines applied as radioprotectors. *Antioxidants* (Basel). 2023;12(7):1437. doi: <https://doi.org/10.3390/antiox12071437>.
17. Ministério da Saúde, Agência Nacional de Vigilância Sanitária (Brasil). Portaria Ministerial MS/GM no 971 de 3 de maio de 2006. Publica a Política Nacional de Práticas Integrativas e Complementares no Sistema Único de Saúde [Internet]. Diário Oficial da União; 2006 [cited 2024 May 02]. Available from: https://bvsms.saude.gov.br/bvs/saudelegis/gm/2006/prt0971_03_05_2006.html.
18. Ministério da Saúde, Agência Nacional de Vigilância Sanitária (Brasil). Decreto no 5.813, em 22 de junho de 2006. Publica a Política Nacional de Plantas Medicinais e Fitoterápicos [Internet]. Diário Oficial da União; 2006 [cited 2024 May 21]. Available from: https://www.planalto.gov.br/ccivil_03/_ato2004-2006/2006/decreto/d5813.htm.
19. Conselho Federal de Nutricionistas (Brasil). Resolução no 402, de 30 de julho de 2007. Regulamenta a prescrição fitoterápica pelo nutricionista de plantas in natura frescas, ou como droga vegetal nas suas diferentes formas farmacêuticas [Internet]. Diário Oficial da União; 2007 [cited 2024 May 21]. Available from: <http://sisnormas.cfn.org.br:8081/viewPage.html?id=402>.
20. Conselho Federal de Nutricionistas (Brasil). Resolução no 525, de 25 de junho de 2013. Regulamenta a prática da Fitoterapia pelo nutricionista [Internet]. Diário Oficial da União; 2013 [cited 2024 May 18]. Available from: <http://sisnormas.cfn.org.br:8081/viewPage.html?id=525>.
21. Conselho Federal de Nutricionistas (Brasil). Resolução no 556, de 11 de abril de 2015. Altera as Resoluções no 416 de 2008 e no 525 de 2013, e acrescenta disposições à regulamentação da prática da Fitoterapia para o nutricionista como complemento da prescrição dietética [Internet]. Diário Oficial da União; 2015 [cited 2024 May 18]. Available from: <https://www.cfn.org.br/wp-content/uploads/2015/06/Resol-CFN-556.pdf>.
22. Conselho Federal de Nutricionistas (Brasil). Resolução no 680, de 19 de janeiro de 2021. Regulamenta a prática da Fitoterapia pelo nutricionista [Internet]. Diário Oficial da União; 2021 [cited 2024 May 18]. Available from: <https://www.cfn.org.br/wp-content/uploads/2021/01/RESOLU%C3%87%C3%83O-N%C2%BA-680-DE-19-DE-JANEIRO-DE-2021-RESOLU%C3%87%C3%83O-N%C2%BA-680-DE-19-DE-JANEIRO-DE-2021-DOU-Imprensa-Nacional.pdf>.
23. Ministério da Saúde (Brasil). Relação Nacional de Plantas Medicinais de Interesse ao SUS (ReniSUS) [Internet]. Brasília: Ministério da Saúde; 2009 [cited 2024 May 18]. Available from: <https://www.gov.br/saude/pt-br/composicao/sectics/pnpmf/ppnpmf/arquivos/2014/renisus.pdf>.
24. Qiu L, Gao C, Wang H, Ren Y, Li J, Li M, et al. Effects of dietary polyphenol curcumin supplementation on metabolic, inflammatory, and oxidative stress indices in patients with metabolic syndrome: a systematic review and meta-analysis of randomized controlled trials. *Front Endocrinol* (Lausanne). 2023;14:1216708. doi: <https://doi.org/10.3389/fendo.2023.1216708>.
25. Collins J, Maughan RJ, Gleeson M, Bilsborough J, Jeukendrup A, Morton JP, et al. UEFA expert group statement on nutrition in elite football. Current evidence to inform practical recommendations and guide future research. *Br J Sports Med*. 2021;55(8):416. doi: <https://doi.org/10.1136/bjsports-2019-101961>.
26. He S, Zhang C, Zhou P, Zhang X, Ye T, Wang R, et al. Herb-induced liver injury: phylogenetic relationship, structure-toxicity relationship, and herb-ingredient network analysis. *Int J Mol Sci*. 2019;20(15):3633. doi: <https://doi.org/10.3390/ijms20153633>.
27. Parvez MK, Rishi V. Herb-drug interactions and hepatotoxicity. *Curr Drug Metab*. 2019;20(4):275-82. doi: <https://doi.org/10.2174/1389200220666190325141422>.
28. Suroowan S, Mahomoodally MF. Herbal medicine of the 21st century: a focus on the chemistry, pharmacokinetics and toxicity of five widely advocated phytotherapies. *Curr Top Med Chem*. 2019;19(29):2718-38. doi: <https://doi.org/10.2174/1568026619666191112121330>.
29. Allegra S, Francia SD, Turco F, Bertaggia I, Chiara F, Armando T, et al. Phytotherapy and drugs: can their interactions increase side effects in cancer? *J Xenobiot*. 2023;13(1):75-89. doi: <https://doi.org/10.3390/jox13010007>.
30. Cheng W, Xia K, Wu S, Li Y. Herb-drug interactions and their impact on pharmacokinetics: an update. *Curr Drug Metab*. 2023;24(1):28-69. doi: <https://doi.org/10.2174/1389200224666230116113240>.
31. Bridi R, Ebensperger R, Trittini P, Maturana F, Plaza-Plaza JC. Use of medicinal plants among older people attending a public primary care center. *Rev Med Chil*. 2023;151(3):289-95. doi: <https://doi.org/10.4067/s0034-98872023000300289>.

32. Clemente-Suárez VJ, Beltrán-Velasco AI, Redondo-Flórez L, Martín-Rodríguez A, Tornero-Aguilera JF. Global impacts of western diet and its effects on metabolism and health: a narrative review. *nutrients*. 2023;15(12):2749. doi: <https://doi.org/10.3390/nu15122749>.
33. Temple NJ. A rational definition for functional foods: a perspective. *Front Nutr*. 2022; 9:957516. doi: <https://doi.org/10.3389/fnut.2022.957516>.
34. Sharma S, Singh A, Kant A, Sevda S, Taherzadeh MJ, Garlapati VK. Functional foods as a formulation ingredients in beverages: technological advancements and constraints. *Bioengineered*. 2021;12(2):11055-75. doi: [10.1080/21655979.2021.2005992](https://doi.org/10.1080/21655979.2021.2005992).
35. Granato D, Barba FJ, Bursać Kovačević D, Lorenzo JM, Cruz AG, Putnik P. Functional foods: product development, technological trends, efficacy testing, and safety. *Annu Rev Food Sci Technol*. 2020;11:93-118. doi: <https://doi.org/10.1146/annurev-food-032519-051708>.
36. Ministério da Saúde, Agência Nacional de Vigilância Sanitária (Brasil). Diretrizes básicas para análise e comprovação de propriedades funcionais e ou de saúde alegadas em rotulagem de alimentos. Portaria nº 398, de 30 de abril de 1999 [Internet]. Diário Oficial da União; 1999 [cited 2024 May 26]. Available from: https://bvsms.saude.gov.br/bvs/saudelegis/anvisa/1999/prt0398_30_04_1999.html.
37. Ministério da Saúde, Agência Nacional de Vigilância Sanitária (Brasil). Guia para avaliação de alegação de propriedade funcional e de saúde para substâncias bioativas presentes em alimentos e suplementos alimentares - Guia nº 55/2021 – versão 1 [Internet]. Brasília: ANVISA; 2021 [cited 2024 May 26]. Available from: https://antigo.anvisa.gov.br/documents/10181/6358888/Guia+55_2021_vers%C3%A3o+1+de+25+11+2021.pdf/3e7d36b7-c14f-4feb-8028-041fb2fe78ac.
38. Kussmann M, Abe Cunha DH, Berciano S. Bioactive compounds for human and planetary health. *Front Nutr*. 2023;10:1193848. doi: <https://doi.org/10.3389/fnut.2023.1193848>.
39. Hoang T, Kim J. Phytonutrient supplements and metabolic biomarkers of cardiovascular disease: An umbrella review of meta-analyses of clinical trials. *Phytother Res*. 2021;35:4171-82. doi: <https://doi.org/10.1002/ptr.7079>.
40. Kurek M, Benaïda-Debbache N, Garofulić IE, Galić K, Avallone S, Voilley A, et al. Antioxidants and bioactive compounds in food: critical review of issues and prospects. *Antioxidants (Basel)*. 2022;11(4):742. doi: <https://doi.org/10.3390/antiox11040742>.
41. Conselho Federal de Nutricionistas (Brasil). Resolução no 2, de 07 de janeiro de 2002. Aprova o regulamento técnico de substâncias bioativas e probióticos isolados com alegação de propriedades funcional e ou de saúde [Internet]. Diário Oficial da União; 2002 [cited 2024 May 26]. Available from: https://bvsms.saude.gov.br/bvs/saudelegis/anvisa/2002/rdc0002_07_01_2002_rep.html.
42. Miller GD, Ragalie-Carr J, Torres-Gonzalez M. Perspective: seeing the forest through the trees: the importance of food matrix in diet quality and human health. *Adv Nutr*. 2023;14(3):363-5. doi: <https://doi.org/10.1016/j.advnut.2023.03.005>.
43. Aguilera JM. The food matrix: implications in processing, nutrition and health. *Crit Rev Food Sci Nutr*. 2019;59(22):3612-29. doi: <https://doi.org/10.1080/10408398.2018.1502743>.
44. Silva M, Rodrigues LB, Domene S, Louzada M. Household availability of foods from Brazilian biodiversity. *Cad Saude Publica*. 2023;39(6):e00206222. doi: <https://doi.org/10.1590/0102-311XEN206222>.
45. Ellwanger JH, Kulmann-Leal B, Kaminski VL, Valverde-Villegas JM, Veiga A, Spilki FR, et al. Beyond diversity loss and climate change: impacts of Amazon deforestation on infectious diseases and public health. *An Acad Bras Cienc*. 2020;92(1):e20191375. doi: <https://doi.org/10.1590/0001-3765202020191375>.
46. Lucas KRG, Caldarelli CE, Ventura MU. Agriculture and biodiversity damage: a prospective evaluation of the impact of Brazilian agriculture on its ecoregions through life cycle assessment methodology. *Sci Total Environ*. 2023;899:165762. doi: <https://doi.org/10.1016/j.scitotenv.2023.165762>.
47. Food and Agriculture Organization of the United Nations. FAOSTAT [Internet]. Rome: FAO; 2022 [cited 2024 Jul 28]. Available from: https://www.fao.org/faostat/en/#rankings/countries_by_commodity.
48. Instituto Brasileiro de Geografia e Estatística. Produção Agropecuária. Rio de Janeiro: IBGE; 2022 [cited 2024 Jul 28]. Available from: <https://www.ibge.gov.br/explica/producao-agropecuaria>.
49. Meena L, Sengar AS, Neog R, Sunil CK. Pineapple processing waste (PPW): bioactive compounds, their extraction, and utilisation: a review. *J Food Sci Technol*. 2022;59(11):4152-64. doi: <https://doi.org/10.1007/s13197-021-05271-6>.

50. Leelakanok N, Petchsomrit A, Janurai T, Saechan C, Sunsandee N. Efficacy and safety of bromelain: a systematic review and meta-analysis. *J Nutr Health*. 2023;29(3):479-503. doi: <https://doi.org/10.1177/02601060231173732>.
51. Baptista SL, Copetti CLK, Cardoso AL, Di Pietro PF. Biological activities of açaí (*Euterpe oleracea* Mart.) and juçara (*Euterpe edulis* Mart.) intake in humans: an integrative review of clinical trials. *Nutr Rev*. 2021;79(12):1375-91. doi: <https://doi.org/10.1093/nutrit/nuab002>.
52. Kazman BSA, Harnett JE, Hanrahan JR. The phytochemical constituents and pharmacological activities of *Annona atemoya*: a systematic review. *J Pharm*. 2020;13(10):269 doi: <https://doi.org/10.3390/ph13100269>.
53. James-Martin G, Brooker PG, Hendrie GA, Stonehouse W. Avocado consumption and cardiometabolic health: a systematic review and meta-analysis. *J Acad Nutr Diet*. 2022;124:233-48. doi: <https://doi.org/10.1016/j.jand.2022.12.008>.
54. Escutia-Gutiérrez R, Sandoval-Rodríguez A, Galicia-Moreno M, Rosas-Campos R, Almeida-López M, Santos A, et al. Mexican ancestral foods (*Theobroma cacao*, *Opuntia ficus indica*, *Persea americana* and *Phaseolus vulgaris*) supplementation on anthropometric, lipid and glycemic control variables in obese patients: a systematic review and meta-analysis. *Foods*. 2023;12(6):1177. doi: <https://doi.org/10.3390/foods12061177>.
55. Nouruzi S, Farahani AV, Rezaeizadeh H, Ghafouri P, Ghorashi SM, Omid N. Platelet aggregation inhibition: an evidence-based systematic review on the role of herbs for primary prevention based on randomized controlled trials. *Iran J Med Sci*. 2022;47(6):505. doi: <https://doi.org/10.30476/IJMS.2021.91328.2247>.
56. Shateri Z, Kooshki A, Hormoznejad R, Hosseini SA, Mousavi R, Foroumandi E. Effects of chocolate on cognitive function in healthy adults: a systematic review and meta-analysis on clinical trials. *Phyther. Res*. 2023;37(9):3688-97. doi: <https://doi.org/10.1002/ptr.7896>.
57. García-Chacón JM, Marín-Loaiza JC, Osorio C. Camu Camu (*Myrciaria dubia* (Kunth) McVaugh): an Amazonian Fruit with Biofunctional Properties-A Review. *ACS Omega*. 2023;8(6):5169-83. doi: <https://doi.org/10.1021/acsomega.2c07245>.
58. Liu H, Wei S, Shi L, Tan H. Preparation, structural characterization, and bioactivities of polysaccharides from *Psidium guajava*: a review. *Food Chem*. 2023;411:135423. doi: <https://doi.org/10.1016/j.foodchem.2023.135423>.
59. Pasupuleti MK, Nagate RR, Alqahtani SM, Penmetsa GS, Gottumukkala SN, Ramesh KSV. Role of medicinal herbs in periodontal therapy: a systematic review. *J Int Soc Prev Community*. 2023;13(1):9-16. doi: https://doi.org/10.4103/jispcd.JISPCD_210_22.
60. Chechani B, Roat P, Hada S, Yadav DK, Kumari N. *Psidium guajava*: an insight into ethnomedicinal uses, phytochemistry, and pharmacology. *Comb Chem High Throughput Screen*. 2024;27(1):2-39. doi: <https://doi.org/10.2174/1386207326666230426093315>.
61. Garrido G, Garrido Suárez BB, Tapia NM, Valdés-González M, Ortega Mardones A. Antidiarrheal effect of *Psidium guajava* L. extract in acute diarrhea: a systematic review. *J Sci Food Agric*. 2024;104(13):7731-53. doi: <https://doi.org/10.1002/jsfa.13515>.
62. Hack B, Penna EM, Talik T, Chandrashekhar R, Millard-Stafford M. Effect of guarana (*Paullinia cupana*) on cognitive performance: a systematic review and meta-analysis. *Nutrients*. 2023;15(2):434. doi: <https://doi.org/10.3390/nu15020434>.
63. Nunes VV, Silva-Mann R, Souza JL, Calazans CC. Pharmaceutical, food potential, and molecular data of *Hancornia speciosa* Gomes: a systematic review. *Genet Resour Crop Evol*. 2022;69(2):525-43. doi: <https://doi.org/10.1007/s10722-021-01319-w>.
64. Reis VHOT, Rodrigues BM, Loubet Filho PS, Cazarin CBB, Rafacho BPM, Santos EEF. Biotechnological potential of *Hancornia speciosa* whole tree: a narrative review from composition to health applicability. *Heliyon*. 2022;8(10):e11018. doi: <https://doi.org/10.1016/j.heliyon.2022.e11018>.
65. Santos RS, Chaves-Filho AB, Silva LAS, Garcia CAB, Silva ARST, Dolabella SS, et al. Bioactive compounds and hepatoprotective effect of *Hancornia speciosa* fruit juice on acetaminophen-induced hepatotoxicity in vivo. *Nat Prod Res*. 2022;36(10):2565-69. doi: <https://doi.org/10.1080/14786419.2021.1902324>.
66. Silva VR, Pinheiro AC, Ombredane AS, Martins NO, Luz GV, Carneiro ML, et al. Anti-inflammatory activity of Pequi oil (*Caryocar brasiliense*): a systematic review. *Pharmaceutics*. 2023;17(1):11. doi: <https://doi.org/10.3390/ph17010011>.
67. Valente MAS, Oliveira DDS, Batista ÂG, Lucia CMD, Cardoso LM. Editorial: Chemical composition, processing, and health-promoting potential of unconventional food plants. *Front Nutr*. 2024;11:1368629. doi: <https://doi.org/10.3389/fnut.2024.1368629>.

68. Dias MI, Corrêa RCG, Steinmacher NC, Pinela J, Pereira C. Editorial: Emerging unconventional plants for derived food products and ingredients. *Front Nutr*. 2024;11:1373439. doi: <https://doi.org/10.3389/fnut.2024.1373439>.
69. Ferreira CP, Lima MDC, Silva JG, Peixoto Araujo NM. Nutritional composition, phenolic compounds and biological activities of selected unconventional food plants. *Food Res Int*. 2024;191:114643. doi: <https://doi.org/10.1016/j.foodres.2024.114643>.
70. Abbasi S, Mashatan N, Farmani E, Khodashenas M, Musazadeh V, Ahrabi SS, et al. The effects of purslane (*Portulaca oleracea*) on glycemic indices: a GRADE-assessed systematic review and meta-analysis of randomized controlled trials. *Phytother Res*. 2023;37(12):5529-40. doi: <https://doi.org/10.1002/ptr.7997>.
71. Ghorani V, Saadat S, Khazdair MR, Gholamnezhad Z, El-Seedi H, Boskabady MH. Phytochemical characteristics and anti-inflammatory, immunoregulatory, and antioxidant effects of *Portulaca oleracea* L.: a comprehensive review. *Evid Based Complement Alternat Med*. 2023;2075444. doi: <https://doi.org/10.1155/2023/2075444>.
72. Ahmed F. Hypoglycemic potential of *basella alba* linn. - An in vitro study. *Arch Pharm Pract*. 2022;13(1):18-23. doi: <https://doi.org/10.51847/uE5RG9zRch>.
73. Sheik A, Kim E, Adepelly U, Alhammadi M, Huh YS. Antioxidant and antiproliferative activity of *Basella alba* against colorectal cancer. *Saudi J Biol Sci*. 2023;30(4):103609. doi: <https://doi.org/10.1016/j.sjbs.2023.103609>.
74. Santos DCD, Oliveira Filho JG, Sousa TL, Ribeiro CB, Egea MB. Ameliorating effects of metabolic syndrome with the consumption of rich-bioactive compounds fruits from Brazilian Cerrado: a narrative review. *Crit Rev Food Sci Nutr*. 2022;62(27):7632-49. doi: <https://doi.org/10.1080/10408398.2021.1916430>.
75. Alves-Santos AM, Silva MMA, Lima MS, Souza EL, Naves MMV. Baru (*Dipteryx alata* Vog.) agro-industrial by-products promote the growth and metabolism of probiotic strains. *J Appl Microbiol*. 2023;134(9):lxad206. doi: <https://doi.org/10.1093/jambio/lxad206>.
76. Sanusi SY, Al-Batayneh OB. Pulp Therapy of primary dentition; its relevance despite insufficient histological evidence: a review. *Iran Endod J*. 2023;18(1):15-40. doi: <https://doi.org/10.22037/iej.v18i1.34931>.
77. Pascoe-González S, Ramos-Zavala MG, Buenrostro Ahued MA, Hernández-González SO, Cardona-Muñoz EG, García-Benavides L, et al. Administration of herbarium mixture (*Guazuma ulmifolia*/*Tecoma stans*) on metabolic profile in type 2 diabetes mellitus patients: a randomized, double-blind, placebo-controlled trial. *J Med Food*. 2021;24(5):527-32. doi: <https://doi.org/10.1089/jmf.2020.0082>.
78. Ramos Junior OJF, Tavares IRG, Lima RC, Conte-Junior CA, Alvares TS. Jaboticaba berry (*Myrciaria jaboticaba*) supplementation protects against micro- and macrovascular dysfunction induced by eccentric exercise: a randomized clinical trial. *Food Funct*. 2024;15(13):7148-60. doi: <https://doi.org/10.1039/d4fo01907e>.

CONTRIBUTORS

Conceptualization: LC VIEIRA and PF DI PIETRO. Methodology: LC VIEIRA, JS DE SOUZA, CLK COPETTI, MLR DE SOUZA, and AB BAPTISTELLA. Supervision: PF DI PIETRO. Writing – original draft: LC VIEIRA, JS DE SOUZA, CLK COPETTI, MLR DE SOUZA, and AB BAPTISTELLA. Writing – review & editing: LC VIEIRA, JS DE SOUZA, CLK COPETTI, MLR DE SOUZA, and AB BAPTISTELLA.