Unconventional Food Plants: Food or Medicine?

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1 Introduction

Several human groups, especially in rural environments, depend on local plant species for the treatment of diseases and food (FAO 2010). Some of these species are poorly studied (particularly wild species), and, although they are used by some human groups, they are underused in several other regions (FAO 2010). Considering that in 2019 there were around 690 million people in the world under malnutrition (FAO et al. 2020), the study and popularization of these locally important wild species may promote food security for different human populations.

There are wild or cultivated species that have an important nutritional role as well as good potential for the prevention and treatment of diseases, which are undervalued or used only locally by a few human groups (Leal et al. 2018; Peisino et al. 2019). In this sense, unconventional food species can offer alternatives to strategies

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that address not only food and nutrition security but also the treatment of diseases in several vulnerable human groups.

In this sense, the term “unconventional food plants” has been widely used in Brazilian scientific literature to refer to plants that have food potential, but are unknown or unused by most of the population. This concept, therefore, considers not only wild plants, but low spread cultivated species, in addition to unconventional parts of conventional plants (Kinupp and Lorenzi 2014). The issue has been gaining strong media appeal (Junqueira and Perline 2019), behaving like an umbrella for the popularization of a series of species, especially short-lived ruderal species (Oliveira and Ranieri 2017). However, outside the Brazilian context, this term has not been used, so ethnobiological studies usually work with wild food plants (Pieroni 1999; Lentini and Venza 2007; Sõukand 2016).

A large number of studies carried out in different regions have shown that some wild plants are used by human groups both for food and for the treatment of diseases. For example, when reviewing the use of wild plants by different human groups in northeastern Portugal, Pinela et al. (2017) observed that 33 species (out of a total of 37) had some medicinal application, in addition to the indications for use as food. Furthermore, the research by Purba et al. (2018) recorded a preparation known as “terites” made by the Batak Karo ethnic group in Indonesia. This preparation is based on a juice that is the product of partially digested food from cattle, with the addition of several plants, being used in food for large festivities and indicated for the treatment of diseases. The study by Yang et al. (2020), when investigating the knowledge about food and medicinal plants in four traditional human groups in India, registered 75 useful species, 19 of which indicated both for food and for the treatment of diseases.

Another example shows that the research by Urso et al. (2016), carried out with different human groups located in southeastern Angola, found that approximately 11% of the plants that are known in the studied communities are indicated as medicine and food. For example, the fruit of the species *Aframomum alboviolaceum* (Ridl.) K.Schum. (Zingiberaceae) was indicated for medicinal use as anthelmintic, being also consumed raw as food. According to the authors, two other species also had the same parts of the plants indicated for both uses (medicine and food). These species can be investigated in relation to their potential both nutritionally and for the treatment of diseases (Urso et al. 2016), which is relevant to indicate a list of species that may favor nutritional security and maintain people’s health.

These studies indicate that there is an overlap – at least partial – between uses as food or medicine for a set of species in different human groups. This raises the question of the therapeutic potential of neglected wild edible species, which have also been recorded as medicinal in one or more human groups, in addition to the reasons that lead these important species to be neglected. In this sense, this chapter discusses a set of evidences indicating the potential of many of these plants for the prevention and treatment of diseases. In addition, we evaluate here the main factors that may contribute to the popularization of these species, in order to promote the nutritional security and the health of several vulnerable human groups in the future.

2 What Is the Potential of Unconventional Food Plants (UFPs) in the Medicinal Use?

Traditional health strategies, which incorporate plants such as food, medicine, or both, can play an important role in individual well-being. Tows and Andel (2016) argue that many plants are used historically within a food-medicinal *continuum*. However, studies developed on knowledge and use of plants are characterized by a historical segmentation involving research that has investigated these uses separately. There has been an increase in interest in understanding whether there is a separation threshold between these two categories, thus leading to research on how these uses are related, whether the same plant is used for both purposes, regardless of the part of the plant used, whether the same part of the plant is used, concurrently, for both purposes (see Ferreira Júnior et al. 2015).

Therefore, in order to better understand the different ways that the *continuum* can happen, we will present some examples of ethnobotanical studies that addressed this theme in their research, within the classification proposed by Pieroni and Quave (2006). The authors suggested that uses as food and medicine can be related in three different ways (Fig. 1). In the first, it is suggested that certain plants are indicated as food and medicine, but the parts used or forms of preparation are not related. In this sense, we can cite a study carried out in the Brazilian semiarid region, in which the authors sought to understand the overlap of the food category with other categories of use, especially medicine. The authors found that the species *Hancornia speciosa* Gomes (Apocynaceae), popularly known as mangaba, has its fruits used exclusively as food, while the latex derived from the stem is used as medicine in the treatment and prevention of problems related to the gastrointestinal system (Campos et al.

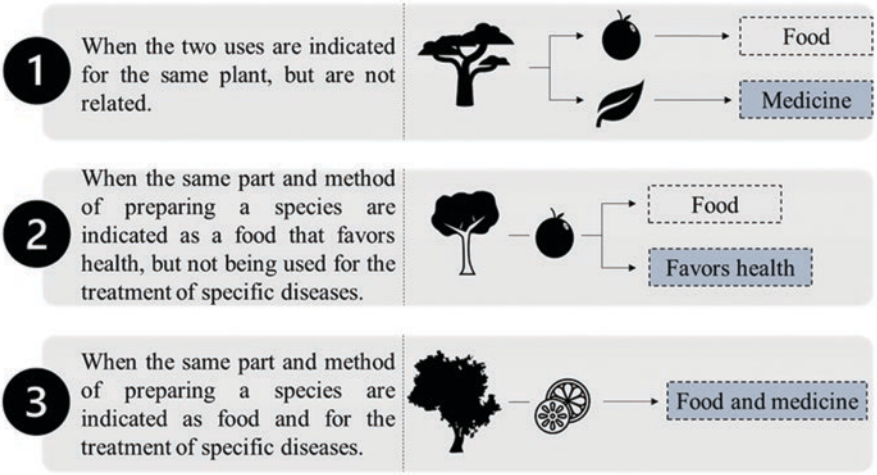

Fig. 1 Different degrees of relationship between the food and medicinal uses of plants, proposed by Pieroni and Quave (2006)

2016). In the study, the participants also reported that green fruits with latex were in other times also used as medicine. However, in the course of time, a similarity between the taste of the latex present in the green fruits and the latex coming from the stem has been recognized, and it started to be used as medicine (Campos et al. 2016). In this case, we can also address other important issues that are mainly related to the role of taste of different parts of the same resource and its availability throughout the year for medicinal use. Thus, considering that the fruit has its presence strongly marked by seasonality, it would not be possible to use them throughout the year for the treatment/prevention of a certain disease, unlike latex from the stem.

Still within the first way in which food and medicinal uses can be related, Rigat et al. (2009) in a study carried out in the Iberian Peninsula, Catalan region, observed that a significant number of plants can be used within a medicinal food *continuum*, although they emphasize that the parts used for each purpose are different. In this study, the authors found that fruits are used more often as food, while flowers are used as medicine. The authors justify their findings by the fact that flowers are richer in products of secondary metabolism, thus having a greater concentration of important components for the treatment of diseases. Additionally, the authors pointed out that many condiment plants are used at the same time in both categories (food and medicine), which is also a trend in other works developed in this perspective. It is suggested that these condiments are classified as functional foods, thus being included in the second classification proposed by Pieroni and Quave (2006) in which they postulate that a plant can be consumed as food, not being indicated for the treatment/prevention of one or more specific diseases, although people recognize its positive impact on health. For example, in West Africa many species are used by women during pregnancy as they are considered to promote strength, ensuring a strong and healthy pregnancy. However, these are not used for a specific system, but guarantee the strengthening action in general, resulting in the well-being of the pregnant woman and the fetus (Towns and Andel 2016).

Chia, *Salvia hispanica* L., is an interesting example. The use of this species is highly widespread in traditional communities in Mexico and has been used for thousands of years by these populations as both food and medicine, to treat different diseases, using both seeds and oil extracted from seeds and leaves. Currently, different places in the world make use of chia seeds and its by-products, as they are indicated as healthy foods, which provide satiety and also prevent and treat a series of diseases, such as high cholesterol and problems related to the gastrointestinal and respiratory system (Cahill 2003). However, nowadays even in traditional communities, satiety is seen as a side effect, and this species is normally ingested because of its health benefits (Cahill 2003). Similar studies carried out in different communities in Africa have found similar results. For example, Ekué et al. (2010) investigating the knowledge about a species of Malpighiaceae used as food observed that this plant is used today not only for its food use but also primarily as medicine. However, the plant is not indicated for a specific medicinal use, as causes a general well-being in the individual.

In this sense, Sõukand (2016) points out that most modern societies no longer need to use wild plants to satisfy the hunger and that, if they continue to be used, it is because they have something beyond the characteristics to supply energy demands and are considered healthy. The following account of the work developed by Sõukand (2016) on the island of Saaremaa, Estonia, northern Europe, can be used as an example in relation to the use of certain species: "I use it because it has vitamin C, it tastes good and you can make tea every day"… "it gives you strength, vitality, but they are not specifically used for healing... it gives you more energy and makes you more intelligent". The discourses brought up in the studies that try to understand how the food and medicinal uses are related express a very interesting discussion about the fact that these uses are so strongly linked that it becomes difficult to draw a line of separation, even if it is not for the treatment/prevention of a specific disease.

Finally, the third classification proposed by Pieroni and Quave (2006) suggests that plants are used as food and also in the prevention and treatment of one or more specific diseases (the same part of the plant used, with the same method of preparation for both purposes). It is very common to find this type of use, especially in indigenous communities. Certain authors have classified these plants in which the same part is used, at the same time, for both purposes, as medicinal foods. They play a very specific medicinal role, such as in the treatment of chronic diseases like diabetes and hypertension. These foods often need to go through processing to remove toxins before being consumed (Jiang and Quave 2013). These medicinal foods can, over time, be classified as preferred species by traditional communities and can even be interpreted as a strategy for optimizing the use of native resources (Johns 1990).

These examples reinforce the ideas proposed by Jiang and Quave (2013). The authors state that diet and health are closely related, especially in traditional communities, where diet is used as a health strategy for the treatment and prevention of a series of diseases. Similarly, Etkin in different studies in African communities found that the use of species that act as food and medicine has been strongly fixed in certain cultures, that there is an immense difficulty in drawing a line of separation between these two categories of use (Etkin 1996; Etkin 2006).

In general, many authors argue that native food species have played an important role in providing nutrients and compounds considered effective for the prevention and treatment of numerous diseases in traditional societies (Johns 1990; Etkin 2006; Leonti 2012). In this regard, Leonti (2012) points out that there are certainly co-evolutionary aspects between plant species and characteristics of human nutrition, and the use of one species in the food-medicine *continuum* has contributed strongly to the development of modern pharmacopoeias. Thus, it can be inferred that selecting a resource that can contribute to both nutrition and disease prevention would have been more advantageous for populations throughout human evolution (Etkin 2006).

2.1 Phytochemical and Pharmacological Evidence of the Medicinal Potential of UFPs

There is a need for interdisciplinary scientific fields, which integrate the pharmacological aspects of biodiversity resources that are used to feed different human groups (Heywood 2011). Chemical compounds ingested in the diet can be important for the prevention or relief of symptoms linked to several diseases, such as diabetes, cardiovascular diseases, cancer, allergy, osteoporosis, and menopause (Heinrich and Prieto 2008). Thus, wild plants that are also indicated for the treatment of diseases and are used in the diet of one or more human groups may indicate both an absence of separation between food and medicinal uses and the need for interdisciplinary studies to assess their impacts on nutritional security and people's health.

Several studies have evaluated the pharmacological activities in vitro and in vivo of edible wild plants, which are indicated as food and medicinal by different human groups. For example, the study by Guarrera and Savo (2013) found 67 wild edible species and 18 cultivated species consumed by informants in Italy and perceived as important for health. When conducting a review of the pharmacological activities of these species in the literature, the authors observed that the species showed the following properties: hypotensive, hypoglycemic, antifungal, inhibition of cancer, anti-inflammatory, hypolipidemic, neuropharmacological (sedative), cancer preventive, antibacterial, immunostimulatory, antimicrobial, and anti-diabetic. These properties have been observed for the treatment of diseases belonging to different body systems, such as digestive system, respiratory system, genital-urinary system, endocrine system, cardiovascular, osteoarticular, and nervous system.

In another example, the species *Leea macrophylla* Roxb. ex Hornem. (Vitaceae), used as food and medicine in several human groups in India, was found to present antioxidant and antimicrobial activity in vitro (Joshi et al. 2016). With these activities, the species can be important for the prevention of diseases linked to oxidative stress and for the treatment of infections (Joshi et al. 2016). Several other studies have observed the potential of edible wild plants for the treatment of diseases (Dewanjee et al. 2013; Zahara et al. 2015; Narzary et al. 2016; Bello et al. 2019) (see Table 1).

Table 1 shows 47 species of wild plants that are indicated by different human groups for both food and medicinal use. These have been investigated in relation to their chemical constituents and pharmacological properties. The table is not exhaustive and considers only some works in the literature that have studied the pharmacological properties of edible wild species in different regions. Based on the studies, we observed a diversity of pharmacological activities presenting antioxidant (44 species), anti-diabetic (9 species), antimicrobial (8 species), and anti-inflammatory (6 species) activities.

Table 1 Phytochemical characterization and pharmacological activities of wild plant species indicated for food and medicinal uses in different human groups from varied regions

Family	Species	Common names in Brazil	Phytochemical characterization	Pharmacological activities	References
Acanthaceae	*Asystasia gangetica* (L.) T. Anderson	Espinafre indiano[a]	Ferulic acid, salicylic acid, myricetin, quercetin, apigenin, kaempferol, catechin	Antioxidant	Datta et al. (2019)
Acanthaceae	*Hygrophila schulli* (Buch.-Ham.) M.R.Almeida & S.M. Almeida	-	Gallic acid, catechin hydrate, vanillic acid, caffeic acid, epicatechin, p-coumaric acid	Antioxidant, anti-diabetic	Alam et al. (2020)
Aizoaceae	*Trianthema portulacastrum* L.	–	Saponins, steroids, alkaloids, flavonoids, terpenes, benzoic acid derivatives, and cinnamic acid derivatives	Antimicrobial activity, anti-inflammatory activity, analgesic and antinociceptive activity, antipiretic activity, antihyperglycemic effects, hepatoprotective effects, cancer preventive and therapeutic effects	Yamaki et al. (2016)
Amaranthaceae	*Achyranthes aspera* L.	Carrapicho[b]	Vanillic acid, ferulic acid, rutin, quercetin, apigenin, kaempferol	antioxidant	Datta et al. (2019)
Amaranthaceae	*Amaranthus viridis* L.	Caruru de mancha, caruru, caruru verde, bredo, bredo verdadeiro, caruru de soldado, caruru de porco[d]	Gallic acid, chlorogenic acid, syringic acid, ferulic acid, ellagic acid, apigenin	Antioxidant	Datta et al. (2019)
Apiaceae	*Eryngium foetidum* L.	Coentro bravo, coentro da colônia, coentro de caboclo[d]	Alkaloids, saponins, cardiac glycoside, steroid, coumarins, phenolic compounds, tannins, flavonoid, lignin, proteins, starch	Antioxidant, anthelmintic	Narzary et al. (2016), Swargiary et al. (2016)

(continued)

Table 1 (continued)

Family	Species	Common names in Brazil	Phytochemical characterization	Pharmacological activities	References
Apocynaceae	*Cryptolepis sinensis* (Lour.) Merr.	–	Alkaloids, saponins, cardiac glycoside, steroid, anthraquinones, coumarins, phenolic compounds, tannins, flavonoid, anthocyanins, phlobatannins, lignin, proteins, starch	Antioxidant	Narzary et al. (2016)
Araceae	*Arum dioscoridis* Sm.	–	Saponins, alkaloids, carbohydrates, phenols, tannin, flavonoid	Antioxidant	Jaradat and Abualhasan (2016)
Araceae	*Arum elongatum* Steven	–	Saponins, alkaloids, carbohydrates, phenols, tannin, flavonoid	Antioxidant	Jaradat and Abualhasan (2016)
Araceae	*Arum hygrophilum* Boiss.	–	Saponins, alkaloids, carbohydrates, phenols, tannin, flavonoid	Antioxidant	Jaradat and Abualhasan (2016)
Araceae	*Arum palaestinum* Boiss.	–	Saponins, alkaloids, carbohydrates, phenols, tannin, flavonoid	Antioxidant	Jaradat and Abualhasan (2016)
Asteraceae	*Tragopogon dubius* Scop.	–	Flavonoids, phenylmethane derivatives	Antimicrobial, antioxidant	See the review of Abdalla and Zidorn (2020)
Asteraceae	*Tragopogon graminifolius* DC.	–	Phenylpropane derivatives	Antimicrobian, healing, antioxidant	See the review of Abdalla and Zidorn (2020)
Asteraceae	*Tragopogon orientalis* L.	–	Phenylmethane derivatives	Antioxidant	See the review of Abdalla and Zidorn (2020)

Family	Species	Common names in Brazil	Phytochemical characterization	Pharmacological activities	References
Asteraceae	*Tragopogon porrifolius* L.	–	Flavonoids, terpenoids	Antitumor, anti-inflammatory, antioxidant	See the review of Abdalla and Zidorn (2020)
Asteraceae	*Tragopogon pratensis* L.	–	Flavonoids, terpenoids, phenylmethane derivatives	Antitumor, antioxidant	See the review of Abdalla and Zidorn (2020)
Asteraceae	*Bidens biternata* (Lour.) Merr. & Sherff	Picão[c]	Alkaloids, glycosides, steroids, tannins	Antioxidant	Zahara et al. (2015)
Asteraceae	*Blumea lanceolaria* (Roxb.) Druce	–	Alkaloids, saponins, cardiac glycoside, steroid, phenolic compounds, tannins, flavonoid, anthocyanins, lignin, proteins	Antioxidant	Narzary et al. (2016)
Asteraceae	*Enhydra fluctuans* Lour.	–	Alkaloids, saponins, cardiac glycoside, steroid, anthraquinones, coumarins, phenolic compounds, tannin, flavonoid, ferulic acid, ellagic acid, quercetin, apigenin, kaempferol	Antioxidant	Narzary et al. (2016), Datta et al. (2019)
Asteraceae	*Gynura bicolor* (Roxb. ex Willd.) DC.	Espinafre de okinawa[e]	Phenolic acids, flavonoids, carotenoids, anthocyanins, essential oils, methoxypyrazines, amino acids, glycosides	Antioxidant property, anti-inflammation, anti-diabetic effects (anti-hyperglycemic effect), anticancer	See the review of Do et al. (2020)
Asteraceae	*Blumea lacera* (Burm. f.) DC.	–	Gallic acid, catechin hydrate, vanillic acid, caffeic acid, epicatechin, p-coumaric acid, myricetin	Antioxidant, anti-diabetic	Alam et al. (2020)

(continued)

Table 1 (continued)

Family	Species	Common names in Brazil	Phytochemical characterization	Pharmacological activities	References
Athyriaceae	*Diplazium esculentum* (Retz.) Sw.	–	Gallic acid, quercetin	Antioxidant, anti-diabetic	Junejo et al. (2018)
Berberidaceae	*Berberis aristata* DC.	–	Epicatechin, p-coumaric acid, quercetin	Antioxidant, anti-diabetic	Alam et al. (2020)
Caryophyllaceae	*Drymaria cordata* (L.) Willd. ex Schult.	cordão-de-sapo, jaboticaá, jaraquicaá, mastruço-do-brejo, agrião-selvagem, erva-tostão[b]	Alkaloids, saponins, cardiac glycoside, steroid, coumarins, phenolic compounds, tannins, flavonoid, proteins	Antioxidant	Narzary et al. (2016)
Cleomaceae	*Cleome gynandra* L.	mussambe [e]	Saponins, reducing compounds, tannins, alkaloids, volatile oils, phenols, anthocyanosides, flavonoids, sterols, and triterpenes, coumarins	Antioxidant	Nabatanzi et al. (2015)
Convolvulaceae	*Ipomoea aquatica* Forssk.	cacon[e]	p-Hydroxy benzoic acid, chlorogenic acid, vanillic acid, syringic acid, p-coumaric acid, sinapic acid, rutin, myricetin	Antioxidant	Datta et al. (2019)
Cucurbitaceae	*Momordica charantia* L.	Melão de são caetano, melãozinho, fruto de cobra[b]	Phenolic acids, triterpenes	Anti-diabetic, anticancer, antioxidant, antimicrobial, analgesic, and neuroprotective	See the review of Nagarani et al. (2014)
Cucurbitaceae	*Momordica cochinchinensis* (Lour.) Spreng	-	Phenolic acids, triterpenes	Anticancer, antimicrobial	See the review of Nagarani et al. (2014)
Cucurbitaceae	*Momordica dioica* Roxb. ex Willd.	melão de são ceaetano[f]	Phenolic acids	Analgesic and neuroprotective activity	See the review of Nagarani et al. (2014)

Family	Species	Common names in Brazil	Phytochemical characterization	Pharmacological activities	References
Cucurbitaceae	*Momordica balsamina* L.	Melão de são caetano[f]	Triterpenes	Antioxidant, antimicrobial	See the review of Nagarani et al. (2014)
Fabaceae	*Sesbania sesban* (L.) Merr.	Cânhamo[e]	Gallic acid, catechin hydrate, vanillic acid, caffeic acid, rutin hydrate, ellagic acid, myricetin, kaempferol, quercetin	Antioxidant, anti-diabetic	Alam et al. (2020)
Fabaceae	*Erythrina variegata* L.	Garra de trigre[e]	Gallic acid, catechin hydrate, vanillic acid, caffeic acid, rutin hydrate, ellagic acid, myricetin, kaempferol, quercetin	Antioxidant, anti-diabetic	Alam et al. (2020)
Lamiaceae	*Clerodendrum viscosum* Vent.	Clerodendrum[d]	Alkaloids, flavonoids, phenol, reducing sugar, saponins, tannins	Antioxidant, anthelmintic	Swargiary et al. (2016)
Malvaceae	*Adansonia digitata* L.	Embondeiro[e]	Tannic acid	Antioxidant, anti-inflammatory	Ayele et al. (2013)
Phyllanthaceae	*Antidesma acidum* Retz.	–	Alkaloids, saponins, cardiac glycoside, steroid, anthraquinones, coumarins, phenolic compounds, tannins, flavonoid, anthocyanins, phlobatannins, proteins	Antioxidant	Narzary et al. (2016)
Rubiaceae	*Oldenlandia corymbosa* L.	Erva-diamante[e]	Vanillic acid, ferulic acid, sinapic acid, ellagic acid, quercetin, apigenin, kaempferol	Antioxidant	Datta et al. (2019)

(continued)

Table 1 (continued)

Family	Species	Common names in Brazil	Phytochemical characterization	Pharmacological activities	References
Rutaceae	*Zanthoxylum acanthopodium* DC.	mamica de cadela; mamica de porca[e]	ascorbic acid, phenolic acids and flavonoids, being ascorbic acid, gallic acid, methyl gallate, caffeic acid, syringic acid, rutin, p-coumaric acid, ferulic acid, quercetin, apigenin, kaempferol	Antioxidant	Seal (2016)
Rutaceae	*Murraya koenigii* (L.) Spreng.	Curry indiano[e]	Flavonoids, phenol, reducing sugar, steroids, tannins	Antioxidant, anthelmintic	Swargiary et al. (2016)
Solanaceae	*Solanum villosum* Forssk.	–	Alkaloids, terpenoids.	Larvicide, antimicrobial, antioxidant	See the review of Zahara et al. (2019)
Solanaceae	*Solanum anguivi* Lam.	–	Saponins, reducing compounds, tannins, alkaloids, phenols, flavonoids, sterols, and triterpenes, coumarins	Antioxidant	Nabatanzi et al. (2015)
Solanaceae	*Solanum nigrum* L.	–	Saponins, reducing compounds, tannins, alkaloids, phenols, flavonoids, sterols, and triterpenes, coumarins	Antioxidant	Nabatanzi et al. (2015)
Solanaceae	*Physalis angulata* L.	Bucho de rã; camapu, camapum, joá, joá de capote, mata fome, balão[c]	Saponins, reducing compounds, alkaloids, anthocyanosides, flavonoids, sterols, and triterpenes, coumarins	Antioxidant	Nabatanzi et al. (2015)
Verbenaceae	*Lippia javanica* (Burm f.) Spreng.	mato-limão[e]	Alkaloids, saponins, cardiac glycoside, steroid, anthraquinones, coumarins, phenolic compounds, flavonoid, anthocyanins, lignin, proteins	Antioxidant, anthelmintic	Narzary et al. (2016), Swargiary et al. (2016)

Family	Species	Common names in Brazil	Phytochemical characterization	Pharmacological activities	References
Vitaceae	*Tetrastigma angustifolium* Planch.	–	Alkaloids, saponins, cardiac glycoside, steroid, phenolic compounds, tannins, flavonoid, anthocyanins, phlobatannins, lignin	Antioxidant	Narzary et al. (2016)
Vitaceae	*Cyphostemma adenocaule* (Steud. ex A. Rich.) Desc. ex Wild & R.B. Drumm.	–	Betulin, betulinic acid, cyphostemmic acid A, cyphostemmic acid B, cyphostemmic acid C, cyphostemmic acid D, epigouanic acid A, lupeol, zizyberanal acid, β-sitosterol and its glucoside, 3 β, 28-dihydroxy-30-norlupan- 20-one	Antioxidant, anti-inflammatory	See the review of Bello et al. (2019)
Vitaceae	*Leea macrophylla* Roxb. ex Hornem.	Léia[d]	Alkaloids, glycosides, flavonoids, steroidal/triterpenes, tannins, saponins, mucilages, proteins, amino acids, and sugars	Antioxidant, antimicrobial, anti-inflammatory	Joshi et al. (2016), Dewanjee et al. (2013)
Zingiberaceae	*Aframomum angustifolium* (Sonn.) K. Schum.	Longoza[e]	Reducing compounds, alkaloids, volatile oils, flavonoids, sterols, and triterpenes, coumarins	Antioxidant	Nabatanzi et al. (2015)

[a] Passos (2019)
[b] Lorenzi (2006)
[c] Lorenzi (2008a)
[d] Lorenzi (2008b)
[e] FAO (2020)
[f] Fernandes et al. (2009)

3 What Factors Influence the Sharing of UFPs in Different Human Groups?

People behave differently to what concerns UFP knowledge and consumption. Such differences may occur between individuals from the same population (intracultural variation) and between populations (intercultural variation). In terms of intracultural variation, literature has searched for the role of socioeconomic variables in the knowledge and/or consumption of wild food plants.

Age is one of the most studied factors, and several investigations have found that the elders either consume, know, or cite more use reports for wild food plants (Ghorbani et al. 2012; Cruz et al. 2013; Bortolotto et al. 2015; Geng et al. 2016). Such a pattern is not restricted to food plants as it was also found for medicinal and other uses. Since knowledge is accumulated with time and, more specifically, local ecological knowledge comes from experience and observation, it is intuitive to imagine that, in most cases, wild food plant knowledge will increase with age.

Gender is another variable widely studied as a possible predictor of wild food plant knowledge and use. However, there is no clear gender pattern in ethnobiological literature. Several studies have found no differences between male and female individuals (Joshi et al. 2015; Ochoa and Ladio 2015; Punchay et al. 2020), and some authors have suggested that this dominium is shared and appropriated by both genders and that female and male learning contexts were also experienced in similar ways (Ochoa and Ladio 2015).

However, to a lesser extent, in some cases, men (Kang et al. 2013) or women (Nascimento et al. 2013) are the most knowledgeable individuals. Such gender differences may have to do with the biased role of men and women in daily activities and wild food collection areas. In a study with Polish migrants in Misiones (Argentina), Kujawska and Luczaj (2015) found that, although no gender differences could be found for species gathered in ruderal areas, men knew more species from primary and secondary forests, which led to a gender bias in the overall number of species.

Other (less studied) predictors of intracultural heterogeneity in wild food plant knowledge and/or consumption include occupation, school education, income, and family structure. Studies have found that married people, parents, and those living in houses with members from more than one generation are more likely to have a greater knowledge of wild food plants (Ochoa and Ladio 2015; Ong and Kim 2016; Punchay et al. 2020).

Less instructed and poorer individuals may also accumulate more knowledge on this use category (Cruz et al. 2013; Ong and Kim 2016). Additionally, in many cases, people with current or past field activities (including agriculture and extractivism) may know or consume more wild food plants than people with other jobs (Cruz et al. 2013). However, some studies were not able to find correlations between some of these variables and wild food plant knowledge (Campos et al. 2015; Punchay et al. 2020).

Even communities in similar social-environmental conditions may present differences in terms of the explanatory power of socioeconomic variables. A study conducted in three neighboring communities from the Brazilian semiarid searched for predictors of wild food plant knowledge and consumption and found that, for all the studied factors, one community behaved differently from the others (Campos et al. 2015). For example, in one of the studied communities, men were found to know more wild food plants than women. However, in the other two communities, no gender biases could be identified. This finding indicates that the processes that generate heterogeneity are too sensitive, and even small social-environmental differences between communities may be responsible for significant alterations in knowledge distribution and sharing.

Although people who experienced hunger may accumulate more knowledge of wild food plants (Ong and Kim 2016), the association between wild foods and poverty/hunger may have led to cultural taboos that can influence cultural transmission. A group of species known as famine foods are accessed by local communities in times of scarcity, when crops and other foods are no longer available (Nascimento et al. 2012). Some of these species are hard to collect and/or require special preparations to eliminate anti-nutritional properties, which makes the knowledge about them an important biocultural inheritance. However, their association with difficult times and unpleasant memories has often made people reluctant to talk about this group of plants, which can compromise cultural transmission and make the youngest generations unaware of their collection and preparation strategies.

To what concerns intercultural variations, ethnicity and migration have found to be important predictors of wild food plant knowledge and/or consumption. People with different histories of relationships with the environment may accumulate a distinct body of knowledge on these species. In the above-cited study with Polish migrants in Argentina, Kujawska and Luczaj (2015) found that knowledge varied depending on the migrants' origin, given that migrants who went to Misiones via Brazil had a more diversified knowledge of edible plants. Other studies that compared different cultural groups in our out the context of migration have also found important differences (Ochoa and Ladio 2015; Pieroni and Cattero 2019).

Additionally, access to the urban-industrial society has also shown to interfere with wild food plant knowledge. In a study with local communities along the Paraguay River (Brazil), Bortolotto et al. (2015) found that people living closer to cities know fewer plants than those far from urban centers. Therefore, besides the well-known effect of urbanization in medicinal plant use, other use categories may also lose importance when people have access to alternative products, and wild food plants seem to be among them.

4 Final Considerations

In this chapter, we indicate evidence demonstrating that a set of unconventional food plants has been indicated in various human groups from different regions in both food and medicinal use. In addition, several of these species have been investigated in relation to phytochemical characterization and pharmacological properties, demonstrating the potential of UFPs for the prevention and treatment of diseases.

However, even with the nutritional and pharmacological potential of these species, a set of socioeconomic and cultural factors affect their popularity within the same human group or between different cultures, in various regions. As several human groups have undergone socioeconomic changes, it is interesting to promote interdisciplinary investigations both to assess the pharmacological potential of locally useful food species and to promote their popularity in different human groups. These studies will contribute to nutritional safety and the health of people in various regions.

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