Ethnobotanical knowledge on non-conventional food and medicinal plants in Rio Cajari Extractivist Reserve, Amazon, Brazil

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Abstract

Background: Information on the knowledge, management and ways of using food and medicinal plants by traditional populations, family farmers and Brazilian native population in the Amazon is essential to guarantee the sovereignty of these groups. The objective of this study was to evaluate the diversity, knowledge and ways of using non-conventional food and medicinal plants in traditional communities in a protected area in the Brazilian Amazon.

Methods: This study was conducted using semi-structured interviews applied to local respondents. Fifty-six residents were interviewed in 26 communities. The Indices of Use Value (UVI) and relative frequency of species citation (Fr) were evaluated; also, their diversity and equitability using the Shannon- Wiener (H') Pielou (J') indices, respectively. The species were listed according to their family, scientific name, popular names, categories of use, propagation environment, growth habit, medicinal indications, domestication status, production cycle, and herbarium registration.

Results: A total of 269 species of both non-conventional food and medicinal plants were identified, distributed in 84 botanical families, 198 genera, in addition to 13 unidentified species. The Arecaceae and Lamiaceae families had the highest species richness (11 and 7, respectively). Eryngium foetidum L. (Apiaceae) and Ipomoea batatas L. (Convolvulaceae) presented the highest relative citation frequencies (19.7 and 19.3, respectively) and the highest index of use value of the species (0.94 and 0.92, respectively). The Shannon-Wiener (H') and Pielou (J') diversity indices were considered high (5.02 and 0.9, respectively).

Conclusions: It was observed that the studied species are consumed daily by the population of this protected area. In the environment in which these families are found, of geographical isolation and distance from urban centers, these species become the only food and medicinal resources, therefore, being fundamental to the sovereignty of these families.

Background

Brazil is a country of immense biodiversity, distributed throughout the biomes that occupy its territory. Among them, Amazonia stands out as the largest and the most preserved Brazilian biome, besides being the largest biodiversity reserve on the planet, occupying 49.3% of the national territory [1]. Its mega-biodiversity is currently estimated at around 2,500 tree species (representing one third of all tropical wood on the planet) and 30 thousand species of herbaceous plants and shrubs (out of a total of 100 thousand existing all over South America) [2]. This biome has a set of nature protected areas that are protected by law, such as the Extractive Reserves, where traditional populations, indigenous groups, *quilombolas*, riverside dwellers and family farmers live. These populations establish their forms of survival in line with and dependence on the available natural resources, especially non-conventional food plants and medicinal plants [3, 4].It is a region of low demographic density, cut by countless rivers and lakes [5, 6], with an enormous coverage of tropical forest that, although has suffered an intense process of deforestation and forest degradation in the last decades, still preserves an extensive area of native forest [7]. This region is inhabited by populations in need of infrastructure and health and education services. The population has a low level of education besides being located in isolated places with difficult access and far from urban centers [8, 9], where people find in the forest resources, especially non-conventional and medicinal food plants, the main food and medicinal resources, respectively [10, 11].

The non-conventional food plants are plant species widely used as food by populations living in rural Brazil [12]. They are species that, in many cases, spread spontaneously, have not undergone the process of agricultural technification and genetic improvement, as in the case of other agricultural cultures, however they have a broad relationship with the food security of many families that consume them daily [13]. These species have one or more parts that are used as human food and can be consumed directly, or providing oils, spices and condiments used in cooking [14]. While medicinal plants are plant species distributed in the environment and have metabolites in their structure, with chemical properties capable of combating and preventing the action of pathogens (fungi, bacteria, protozoa, viruses) harmful to the human organism [15]. It is noteworthy that there are no plant species only for food use and others used only for medicinal purposes. The vegetables have multiple purposes. There are cases where the same species is used in human food; in the elaboration of home remedies; for building homes, boats, tools and other utensils [16].

Considering these specificities, these populations have developed a set of skills and tacit knowledge about the ways of using these forest resources over the years, adapting the survival strategies of the social groups living in these regions, whose knowledge has been tried, validated and transmitted through generations [17]. However, in the course of the last few years, due to an accelerated process of exploration of these areas, this knowledge has been lost [18], so it is necessary and urgent to carry out studies that investigate the

potential of these plant species, which are associated with strategies for sovereignty, food security and therapeutically of these population groups [10, 19].

In aspect of ethnobiology, the present study is interesting mainly because of the multiplicity of uses that the investigated population performs on plant species, as well as the tacit knowledge developed and expanded on these species that enabled the development of forms of preparation, use, management and cultivation by several generations. The present study, although apparently similar to others carried out in the Amazon, stands out for having been developed with traditional populations living in protected areas, far from urban centers; however pressured by forest concession projects (Jari Celulose Project), mineral (RENCA - National Copper and Associates Reserve) and road (BR 156) projects, both strong components of the historical disorderly occupation process in the Amazon. This study can contribute to the understanding of the relationship of these plant species with the sovereignty and food security of dozens of families that depend on them.

This study investigated the diversity, knowledge and ways of using non-conventional food plants and medicinal plants by traditional populations (collectors, family farmers, agro-collectors, *quilombolas*, indigenous and riverside inhabitants) in the Cajari River Extractive Reserve, state of Amapá, in the Brazilian Amazon. This protected area is located on the left bank of the Amazon River, an area cut by dozens of rivers and lakes, rich in plant biodiversity, fishing resources and wild animals that constitute the food base of th0e population residing in this protected area.

Methods

Study sites

The present study aimed to investigate the diversity, knowledge and ways of using non-conventional food plants and medicinal plants by traditional populations. Was carried out in a sustainable use protected area, the Rio Cajari Extractive Reserve (01º05'10''S e 51º46'36''W) (Fig 1), which has an area of 532,397.20 hectares, and is located on the left bank and delta of the Amazon River, in the south of the State of Amapá. This unit is protected by law. It was created by Presidential Decree No. 99.145, of March 12, 1990 [20]. Its predominant vegetation is *terra firme* forests (the highest part of the unit), tidal flooded forests (intermediate part of the unit where floods occur and ebb from rivers) and flooded fields (next to the curves of rivers and streams, as well as rivers, streams and lakes.

The Cajari River Extractive Reserve covers the territory of three municipalities: Mazagão, Vitória do Jari and Laranjal do Jari, and has a population of 4,164 inhabitants [21]. It is located between the Maracá Agroextractive Settlement Project, at the BR 156 Highway (Macapá-Jari), the Jari Celulose Project and the Amazon River. Its population consists predominantly of family farmers who develop agroextractive activities (migratory farming of slash and burn agriculture, collection of fruits and vegetables in the forest and artisanal fishing); *quilombolas* whose inhabitants descended from slaves who came to the municipality of Mazagão in the late 19th century; indigenous people of the Waiãpi ethnic group, riverside dwellers and extractivists who have the natural resources as their main source of survival.

The study was concentrated along three of the main rivers that make up the protected area, exactly where the communities where the collectors reside, in which the rivers Cajari, Muriacá and Amazonas (left bank) are located. In the Extractive Reserve there are communities, groups of several residences that are formed in strategic regions of the rivers, usually close to an inlet; in a place close to the mainland, favorable to small farms; with a vast abundance of certain products (Brazil nuts, Acai), fishing resources; or even in strategic locations for navigation and local commerce, such as the mouth of rivers and *igarapes*.

The houses of the families are built of wood collected in the forest, covered with wood chips or asbestos tiles. The houses are built high above the level of the river and *igarapes* to avoid flooding during the Amazonian winter (rainy season from February to June). In most communities there is a level-I elementary school (up to the fifth grade), and in all communities there is the presence of religious institutions

(Catholicism predominates, but with a marked presence of evangelical churches), elements of African and indigenous religions are also found there, showing strong religious syncretism.

Field trips and authorization for execution of the study

Four trips were made to the study area. Each trip lasted 12 to 15 days, from December 2016 to March 2017. These trips to the study area consisted of establishing an experience process with the community to conduct interviews and participate in their daily activities as well as the usage relationships with food and medicinal plants [22].

During the home visits, we sought to identify people recognized as owners of the ethnobotanical knowledge about medicinal and food plants [23]. To reach them, we counted with the help of key interviewed, such as agents of the unit's management body, leaders of local organizations, teachers of the unit's schools and some students from the Federal University of Amapá (UNIFAP) who are from RESEX Rio Cajari [24].

All the participants of this study were informed of its objective. They all agreed to participate and signed the Free and Informed Consent Form provided by the Ethics Committee in Research with Human Beings of the Federal University of Viçosa (CEP/ UFV), via Brazil Platform (Opinion number: 1.718.017).

Permissions for the study were obtained from the following agencies:

The research was registered in the National Genetic Heritage Management System (SisGen), which establishes criteria to access the genetic heritage and associated traditional knowledge, in accordance with the requirements of the biodiversity law (access registration number: A4DCD0D) [25].

The "Authorization for activities with a scientific purpose" was requested and obtained from the Biodiversity Authorization and Information System (SISBIO), an agency linked to the Ministry of the Environment (MMA), in order to obtain permission for the collection and transportation of biological material (authorization number: 55801-1).

The access to the protected area depended on authorization from the unit's managing body, the Chico Mendes Institute for Biodiversity Conservation (ICMBio), which issued the respective authorization, as well as the access to communities and their respective research interviewed were communicated and authorized by the residents' associations.

Ethnobotanical data collection

Ethnobotanical information was collected through interviews with local experts who were appointed by the key-interviewed. Were considered key-interviewed the people residing in the communities, recognized as references in knowledge about the use and benefits of plants (food and medicinal), those generally consulted by other members of the communities about indication and use of the new plants. In the interviews, semi-structured questionnaires containing pre-defined topics were applied, allowing the rise of new questions during the dialogue and the interviewed could spontaneously express their ideas about the use of plants for food and medicinal purposes [26].

Before starting the interviews, a pre-test of the interview script was carried out, with a group of five interviewed, in order to assess the clear understanding and precision of the terms, unfolding and order of questions, in addition to other information.

Plant species collection and identification

The collections of plant species were performed *in vivo*, with the participation of the interviewee, using the technique known as "guided tour" [27], in order to obtain the identification and more accurate information about the indicated species, following the methodological standards defined for ethnobotanical studies [28].

The species were registered by means of photographs and on records for the collection of botanical material.

Triplicates of each species were collected, then identified by means of comparison with samples from the Herbarium Collection of Amapá State (HAMAB), specialized bibliographies [12, 15]. Subsequently, the exsiccates were herborized and incorporated into the collection of HAMAB, a faithful depository of samples of components of the Genetic Heritage of the Amazon, in the State of Amapá.

Data analysis

The homogeneity and diversity of food and medicinal species were assessed using the *Shannon-Wiener* Biological Diversity Index (H') and the *Pielou* Equitability Index (J') [29, 30]. These indices are used to assess the species richness in the studied area and the distribution of knowledge about plants among the research interviewed, respectively, were calculated for all food and medicinal plant species found in the present study, using the following equations:

Shannon-Wiener Biological Diversity Index (H'):

$$H' = -pi \sum log\ pi,$$

Where:

$Pi = n^i / N$

n^i = number of citations per species

N = total number of citations

Pielou Equitability Index (J'):

$$J' = H' / H'_{max}$$

Where:

H' = *Shannon-Wiener* Biological Diversity Index

H'_{max} = (natural base logarithm) of the total number of the species

These indexes were compared with the indexes of similar studies carried out in the Brazilian Amazon and also in other regions, inside and outside Brazil.

The daily demand of species for food and medicinal use was evaluated, using the Use Value Index (IVU) [31]. This index is used to assess how well the species are known and used by the local population [32]. The IVU was obtained using the following equation:

$$IVU = \sum U / n$$

Where:

U = Number of citations of the species

n = Total number of research interviewed

The Relative Citation Frequency (Fr) indicates how much particular species stands out in relation to the rest of the others, and expresses how well the species is known [29]. This index was obtained using the following equation:

$$Fr = \sum (U \times 100) / N$$

U = Number of citations of the species

N = Number of species found in the study

The species were classified as non-conventional food, medicinal and dual-purpose (food and medicinal) [33]. The propagation environment (vegetable garden, orchard, forest, family farm and riparian forest) and growth habit (creeping, climbing, herbaceous, shrub and tree) of the species were observed and categorized [34], in addition to the forms of use and therapeutic indications in the case of medicinal plants [35].

A classification was made regarding the domestication status of these species in order to verify whether they are cultivated, or whether they propagate spontaneously [34], as well as their production cycles in annual, semi-perennial or perennial.

Results And Discussion

Social-cultural characteristics

The information was obtained from 56 interviewed, residing in 26 communities along these three rivers, which totaled 2,896 citations of food and medicinal vegetable species, are shown in Table 1.

The Tapereira *quilombola* community stood out with the largest number of interviewed, as it has historically accumulated an inheritance in the use of plant resources based on the knowledge inherited from their African ancestors [33]. The Tapereira community resulted in the highest number of species citations. However, the best citation average was generated in the Santana community as the interviewed in this community are familiar with a greater number of species of food and medicinal plants. The fact that the Tapereira and Santana communities had the highest number and average number of plant species has contributed to the fact that the Cajari River had the highest number of plant species mentioned (1215) and the average number of visited rivers (52.8 plant species / interviewee) (Table 1).

Table 1. Rivers, communities, respondents (resp.), citations on food and medicinal plants in the Cajari River Extractive Reserve, Amazon, Brazil.

River	Communities	Resp. / community	Resp. / river	Citations / community	Citations / river	Average of citations	
						Community	River
Muriacá	Aterro do Muriacá	3	16	170	803	56,7	50,2
	Boa Vista	2		89		44,5	
	Comércio	1		44		44	
	Conceição do Muriacá	6		329		54,8	
8 communities	Mirituba	1		35		35	
	Santa Helena	1		42		42	
	São Luis	1		45		45	
	Vila Nova	1		49		49	
Cajari	Costureira	1	23	39	1215	39	52,8
	Formigueiro	2		97		48,5	
	Paraíso	2		127		63,5	
	Poção	2		76		38	
9 communities	Santa Rita	3		144		48	
	São Sebastião	3		141		47	
	Tapereira	7		357		51	
	Terra Vermelha	1		66		66	
	Vila Santana	2		168		84	
Amazonas	Foz do Rio Ajuruxi	4	17	268	878	67	51,6
	Rio Ariramba	1		38		38	
	Rio Arirambinha	2		76		38	
	Rio Bispo	1		53		53	
9 communities	Rio Capitão	2		136		68	
	Rio Carneiro	1		24		24	
	Rio Chato	1		58		58	
	Rio Mulato	2		96		48	
	Vila Betel	3		129		43	
		56	56	2896	2896		

The methodological procedure adopted in the present study resulted in the finding of 56 plant specialists (37 women and 19 men), aged between 25 and 97 years old, and with the following social occupations: farmers, extractivists, artisans, builders, fishermen, chestnut collectors, rubber tappers, carpenters, shamans and midwives.

According to the interviewed, the ethnobotanical knowledge about PANC (Non-Conventional Food Plants) and medicinal plants is concentrated in adults. Of the 56 interviewed, 31 are people aged between 25 and 59 years old, whose average age is 58.9 ± 14.6. Although there are many elderly people, these results differ from other studies found in the literature in which they show that ethnobotanical knowledge about PANC and medicinal plants is concentraded in the elderly [34, 36, 37]. It is worth mentioning that the average age in the state of Amapá is 73.9 years [38], which is 20% higher than the average age of the interviewed in this study, thus, showing that this population, even though younger, has their ways of lives more dependent on the local plant resources.

The interviewees admitted that the young population of the unit are still interested in food and medicinal resources, although it differs from other studies on the subject [39], denominated "cultural erosion" by some authors [40]. However, it was possible to observe through the reports by the interviewed that in recent years, the phenomenon of urbanization in rural areas (access to traditionally urban goods and services, change in the income profile of some families), associated with the scarcity of some food resources (fish, and plants) has impacted the ways of life of local populations, gradually arousing greater interest in other food sources, and medicines in the pharmaceutical industry.

The relationship between the forms of use of these species occurs mainly because they are found in the same environment, propagated or cultivated using the same techniques. This relationship was established, above all, due to the geographic isolation in which these families are found, far from urban centers and without the possibility of income so to acquire other sources of food and medicines, therefore, these species have established themselves as the main resources, whose relationship is observed in other parts of Brazil and the world [41, 42].

Non-conventional food and medicinal plants

A total of 269 plant species used for food and medicinal purposes were identified. They were distributed in 84 families and 198 botanical genera, resulting in a total of 2,896 citations. The species with the highest number of citations were *E. foetidum* (Apiaceae) and *I. batatas* (Convolvulaceae), which were cited 53 and 52 times, respectively. *E foetidum* is a species of medicinal and food use. For therapeutic purposes, the tea boiled from its roots is indicated to fight parasites of the human organism, and as a food use, its leaves are cooked together with other foods. *I. batatas* is used for food purposes only, its tubers are cooked and served for breakfast (Table 2).

Table 2 contains information about the species identified in this study. The botanical families Arecaeae and Lamiaceae had the largest number of food and medicinal species, 19 and 17 species, respectively, with a predominance of species used for medicinal purposes. A situation also observed in other studies carried out with traditional populations in the Amazon, including studies carried out in rural communities in the municipality of Manacapuru, in Amazonas, Brazil [43]. In other communities in this municipality (Manacapuru/AM, Brazil), Costa, Mitja analyzed plant resources used by family farmers and observed a predominance of resources used for medicinal purposes [44].

In relation to the propagation environment of the species, it was found in the forest, vegetable gardens, orchards, Family farms and riparian forests (Table 2), but with predominance for those found in the forest (120 species) and in the vegetable gardens (65 species). This situation occurs mainly for two reasons. Firstly, because the study region is an environmental protected area in which plant extractions is the main source of income of the families, hence their strong relationship with the forest, as observed by Silva, Fantini, Shanley [45]. Secondly, because the communities where the families live are floodplain areas, which are flooded throughout the year, and like their residences, the gardens are also built with wood, or planted in canoes suspended from the ground, to prevent flooding and attack by animals that are raised loose, like buffalo. This form of cultivation in suspended beds has already been recorded in other studies with traditional populations and farmers in the Brazilian Amazon [43, 44].

Vegetable gardens are places where families grow herbaceous species, built on a wooden structure, in which the soil, fertilizer and pots with the plants are placed; are located behind residences and elevated from the ground to protect against flooding rivers and animals. Orchards resemble agroforestry backyards, are located around residences, are forests (medicinal, food and other uses) formed by randomly established tree species, with no defined spacing. Family farms are openings held annually in the middle of the forest, through cutting and burning of vegetation, in these places the species of annual cycle are cultivated, used by the family for food and medicinal purposes.Also, it is observed that the relationship between propagation environment, growth habit, stage of domestication and vegetative cycles is associated with the physiological characteristics of plants since there is no way to establish a tree species in a suspended garden, nor to cultivate a herbaceous in a shaded forest environment as observed in a study carried out on the use and knowledge of plants by traditional populations of the Tapajós National Forest (Santarém PA / Brazil) [17]. The availability of these plant resources is associated with the social organization of families, since herbaceous species are required on a daily basis, and for this reason they are found in vegetable gardens and orchards, being easily accessible for women who deal with household activities [46]. The species located in the forest are seasonal, which makes them to be obtained, making them less required [46].

According to the interviewed' report, the number of PANC species and medicinal plants is decreasing and are found with more difficulties, mainly forest species with wood and food value, such as *Endopleura uchi* (Huber) Cuatrec, *Caryocar villosum* (Aubl.) Pers., *Bertholletia excelsa* H.B.K., *Tabebuia roseoalba* (Ridl.) Sandwith. This situation has occurred mainly due to the raise in the local population, which demanded the construction of more gardens and, consequently, increased the pressure on the river and the forest, but also due to the outbreaks of burning and deforestation that has frequently occurred within the unit. This is an aggravating factor, since many species are

directly related to the food security of these families and there is no agronomic protocol, with propagation and management techniques that make it possible to replant seedlings.

The availability and seasonality of the species influence the social organization of families and communities [47]. This situation was observed in this study, since the forest provides many fruit food species, however they are only available during the rainy season (February to June). After this period, the main food species are grown in the family farms (particularlry the rhizomes and some herbaceous) during the Amazonian summer (July to December). The gardens are perennial and have food and medicinal species throughout the year. Medicinal resources such as leaves, seeds and bark are also available year-round in forests, riparian forests and orchards.

It was found in this study 138 plant species for food use. Of these, 96 are fruit species (the others are vegetables, seeds and rhizomes), and correspond to 69.5% of the food species found in here. Vegetables are consumed with food and represent only 6% of this percentage, which corroborates the fact that fruits are more present in the diet of traditional populations in the Amazon, as already observed in other studies [19, 44], together with cassava flour (*Manihot esculenta* Crantz.) and fish [48, 49]. Also, the consumption of vegetables is low among this population group, as highlighted by Adams, Murrieta, Sanches [50].

Among the species found in the study and available in Table 2, it was observed that some of them, from the families Acanthaceae and Amaranthaceae, has the same popular name of the trade name of some medicines sold by the pharmaceutical industry, such as the anador species (*Justicia pectoralisvar. stenophylla* Leonard), melhoral (*Justicia pectoralis* Jacq.), ampicilina (*Alternanthera tenella* Colla), penicilina (*Gomphrena arborescens* L.f.), terramicina (*Alternanthera brasiliana* (L.) Kuntze), cibalena (*Artemisia vulgaris* L.), elixir paregórico (*Ocimum selloi* Benth.), insulina (*Cissus sicyoides* L.), vique grande (*Mentha spicata* L.) and vique pequeno (*Mentha arvensis* L.). Other authors have already found similar to the one in which these home remedies are associated with names of industrialized medicines, usually prepared in the form of teas [51]. A possible explanation for the attribution of the name of industrialized remedies to many medicinal plants may be related to the influence of allopathic medicine in rural areas, in which the name given to these plants has something to do with the smell, taste or effect of an industrialized medicine [51, 52].

Regarding the non-conventionality of food vegetable species, it is observed that in regions with more technified agriculture, some PANC species are already duly improved genetically and established in commercial cultivation systems, as well *Anacardium occidentale*, *Mangifera indica*, *Cocos nucifera*, *Aloe vera*, *Ruta graveolens*, *Citrus sinensis*, among others. However, authors like Kinupp and Lorenzi; Leal and collaborators emphasize that the condition of non-conventionality is established by the relationship between the plant species and the populations that use it, and also by the technical conditions (cultivation and genetic improvement) in which the species is found [12, 14]. These conditions corroborate what is observed in ethnobotanical studies, which express above all, the relationship and importance of these species for the food security strategies of families residing in regions where these species are the only food resource [14].

Table 2. Botanical family, scientific and popular name, category of use, propagation environment, growth habit, forms of use, medicinal indications, domestication stage and registration of food and medicinal plant species found in the Cajari River Extractive Reserve, Amazon, Brazil.

Botanical family	Scientific name	Popular name	Cat.	Env.	Grow.	Forms of use	Medicinal indications	Dom.	Reg.
Acanthaceae	*Justicia pectoralis* var. *stenophylla* Leonard	Anador	M	Vg	He	Leaf tea	Headache and stomachache	C	INPA 20639
	Justicia pectoralis Jacq.	Melhoral	M	Vg	He	Leaf tea	Headache	C	INPA 106185
	Justicia acuminatissima (Miq.) Bremek	Saratudo	M	Vg, O	He	Leaf tea	Tranquilizer, fever and measles	C, S	INPA 223272
Adoxaceae	*Sambucus australis* Cham. & Schltdl.	Sabugueiro	M	Vg, O	He	Leaf tea	Inflammation	C, S	INPA 208304
Amaranthaceae	*Alternanthera tenella* Colla	Ampicilina de planta	M	Vg	He	Leaf tea with *C. spicatus*, *P. niruri* and *A. muricata* leaves	Stomachache; urinary tract infection	C	INPA 71449
	Chenopodium ambrosioides L.	Mastruz	M	Vg, O	He	Leaf tea with *E. foetidum* and *C. papaya* roots	Worm	C, S	INPA 277507
	Gomphrena arborescens L.f.	Penicilina	M	Vg	He	Leaf tea with *C. spicatus*, *P. niruri* and *A. muricata* leaves	Urinary tract infection	C	INPA 81315
	Alternanthera brasiliana (L.) Kuntze	Terramicina	M	Vg	He	Leaf tea	Headache	C	INPA 220460
Anacardiaceae	*Anacardium occidentale* L.	Caju	Mf	O	Tr	M: Tree bark tea - F: fresh fruit	Diarrhea	S	CEN 65224
	Anacardium giganteum L.	Caju açu	Mf	Fo	Tr	M: Tree bark tea - F: fresh fruit	Diarrhea	S	INPA 61226
	Curatella americana L.	Caju do mato	F	Fo	Tr	Fresh fruit		S	HAMAB 9415
	Schinus terebinthifolia Raddi	Ceru	Mf	Fo	Tr	M: Tree bark tea - F: almond	Gastritis; worm	S	INPA 139911
	Mangifera indica L.	Manga	Mf	O	Tr	M: Tree bark tea; bath: leaves of *M. paradisíaca*, *E. oleracea*, *C. nucifera* and *C. citratus* / F: fresh fruit and juice	Stomachache; bathe woman after childbirth	S	INPA 262837
	Spondias mombin L.	Taperebá (cajá)	Mf	Fo	Tr	M: grind the tree knot and spread over the wound / F: fresh fruit and juice	Healing	S	INPA 141180
Annonaceae	*Annona glabra* L.	Araticum	F	Fo	Tr	Fresh fruit		S	INPA 270299
	Annona mucosa Jacq.	Biribá	Mf	Fo	Tr	M: put tree bark it in the water until it gets colored and drink it / F: fresh fruit and juice	Sore throat	C	INPA 2181
	Annona montana Macfad.	Conde	F	O	Tr	Fresh fruit		S	INPA 246115
	Annona muricata L.	Graviola	Mf	O	Tr	M: beverage of the leaves with *A. esperanzae* problem; leaf tea with *A. tenella* leaves, *P. niruri* and *C. spicatus* / F: fresh fruit and juice	Aches over the body; urinary tract infection	S	INPA 75580
Apiaceae	*Arracacia xanthorriza* Bancr.	Batata crioula	F	Ff	Cr	Cooked rhizome		C	BOTU 25096
	Eryngium foetidum L.	Chicória	Mf	Vg,	He	M: tea of the	Worm	C, S	INPA

Family	Species	Common name		Part	Habit	Preparation	Medical use	C/S	Voucher
				O		roots with *C. papaya* leaves and of *C. ambrosioides* leaves / F: leaves cooked with other foods			269532
	Cuminum cyminum L.	Cominho	Mf	Vg	He	M: Leaf tea; grind the leaf with *C. frutescens* leaves and *P. nigrum* seed / F: leaves cooked with other foods	Seasickness; labor pain	C	MFS 006777
Apocynaceae	*Parahancornia fasciculata* (Poir) Benoist.	Amapá amargo	M	Fo	Tr	Drinking tree milk	Ulcer and gastritis	S	INPA 149037
	Aspidosperma nitidum L.	Carapanauba	M	Fo	Tr	Beverage of the bark of the tree	Tiredness	S	HAMAB 1341
	Lacmellea arborescens (M. Arq.)	Guajaraí	F	Fo	Tr	Fresh fruit		S	INPA 257566
	Himatanthus drasticus (Mart.)	Sucuuba	M	Fo	Tr	Drinking tree milk	Tiredness	S	INPA 102608
Araceae	*Montrichardia linifera* Schott.	Aningueira	M	Fo	Tr	Drink the sap from the stem	Swelling in the spleen (splenomegaly)	S	INPA 1442
	Caladium bicolor L.	Brasileirinho	M	Vg	He	Leaf tea	Hypertension	C	INPA 126294
	Heteropsis flexuosa (H.B.K.) G.S. Bunting	Cipó titica	M	Fo	Cl	Heat the plant stem and spread it over the spot	Stingray sting (*Brycon* sp.)	S	INPA 40853
	Pistia stratiotes L.	Mururé	M	Fo	Tr	Drinking tree milk	Inflammation	S	INPA 108940
	Philodendron martianum Engl.	Pacapeá	M	Fo	Tr	Pour the tree milk in the aching tooth	Toothache	S	IAN 23267
	Xanthosoma taioba E.G. Gonç.	Tajoba	F	Ff, O	He	Leaf, stem and rhizome cooked together with other foods		C, S	EAFM 11025
Arecaceae	*Euterpe oleracea* Mart.	Açaí	Mf	O, Rf	Tr	M: tea with the roots, with *C. citratus* root, dry *C. nucifera* and *B. excelsa* exocarp, and *C. winterianus* leaves; bath with dry straw with *C. citratus*, *M. indica* peel and *M. paradisíaca* leaf; bath: dry leaves of *M. paradisíaca* and *C. nucifera* leaves, with *M. indica* peel and *C. citratus* / F: juice	Hepatitis; malaise during pregnancy; bathe woman after childbirth	C, S	INPA 50244
	Oenocarpus bacaba Mart.	Bacaba	Mf	Fo, O	Tr	M: tea with the roots / F: juice	Worm	S	INPA 166040
	Oenocarpus mapora Karsten	Bacabi	F	Fo	Tr	Juice		S	INPA 237380
	Manicaria saccifera Gaertn.	Buçu	Mf	Fo	Tr	M: drink *C. nucifera* water / F: fresh fruit	Gastritis	S	INPA 169645
	Mauritiella armata L.	Caranã	F	Rf	Tr	F: fresh fruit		S	INPA 45076
	Cocos nucifera L.	Coco	Mf	O	Tr	M: tea with the dry exocarp, with *C. citratus* root and *B.*	Hepatitis; malaise during pregnancy;	C	INPA 224686

						excelsa exocarp, and *C. winterianus* leaves; bath (dry exocarp), *C. citratus*, *M. indica* peel, *M. paradisíaca* leaf and *E. oleracea* leaves; bath: dry leaves from *M. paradisíaca*, *E. oleracea* and *C. citratus*, with *M. indica* peel / F: fresh fruit and candy	bathe woman after childbirth		
	Syagrus romanzoffiana (Cham.) Glassman	Coquinho	M	Fo	Tr	Drink the fruit water	Malaria	S	UB 4332
	Elaeis guineensis Jacq.	Dendê	M	Fo	Tr	Beverage of root with *C. langsdorfii* oil and honey	Gastritis	S	IAN 44216
	Maximiliana maripa L.	Inajá	F	Fo	Tr	Fresh fruit		S	INPA 142748
	Bactris acanthocarpa Mart.	Marajá	F	Fo	Sh	Fresh fruit		S	INPA 163347
	Mauritia flexuosa L.f.	Miriti	F	Rf	Tr	Fresh fruit		S	INPA 170030
	Acrocomia aculeata (Jacq.) Lodd. ex Mart.	Mucajá	Mf	Fo	Tr	M: tea with the roots / F: fresh fruit	Urinary tract infection	S	INPA 187839
	Astrocaryum murumuru Mart.	Muru muru	Mf	Fo	Tr	M: Pour almond oil over the aching tooth / F: fresh fruit	Toothache	S	INPA 172726
	Attalea phalerata Mart. ex Spreng.	Ouricuri	F	Fo	Tr	Fresh fruit		S	IAN 181411
	Attalea speciosa Mart. ex Spreng	Palha preta (babaçu)	F	Rf	Tr	Fresh fruit		S	IAN 158491
	Oenocarpus bataua Mart.	Patauá	F	Fo	Tr	Suco		S	INPA 172632
	Socratea exorrhiza (Mart.)	Paxiuba	M	Fo	Tr	Scrape the bark of the tree and put it under the navel	New-born navel healing	S	INPA 70450
	Bactris gasipaes (kunth)	Pupunha	Mf	O	Tr	M: massage the body with the fruit oil / F: boiled fruit	Aches over the body	C	INPA 206550
	Astrocaryum aculeatum G. Mey.	Tucumã	Mf	Rf	Tr	M: wash the hair with the seed water / F: fresh fruit	Loss of hair	S	INPA 20491
Aristolochiaceae	*Aristolochia esperanzae* Kuntze	Cipó pra tudo	M	Fo	Cl	Beverage with *A. muricata* leaves; leaf and stem tea with *C. sinensis* leaves	Pain (stomachache, headache); gases	S	INPA 200441
	Aristolochia cymbifera Mart. & Zucc.	Urubu-caá	M	Fo	Cl	Tea from the fruit and bark of the tree	Pain (stomachache, headache)	S	CEN 55930
Asclepiadaceae	*Elcomarrhiza amylacea* Barb. Rod.	Cumacá	M	Fo	He	Pour plant milk over the eye	Sight problems	S	ESA 118941
Asparagaceae	*Sansevieria trifasciata* Bojer	Babosa grande	M	Vg	He	Drink the beverage, or cut and spread the gel on the swelling; prepare mixture and massage the body; syrup	Swelling, inflammation, low blood pressure; gastritis	C	INPA 268044

Family	Species	Common name				Preparation	Indication		Voucher
						with *K. brasiliensis* or *B. pinnatum* leaves and honey			
Asphodelaceae	*Aloe vera* (L.) Burn. f.	Babosa pequena	M	Vg	He	Drink the beverage, or cut and spread the gel on the swelling; prepare mixture and massage the body; syrup with *K. brasiliensis* or *B. pinnatum* leaves and honey	Swelling, inflammation, low blood pressure; gastritis	C	INPA 106256
Asteraceae	*Gymnanthemum amygdalinum* (Delie)	Boldo africano	M	Vg	He	Leaf tea, with *C. rotundus* and *F. chica* leaves	Malaria, diabetes and cirrhosis	C	IAN 192804
	Matricaria recutita L.	Camomila	M	Vg	He	Leaf tea	Tranquilizer	C	UB 25796
	Tanacetum vulgare L.	Catinga de mulata	M	Vg	He	Leaf tea. Leaf mixture with alcohol, leaves from *R. officinalis*, *R. graveolens* and *S. orientale* seed	Headache; diarrhea, stroke	C	EAFM 11721
	Artemisia vulgaris L.	Cibalena	M	Vg	He	Leaf tea	cramps, hemorrhage and fever	C	INPA 195375
	Mikania cordifolia (L.f.) Willd.	Cipó sucuriju	M	Fo	Sh	Beverage of the bark of the vine	Gastritis	S	INPA 11390
	Tagetes minuta L.	Cravo de planta	M	Vg	He	Leaf bath	Flu and cold	C	INPA 208085
	Clibadium surinamense Linn.	Cunambi	M	Ff	He	Seed tea	Pneumonia	C	INPA 7304
	Acmella oleracea (L.) R.K. Jansen	Jambu	Mf	Vg	He	M: beverage of the leaves with bee honey and *C. guianensis* oil / F: leaf cooked with other foods	Sore throat and flu	C	INPA 234141
	Eupatorium ayapana Vent.	Japana branca	M	Vg	He	Leaf tea	Headache	C	JPB 40991
	Eupatorium triplinerve Vahl.	Japana roxa	M	Vg	He	Leaf tea	Headache	C	IAN 182445
	Chaptalia nutans (L.) Pol.	Língua de vaca	M	O	He	Leaf tea	Hemorrhage	S	INPA 139919
Basellaceae	*Basella alba* L.	Couve manteiga	F	Vg	He	Sautéed with other foods		C	INPA 202567
Bignoniaceae	*Tabebuia caraiba* (Mart.)	Cariobeira	M	Fo	Tr	Tree bark tea	Inflammation	S	INPA 208861
	Mansoa alliacea (Lam.) A.H. Gentry	Cipó alho	Mf	Fo	Cl	M: tea and beverage of the leaves / F: cooked with other foods	Aches over the body	S	INPA 177754
	Tanaecium nocturnum (Barb. Rodr.)	Cipó curimbó	M	Fo	Cl	Leaf and bark tea	Protect against "evil eye"	S	IAN 134799
	Bignonia exoleta Vell.	Cipó morceguinho (unha de morcego)	M	Fo	Cl	Stem tea	Headache and stomachache	S	IAC 25183
	Crescentia cujete L.	Cuia	M	O	Tr	Leaf bath; bath with bark of *nazarana* tree	Flu and cold; fever and "evil eye"	S	INPA 262772

Family	Species	Common name				Preparation/Use	Indication		Voucher
						and *C. deodara* with *S. guianensis* leaves			
	Fridericia chica (Humb. & Bonpl.)	Pariri (crajiru, bariri)	M	Vg	He	Leaf tea; beverage of the leaves with bark of the *D. subcymosa*, and leaves of *P. americana* tree and of *G. hirsutum*	Anemia and gastritis	C	INPA 268098
	Tabebuia roseoalba (Ridl.) Sandwith	Pau d'arco	M	Fo	Tr	Put tree bark it in the water until it gets colored and drink it	Stomachache	S	INPA 197056
Bixaceae	*Bixa orellana* L.	Urucum	Mf	O	Sh	M: beverage of the seed with *H. courbaril* bark, *D. odorata* seed, *Z. mioga* and honey / F: food coloring	Flu, cough and pneumonia	S	INPA 126318
Bromeliaceae	*Ananas comosus* L.	Abacaxi	Mf	Ff	He	M: eat the fresh fruit or drink juice with milk / F: fresh fruit and juice	Kidney stone	C	INPA 21589
Burseraceae	*Protium heptaphyllum* (Aubl.) Marchand	Breu branco	M	Fo	Tr	Squeeze the green bark and drink the juice	Amoeba, diarrhea	S	INPA 48621
Cactaceae	*Hylocereus undatus* (Haw.) Britton & Rosa	Pitaíca	M	Fo	Tr	Spread plant milk on the cut or wound. In relation to hemorrhage, drink the milk	Stop cutting blood, wound and bleeding	S	IAN 143972
Caesalpiniaceae	*Martiodendron elatum* (Ducke) Gleason	Jutaicica	M	Fo	Tr	Tree bark tea	Worm	S	INPA 2582
	Mora paraensis (Ducke)	Pracuuba	M	Fo	Tr	Tree bark tea	Diarrhea	S	INPA 66512
	Tachigalia paniculata Aublet	Taxizeiro	M	Fo	Tr	Beverage of the bark of the tree	Aches over the body	S	INPAw 598
Calophyllaceae	*Calophyllum brasiliense* Cambess.	Jacareúba	M	Fo	Tr	Put tree bark it in the water until it gets colored and drink it	Diabetes	S	INPA 191340
Caricaceae	*Carica papaya* L.	Mamão	Mf	O	Tr	M: tea of the roots with *E. foetidum* leaves and of *C. ambrosioides* leaves; mixture with honey and drink / F: fresh fruit	Worm; relieves cervical spine pain	S	INPA 1104
Caryocaraceae	*Caryocar villosum* (Aubl.) Pers.	Pequiá	F	Fo	Tr	Boiled fruit		S	INPA 20557
Caryophyllaceae	*Drymaria cordata* (L.) Wild.	Agrião selvagem	F	Vg	He	Leaves cooked with other foods		C	INPA 216554
Chrysobalanaceae	*Chrysobalanus icaco* L.	Juru	F	Rf	Tr	Fresh fruit		S	INPA 13451
	Licania tomentosa (Benth.) Fritsch	Macucu (oiti)	F	Fo	Tr	Fresh fruit		S	INPA 44983
	Couepia subcordata Benth.	Marí marí	F	Fo	Tr	Fresh fruit		S	INPA 108789
Clusiaceae	*Symphonia globulifera* L. f.	Anani	M	Fo	Tr	Use milk to clog the area of the strain	Muscle strain	S	INPA 175947
	Platonia insignis Mart.	Bacuri	F	Fo, O	Tr	Fresh fruit and juice		S	INPA 23852
	Platonia grandiflora Plach.	Bacuri açu	F	Fo	Tr	Fresh fruit and juice		S	NYBG

Family	Species	Common name				Preparation	Medicinal use		Voucher
									2730667
	Garcinia madruno (Kunth) Hammel	Bacuri azedo	F	Fo	Tr	Fresh fruit and juice		S	INPA 92041
	Garcinia brasiliensis Mart.	Bacuri liso (bacurizinho)	F	Fo	Tr	Fresh fruit and juice		S	INPA 98907
	Vismia guianensis (Aubl.) Pers.	Lacre	M	Fo	Tr	Squeeze the juice from the leaves on the affected area	Mycosis and skin irritation	S	INPA 178820
Convolvulaceaea	*Ipomoea batatas* (L.)	Batata doce	F	Ff, O	Cr	Cooked		C, S	INPA 3882
	Ipomoea batatas (L.) *var.* Rainha	Batata rainha	F	Ff, O	Cr	Cooked		C, S	IAN 169732
	Ipomoea purga (Wender.) Hayne	Batatão	M	Ff	Cr	Grind the rhizome, put it in the water until it gets colored and drink it	Elimination of toxic substances in the blood	C	MBM 214631
Costaceae	*Costus spicatus* (Jacq.) Sw.	Cana ficha	M	O	Sh	Leaf and stem tea with *A. tenella* leaves, of *P. niruri* and of *A. muricata*; beverage of *V. surinamensis* bark with "mangangá" *M. acuminata*	Urinary tract infection; uterine infection	S	INPA 268099
Crassulaceae	*Kalanchoe brasiliensis* Cambess.	Pirarucu branco (são raimundo)	M	VG, O	He	Syrup: mixture the leaves with *Aloe* sp. and honey; leaf tea	Gastritis	C, S	IAN 165540
	Bryophyllum pinnatum (Lam.) Oken	Pirarucu roxo (são raimundo)	M	Vg, O	He	Syrup: mixture the leaves with *Aloe* sp. and honey; leaf tea	Gastritis	C, S	INPA 268096
Cucurbitaceae	*Luffa operculata* (L.) Cogn.	Buchinha (cabacinha)	M	O	Cl	Cut the fruit, boil it in oil and massage the local; dried fruit tea with the root of the *P. angulata*, and leaves of *Q. amara* and *A. grandifolia*	Hematoma; malaria	C	INPA 224139
	Cucurbita pepo L.	Jerimum (abóbora)	Mf	Ff, O	Cr	M: stem tea / F: fruit cooked with other foods	Rheumatism	C, S	INPA 235420
	Cucumis anguria L.	Maxixe	Mf	Ff, O	Cr	Fruit cooked with other foods (M/F)	Cholesterol	C, S	INPA 1082
	Citrullus lanatus (Thunb.)	Melancia	Mf	Ff, O	Cr	M: grind the seed, put it in the water and drink it / F: fresh fruit	Stroke	C, S	INPA 56793
	Sicana odorifera (Vell.) Naudin	Melão caipira	F	Ff, O	Cl	Fresh fruit and juice		C, S	INPA 8973
Cyperaceae	*Cyperus articulatus* L.	Pripioca	M	Vg	He	Grind the rhizome, make bath or tea and massage the body	Aches over the body	C	INPA 21149
	Cyperus rotundus L.	Tiririca	M	Fo	He	Leaf tea, with *P. barbatus* and from *F. chica* leaves	Diabetes	S	INPA 2202
Dioscoreaceae	*Dioscorea dodecaneura* Vell.	Cará branco	F	Ff, O	Cl	Cooked rhizome		C, S	INPA 192411
	Dioscorea bulbifera L.	Cará do ar	F	Ff, O	Cl	Boiled fruit		C, S	MFS 8146
	Dioscorea altissima Lam.	Cará mão de	F	Ff,	Cl	Cooked rhizome		C, S	INPA

Family	Species	Common name				Preparation	Indication		Voucher
		onça		O					200524
	Dioscorea trifida L.f.	Cará roxo	F	Ff, O	Cl	Cooked rhizome		C, S	INPA 234412
Euphorbiaceae	*Hura crepitans* L.	Assacu	M	Fo	Tr	Drink the tree milk diluted in water	Combat and avoid cancer	S	INPAw 9850
	Euphorbia tirucalli L.	Cachorro pelado	M	Ff, O	He	Drink the tree milk diluted in water	Combat and avoid cancer	C, S	HAMAB 016898
	Omphalea diandra L.	Comadre do azeite (mãe de azeite)	Mf	Fo	Cl	M: grind the fruit, cook it, extract the oil and drink it / F: use the oil from the fruit to prepare the food	Asthma	S	INPA 39142
	Croton calycularis Huber	Esturaque	M	O	He	Syrup with honey, *D. odorata* seed with *P. amboinicus* leaves	Flu and cold	S	INPAw 1877
	Manihot esculenta Crantz.	Macaxeira	F	Ff	Sh	Roots cooked with other foods		C	INPA 17931
	Sapium taburu Ule	Murupita	M	Fo	Tr	Spread the tree milk over the affected area	Stingray sting (*Brycon* sp.)	S	INPA 206577
	Jatropha curcas L.	Pião branco	M	O	Sh	Leaf bath, prepare a pill from the crushed seed; spread the milk from the plant over the wounded site; bath with *Citrus* and *O. campechianum* leaves, leave in the dew and wash your hair the next day	Migraine; wound healing; flu and cold	S	INPA 224670
	Jatropha molissima L.	Pião pajé	M	O	He	Fruit cooked with coffee; spread the milk of the plant over the wound, or drink tea from the leaves	Anti-inflammatory; heal wounds	S	EAC 160
	Jatropha gossypiifolia L.	Pião roxo	M	O	Sh	Tea and bath of the leaves, prepares a pill from the ground seed; spread the milk from the plant over the wounded site; bath with *Citrus* and *O. campechianum* leaves, leave in the dew and wash your hair the next day; Leaf bath, with *B. caapi* and *P. alliacea* leaves	Migraine; wound healing; flu and cold; "evil eye"	S	INPA 187526
	Hevea brasiliensis L.	Seringueira	Mf	Fo	Tr	M: use milk to clog the area of the strain / F: mixes the tree milk in the coffee and drinks	Muscle strain	S	INPA 54796
Fabaceae -									

caesalpinioideae	*Vouacapoua americana* Aubl.	Acapu	M	Fo	Tr	Tree bark tea	Amoeba	S	INPA 266591
	Ormosia coutinhoi Ducke	Buiuçú	Mf	Fo	Sh	M: put tree bark it in the water until it gets colored and drink it / F: fresh fruit	"evil eye"	S	INPA 140000
	Copaifera langsdorfii Desf.	Copaíba	M	Fo	Tr	Beverage of the tree oil with *E. guineensis* roots and honey	Gastritis	S	INPA 74512
	Hymenaea courbaril L.	Jatobá (jutaí)	Mf	Fo	Tr	M: beverage with *D. odorata* and *B. orellana* seeds, *Z. mioga* and honey / F: fresh fruit	Flu, cough and pneumonia	S	INPA 143023
	Caesalpinia ferrea var. *cearensis* Huber.	Jucá	M	Fo	Tr	Leaf tea	Stomachache	S	IAN 11254
	Senna alata (L.) Roxb.	Mata-pasto	M	Rf	Sh	Flower tea	Worm	S	INPA 192128
	Tamarindus indica L.	Tamarindo	F	Fo	Tr	Fresh fruit		S	INPA 40979
Fabaceae - faboideae									
	Dalbergia subcymosa Ducke.	Cipó verônica	M	Rf, O	Sh	Beverage: bark with and leaves of *P. americana*, *F. chica* and of *G. hirsutum*; or with bark of *espinheira santa*, *U. tomentosa* and *S. adstringens*	Gastritis and anemia	S	INPA 248892
	Dipteryx odorata (Aubl.) Wild.	Cumaru	M	Fo	Tr	Beverage of *H. courbaril* bark, *B. orellana* seeds, *Z. mioga* and honey; syrup with honey, leaves *C. calycularis* and *P. amboinicus*	Flu, cough, pneumonia and could	S	INPA 171369
	Bauhinia rutilans Spruce ex Benth.	Escada de jabuti	M	Fo	Cl	Tea or beverage of vine	Aches over the body	S	HAMAB 9721
	Vicia faba L.	Faveira	M	Fo	Tr	Squeeze the seed oil into the skin with ringworm	Ringworm	S	MAR 1293
	Bauhinia splendens Kunth	Macaco cipó	M	Fo	Cl	Use milk to clog the area of the strain	Muscle strain	S	INPA 88854
	Erythrina falcata Benth.	Molongó	Mf	Fo	Tr	M: spread the tree milk on the affected area / F: fresh fruit	Eliminate the skin bug	S	UB 141887
	Pterocarpus rohrii Vahl	Mututi	M	Fo	Tr	Tea; put it in the water until it gets colored and drink it	Anti-inflammatory	S	INPA 3358
	Canavalia boliviana Piper.	Papo de mutum	F	Fo	Tr	Fresh fruit		S	EAC 24200
	Ateleia glazioveana Baillon	Timbó	M	O	He	Rub the leaf milk over the distended area	Muscle strain	S	INPA 2626
Fabaceae - mimosoideae	*Pentaclethra macroloba* Wild. Kuntze	Pracaxi	M	Fo	Tr	Apply the oil over the infection	Skin infection	S	INPA 1356
	Stryphnodendron adstringens (Mart.) Covile	Barbatimão	M	Fo	Tr	Beverage of the bark tree with bark of	Gastritis	S	INPA 220296

Family	Species	Common name				Preparation	Disease		Voucher
						espinheira santa, *U. tomentosa* and *D. subcymosa*			
	Inga edulis Mart.	Ingá cipó	F	Rf	Tr	Fresh fruit		S	INPA 221912
	Inga sessilis (Vell.) Mart.	Ingá macaco	F	Fo	Tr	Fresh fruit		S	VIC 52305
	Inga vulpina Benth.	Ingá peludo	F	Fo	Tr	Fresh fruit		S	INPA 200956
	Inga cinnamomea Spruce Ex Benth.	Ingá pracuúba	F	Fo	Tr	Fresh fruit		S	INPA 10285
Goupiaceae	*Goupia glabra* Aubl.	Cupiuba	M	Fo	Tr	Drink the tree milk	Diabetes	S	INPA 68431
Hippocrateaceae	*Salacia* sp.	Gogó de guariba	F	Fo	Sh	Fresh fruit		S	INPA 188715
Humiriaceae	*Sacoglottis guianensis* Benth.	Achuá (chuá)	F	Fo	Tr	Fresh fruit		S	INPA 264871
	Endopleura uchi (Huber) Cuatrec.	Uxi	Mf	Fo	Tr	M: Tree bark tea / F: fresh fruit	Diarrhea	S	INPA 125538
	Sacoglottis amazonica Benth.	Uxirana	F	Fo	Tr	Fresh fruit		S	INPA 149064
Icacinaceae	*Poraqueiba sericea* Tul	Marí	F	Fo	Tr	Fresh fruit		S	INPA 211642
Iridaceae	*Eleutherine plicata* Herb.	Marupá (marupazinho)	M	Vg	He	Root tea; leaf tea, with *P. pilosa* leaves	Worm; diarrhea	C	INPA 106195
Lamiaceae	*Rosmarinus officinalis* L.	Alecrim	Mf	Vg	He	M: leaf tea, with leaves *H. suaveolens* and *O. selloi*; mixture of the leaves with alcohol, leaves of *T. vulgare*, *R. graveolens* and *S. orientale* seeds / F: cooked with other foods	Diarrhea; stroke	C	EAFM 12462
	Ocimum campechianum Mill.	Alfavaca	Mf	Vg, O	He	M: cooked with other foods; bath with leaves *C. limonum* and *Jatropha* sp., leave in the dew and wash your hair the next day / F: cooked with other foods	Flu and cold	C, S	INPA 106235
	Hyptis suaveolens (L.) Poit.	Alfazema	M	Vg	He	Leaf tea, with leaves *R. officinalis* and *O. selloi*; mixture with leaves, alcohol, leaves *T. vulgare* and *R. graveolens*; and *Sesamum* seeds	Diarrhea; stroke	C	INPA 199432
	Plectranthus barbatus Andrews	Boldo grande	M	Vg, O	He	Leaf tea, with leaves *C. rotundus* and *F. chica*	Diabetes	C, S	INPA 224638
	Plectranthus grandis	Boldo	M	Vg,	He	Leaf tea, with	Diabetes	C, S	HPL

	(Cramer) R. Willense	pequeno		O		leaves *C. rotundus* and *F. chica*		3629
	Marrubium vulgare L.	Desinflama	M	Vg, O	He	Leaf tea	Tiredness	C, S	IAN 167767
	Ocimum selloi Benth.	Elixir paregórico	M	Vg, O	He	Leaf tea, with leaves *R. officinalis* and *R. officinalis*; mixture with leaves, alcohol, leaves *T. vulgare* and *R. graveolens*; and *Sesamum* seeds	Diarrhea; stroke	C, S	IAC 44399
	Melissa officinalis L.	Erva cidreira	Mf	Vg, O	He	M: leaf tea / F: cooked with other foods	Tranquilizer	C, S	IAN 35950
	Plectranthus amboinicus (Lour.) Spreng.	Hortelã grande	Mf	Vg, O	He	M: syrup with honey, *D. odorata* seeds and *C. calycularis* leaves / F: cooked with other foods	Flu and cold	C, S	INPA 268057
	Mentha x villosa Huds.	Hortelanzinho	Mf	Vg, O	He	M: syrup with honey, *D. odorata* seeds and *C. calycularis* leaves / F: cooked with other foods	Flu and cold	C, S	EAC 54138
	Ocimum basilicum L.	Manjericão	Mf	Vg, O	He	M: leaf tea and bath to wash your head / F: cooked with other foods	Flu and cold	C, S	HFSL 2735
	Origanum vulgare L.	Manjerona	M	Vg, O	He	Leaf tea	Headache	C, S	INPA 147733
	Pogostemon cablin Benth.	Oriza	M	Vg, O	He	Leaf tea	Aches over the body	C, S	INPA 187521
	Tetradenia riparia (Hochst.) Codd	Pluma	M	Vg, O	He	Leaf tea	Stomachache	C, S	EAFM 12123
	Scutellaria agrestis A. St.-Hil. ex Benth.	Trevo roxo (panana)	M	Vg, O	He	Squeeze the juice from the leaves on the ear	Ear pain	C, S	INPA 235447
	Mentha spicata L.	Vique grande	M	Vg, O	He	Leaf tea	Headache	C, S	INPA 233360
	Mentha arvensis L.	Vique pequeno	M	Vg, O	He	Leaf tea	Headache	C, S	IAN 112431
Lauraceae	*Persea americana* Mill.	Abacate	Mf	O	Tr	M: leaf tea; beverage of leaves with *D. subcymosa* bark, and *F. chica* and *G. hirsutum* leaves / F: fresh fruit and juice	Rheumatism; gastritis and anemia	C	INPA 280645
	Cinnamomum zeylanicum Blume	Canela	Mf	O	Tr	Leaf tea (M/F)	Tranquilizer	S	EAFM 13320
	Aniba canelilla (Kunth)	Preciosa	Mf	O	Tr	Leaf tea (M/F)	Stomachache	S	IAN 146413
Lecythidaceae	*Bertholletia excelsa*	Castanha-do-	Mf	Fo	Tr	M: put tree bark	Amoeba;	S	INPAw

Family	Species	Common name				Use/preparation	Treats		Voucher
	H.B.K.	brasil				it in the water until it gets colored and drink it; leaf tea with *C. citratus* and *E. oleracea* root, and *C. nucifera* / F: fresh almonds	hepatitis		7785
	Couroupita guianensis Aubl.	Curupita	M	Fo	Tr	Spread the tree milk under the affected area	Stingray sting (*Brycon* sp.), scorpion and snake	S	INPA 15960
	Lecythis pisonis Cambess.	Sapucaia	Mf	Fo	Tr	M: put tree bark it in the water until it gets colored and under the affected area - / F: fresh almonds	Ringworm	S	INPA 161763
Loganiaceae	*Spigelia anthelmia* L.	Lombrigueira	M	Fo	He	Leaf tea	Worm	S	INPA 104116
Malpighiaceae	*Banisteria caapi* (Spruce ex Griseb.)	Cabi	M	Fo	Tr	Leaf tea with *J. gossypiifolia* and *P. alliacea* leaves	"evil eye"	S	RFA 5243
	Byrsonima crassifolia (L.) Kunth	Muruci	F	Fo	Tr	Fresh fruit and juice		S	INPA 187250
Malvaceae	*Gossypium hirsutum* L.	Algodão branco	M	O	Sh	Beverage of leaf with bark *D. subcymosa*, *F. chica* and *P. americana*; grind the seed with milk and drink it	Gastritis, anemia; babies vomiting	S	INPA 106310
	Herrania mariae (Mart.) Decne. ex Goudot	Cacauí (cacau jacaré)	F	Fo	Tr	Fresh fruit		S	INPA 3788
	Theobroma subincanum Mart.	Cupuí	F	Fo	Tr	Fresh fruit		S	INPA 200343
	Althaea officinalis L.	Malvarisco	M	Vg	He	Grind the leaf, spread the gel on the place and tie with cloth	Stop injury blood	C	IAC 56164
	Pachira aquatica Aubl.	Mamorana	F	Fo	Tr	Boiled almonds		S	INPA 212659
	Abelmoschus esculentus L. Moench	Quiabo	Mf	Ff, Vg	Sh	M: dried fruit tea / F: cooked with other foods	Postpartum treatment	C	EAFM 10867
	Hibiscus sabdariffa L.	Vinagreira	Mf	O	Sh	M: dried fruit tea / F: cooked with other foods	Tranquilizer	S	INPA 57076
Marantaceae	*Calathea allouia* (Aubl.) Lindl	Ariá	F	Ff	He	Cooked rhizome		C	EAFM 5247
Melastomataceae	*Mouriri grandiflora* D.C.	Camutim	F	Fo	Sh	Fresh fruit		S	INPA 146192
Meliaceae	*Carapa guianensis* Aubl.	Andiroba	M	Fo	Tr	Beverage of oil extracted from the stem with bee honey and leaves of *A. oleracea*	Sore throat and flu	S	INPA 158520
	Guarea guidonia (L.) Sleumer	Jataúba	M	Fo	Tr	Cooked root with other foods	To clean the intestine	S	INPA 118374
Menispermaceae	*Abuta grandifolia* L.	Bôta	M	Rf	Cl	Leaf tea with *P. angulata* root, *Q. amara* leaf	Malaria	S	INPA 94362

					and *L. operculata* fruit dried			
Monimiaceae	*Siparuna guianensis* L.	Capitiú	M	Vg	He	Tree bark tea; bath with bark of *nazarana* tree and *C. deodara* with *C. cujete* leaf	Flu and headache; fever and "evil eye"	C	INPA 165827
Moraceae	*Brosimum potabile* Ducke.	Amapá doce	Mf	Fo	Tr	Collect the milk from the tree, beat it to remove the foam and drink it, mashed or with coffee (M/F)	Gastritis	S	INPA 7638
	Ficus insipida Willd.	Apuí (caxinguba)	M	Fo	Tr	Use milk to clog the area of the strain	Muscle strain	S	INPA 39967
	Artocarpus camansi Blanco	Fruta pão	Mf	Fo	Tr	M: Use milk to clog the area of the strain / F: cooked fruit	Muscle strain	S	INPA 280857
	Artocarpus heterophyllus Lam.	Jaca	F	O	Tr	Fresh fruit		S	INPA 192145
Musaceae	*Musa paradisiaca* L.	Banana (bananeira)	Mf	O	Sh	M: Bath: dry leaves with *E. oleracea* and *C. nucifera*, with *M. indica* peel and *C. citratus* leaf / F: fresh fruit	Bathe woman after childbirth	C	INPA 199519
	Musa acuminata L.	Banana roxa	Mf	O	Sh	M: Bath: dry leaves with *E. oleracea* and *C. nucifera*, with *M. indica* peel and *C. citratus* leaf; beverage with *mangangá* and *C. spicatus* leaves and *V. surinamensis* bark / F: fresh fruit	Bathe woman after childbirth; uterus infection	C	OUPR 30362
Myristicaceae	*Virola surinamensis* (Rol. ex Rottb.) Warb.	Virola, ucuuba, bucuuba	M	Fo	Tr	Beverage of the bark tree with *C. spicatus* leaves and *M. acuminata mangangá*	Uterus infection	S	INPA 57328
Myrtaceae	*Syzygium cumini* (L.) Skeels	Ameixa	Mf	O	Tr	M: tree bark tea / F: fresh fruit	Diarrhea	S	INPA 268285
	Psidium cattleianum Sabine	Araçá	F	O	Sh	Fresh fruit		S	EAFM 12223
	Syzygium aromaticum (L.) Merr. & L.M. Perry	Cravo arvore	Mf	Fo	Tr	Tree bark tea (M/F)	Stomachache, intestinal constipation	S	IAC 5345
	Eugenia victoriana Cuatrec.	Ginja	F	Rf	Tr	Fresh fruit		S	HPL 6127
	Psidium guajava L.	Goiaba	Mf	O	Sh	M: tree bark tea / F: fresh fruit	Diarrhea	S	INPA 237204
	Syzygium malaccense (L.) Merr. & L.M. Perry	Jambo	F	O	Tr	Fresh fruit		S	INPA 214039
Olacaceae	*Ptychopetalum uncinatum* Anselmino	Marapuama	M	Rf	Tr	Mixture of the tree bark with alcohol and massage	Cramp and rheumatism	S	INPA 95874

Oxalidaceae	*Averrhoa carambola* L.	Carambola	F	O	Sh	Fresh fruit and juice		S	INPA 224146
	Averrhoa bilimbi L.	Limão caiana	F	O	Sh	Food flavoring		S	INPA 146883
Passifloraceae	*Passiflora micropetala* Mart. ex Mast.	Maracujá de paca	F	O	Cl	Fresh fruit		S	EAFM 279
	Passiflora nitida Kunth	Maracujá do mato (de cheiro)	F	Fo	Cl	Fresh fruit		S	INPA 154814
	Passiflora quadrangularis L.	Maracujá peroba	F	Ff	Cl	Fresh fruit		C	INPA 69856
Pedaliaceae	*Sesamum orientale* L.	Gergelim branco	Mf	Ff	He	M: mixture with seeds, alcohol, leaves from *T. vulgare*, *R. graveolens* and *R. officinalis* / F: make *paçoca* from the seeds	Diarrhea; stroke	C	EAFM 4722
	Sesamum indicum L.	Gergelim preto	Mf	Ff	He	M: mixture with seeds, alcohol, leaves from *T. vulgare*, *R. graveolens* and *R. officinalis* / F: make *paçoca* from the seeds	Diarrhea; stroke	C	INPA 206973
Phyllanthaceae	*Phyllanthus niruri* L.	Quebra pedra	M	Vg	He	Leaf tea (or *G. arborescens* leaves), leaves from *A. tenella*, *C. spicatus* and *A. muricata*	Urinary tract infection, kidney stones	C	INPA 193468
	Petiveria alliacea L.	Mucuracaá	M	Vg	He	Leaf tea with *J. gossypiifolia* and *B. caapi* leaves; beverage with leaves	"evil eye"; gastritis	C	INPA 259176
Pinaceae	*Cedrus deodara* L.	Cedro	M	Fo	Tr	Bark tea; bath: tree bark, with *nazarana* bark, and leaves from *S. guianensis* and *C. cujete*	Tranquilizer and Stomachache; fever and "evil eye"	S	ICN 128901
Piperaceae	*Peperomia pellucida* (L.) Kunth	Comida de jabuti	Mf	Vg, O	He	M: leaf and stem tea / F: sautéed with other foods	Infection	S	INPA 33834
	Piper callosum Ruiz & Pav.	Óleo elétrico	M	O	He	Leaf tea	Migraine and sting of insects	S	INPA 243162
Plantaginaceae	*Scoparia dulcis* L.	Vassourinha	M	O	He	Squeeze the juice from the leaves on the affected area	Mycosis and skin irritation	S	INPA 58086
Poaceae	*Bambusa vulgaris* Schrad.	Bambu	M	Fo	Tr	Leaf tea	Arterial hypertension	S	IAN 197468
	Saccharum spp. L.	Cana	Mf	Ff	Sh	Drink the juice from the stem (M/F)	Malaise and indisposition	C	IAN 62600
	Cymbopogon citratus (DC.) Stapf	Capim marinho (capim santo)	Mf	Vg	He	M: leaf bath with dry leaves from *M. paradisíaca*, *E. oleracea* and *C. nucifera*, with *M. indica* peel; leaf tea from *C. winterianus* with *E. oleracea*	Bathe woman after childbirth; hepatitis	C	INPA 268065

					root, and *C. nucifera* and *B. excelsa* peel / F: leaf tea			
	Cymbopogon winterianus Jowitt ex Bor	Eucalipto	M	Vg	He	Leaf tea with raiz *C. citratus* and *E. oleracea* root, and *C. nucifera* and *B. excelsa* peel	Hepatitis	C	IAN 194324
	Guadua weberbaueri Pilg.	Tabuqui	M	Fo	Sh	Chew and swallow the apical bud of the plant	Sting of insects	S	INPA 26135
Portulacaceae	*Portulaca pilosa* L.	Amor crescido	M	Vg	He	leaf tea with *E. plicata* leaves	Diarrhea	C	INPA 177381
	Portulaca grandiflora L.	Onze-horas	M	Vg	He	Leaf tea	Arterial hypertension	C	INPA 56716
Rhamnaceae	*Houvenia dulcis* Thunberg.	Pau doce	M	Fo	Tr	Bark tea	Headache	S	MACK 2691
Rosaceae	*Licania macrophylla* Benth.	Anauerá	M	Fo	Tr	Put tree bark it in the water until it gets colored and drink it	Stomachache and amoeba	S	IAN 11348
Rubiaceae	*Genipa americana* L.	Jenipapo	Mf	Fo	Tr	Fresh fruit and juice (M/F)	Cholesterol	S	INPA 1871
	Morinda citrifolia L.	Noni	M	O	Sh	Leaf tea	Aches over the body	S	INPA 237845
	Calycophyllum spruceanum (Benth.) K.	Pau mulato	M	O	Tr	Bark tea	Stomachache and amoeba	S	INPA 253827
	Alibertia sorbilis Ducke	Puruí	F	Rf	Tr	Fresh fruit		S	INPA 16548
	Cinchona calisaya Weed.	Quinarana	M	Fo	Tr	Root tea	Fever	S	IAC 6280
	Uncaria tomentosa (Willd) D. C.	Unha de gato (jupindá)	M	Rf	Cl	Beverage of the bark of the vine with bark from *espinheira santa*, *D. subcymosa* and *S. adstringens*	Gastritis	S	INPA 55269
Rutaceae	*Ruta graveolens* L.	Arruda	M	Vg	He	Leaves mixture with alcohol, leaves from *T. vulgare* and *O. campechianum*, and *Sesamum* seeds	Diarrhea; stroke	C	INPA 100963
	Citrus sinensis L. Osb.	Laranja	Mf	O	Tr	M: leaf tea with *A. esperanzae* / F: fresh fruit and juice	Gases	S	INPA 161639
	Citrus aurantium L.	Laranja da terra	M	O	Tr	Eat the fresh fruit with bee honey	Anemia	S	INPA 40936
	Citrus limettioides Tan	Lima	Mf	O	Tr	M: tree bark tea / F: fresh fruit	Arterial hypertension	S	HPL 7120
	Citrus limonum L.	Limão	Mf	O	Tr	M: cooked with other foods; bath leaves from *O. campechianum* and *Jatropha*, leave in the dew and wash your hair the next	Flu and cold	S	MAR 3171

Family	Species	Common name							
						day / F: use it in sauces and broths			
Sapindaceae	*Talisia esculenta* (A.St.-Hil.) Radlk	Pitomba	F	Fo	Sh	Fresh fruit		S	INPA 12607
Sapotaceae	*Pouteria caimito* (Ruiz & Pav.) Radlk.	Abiu	F	Fo	Tr	Fresh fruit		S	INPA 10714
	Pouteria pachyphylla Pires	Abiurana	F	Fo	Tr	Fresh fruit		S	INPA 45784
	Pouteria macrophylla (Lam.) Eyma	Cutite	F	Fo	Sh	Fresh fruit		S	INPA 130432
Sapotaceae	*Manilkara huberi* (Ducke) Stand.	Maçaranduba	Mf	Fo	Tr	M: drink the tree milk / F: fresh fruit	Improves the sight	S	INPA 10320
Simaroubaceae	*Simarouba amara* Aubl.	Jaruba (aruba, marupá)	M	Fo	Tr	Bark tea	Worm	S	INPA 10369
	Simarouba versicolor A. St. -Hil.	Pau chave	M	Fo	Tr	Put tree bark it in the water, leave in the dew, remove the foam and drink it	Malaria	S	INPA 12499
	Quassia amara L.	Quina	M	Fo	Tr	Leaf and bark tea	Malaria	S	INPA 4159
Solanaceae	*Physalis angulata* L.	Camapu	Mf	Ff	He	Root tea, leaves from *Q. amara* and *A. grandifolia*, and *L. operculata* fruit dried	Malaria	S	INPA 106301
	Solanum sessiliflorum Dunal	Cubiu	F	Fo	Sh	Fresh fruit		S	INPA 20716
	Capsicum frutescens L.	Pimenta malagueta	Mf	Vg	He	M: grind the leaf with *C. cyminum* and *P. nigrum* seeds / F: food flavoring	Labor pain	C	MIRR 5805
	Solanum americanum Mill.	Pretinha	F	Rf	He	Fresh fruit		S	INPA 109121
Talinaceae	*Talinum paniculatum* (Jacq.) Gaertn.	Cariru grande	F	Vg, Ff	He	Leaf cooked with other foods		C	INPA 163212
	Talinum triangulare (Jacq.) Willd.	Cariru pequeno	F	Vg, Ff	He	Leaf cooked with other foods		C	INPA 259147
Urticaceae	*Cecropia pachystachya* Trécul	Embaúba	M	Rf	Tr	Grind the leaf, put it in the water and drink it	Diabetes	S	INPA 109923
Verbenaceae	*Lippia alba* (Mill.) N.E. Br.	Carmelitana	Mf	Vg	He	M: leaf tea / F: leaf cooked with other foods	Headache	C	EAFM 12165
Vitaceae	*Cissus verticillata* (L.) Nicolson & C.E. Jarvis	Cipó pucá	M	Fo	Cl	Bark tea	Stomachache	S	INPA 167873
	Cissus sicyoides L.	Insulina	M	Vg	He	Leaf tea	Diabetes	C	EAFM 13214
Zingiberaceae	*Zingiber mioga* (Thunb.) Roscoe	Gengibre grande	Mf	Vg, O	He	M: beverage: *H. courbaril* leaves, *D. odorata* and *B. orellana* seeds, and honey / F: tea from the rhizome	Flu, cough and pneumonia	C	INPA 5706
	Zingiber officinale Roscoe	Gengibre pequena	Mf	Vg, O	He	M: beverage: *H. courbaril*	Flu, cough and pneumonia	C	INPA

									186157
						leaves, *D. odorata* and *B. orellana* seeds, and honey / F: tea from the rhizome			
Not identified	Not identified	Aririmba (ariramba)	F	Fo	Tr	Fresh fruit		S	--
Not identified	Not identified	Bolota	F	Fo	Sh	Fresh fruit		S	--
Not identified	Not identified	Copaíba de planta	M	Vg	He	Tea and syrup of the leaves	Headache and cough	C	--
Not identified	Not identified	Cumaru de planta	M	Vg	He	Syrup of the leaves	Pneumonia	C	--
Not identified	Not identified	Espinheira santa	M	Fo	Tr	Beverage of the bark tree with bark of *S. adstringens, U. tomentosa* and *D. subcymosa*	Gastritis	S	--
Not identified	Not identified	Japá	M	Fo	Tr	Drink the tree milk	Gastritis	S	--
Not identified	Not identified	Larém (aralém)	M	Vg	He	Leaf tea	Malaria	C	--
Not identified	Not identified	Lua	F	Rf	Cl	Fresh fruit		S	--
Not identified	Not identified	Nazarana	M	Fo	Tr	Bath: tree bark, *C deodara* bark, *S. guianensis* and *C. cujete* leaves	Fever and "evil eye"	S	--
Not identified	Not identified	Papagainho	M	Vg	He	Leaf tea	Worm	C	--
Not identified	Not identified	Pichona	F	Fo	Sh	Fresh fruit		S	--
Not identified	Not identified	Pracapeá	F	Rf	Tr	Fresh fruit		S	--
Not identified	Not identified	Pranari	F	Rf	Tr	Fresh fruit		S	--

(Cat.) = Category of use, (Env.) = Propagation environment, (Grow.) = Growth habit, (Dom.) = Domestication stage, (Veg.) = Vegetative cycle, (Reg.) = Registration of plant species, (M) = Medicinal, (F) = Food, (Mf) = Medicinal and Food, (Vg) = Vegetable garden, (O) = Orchard, (Fo) = Forest, (Ff) = Family farm, (Rf) Riparian forest, (Tr) = Tree, (Sh) = Shrub, (He) = Herbaceous, (Cr) = Creeper, (Cl) = Climbers, (C) = Cultivated, (S) = Spontaneous.

The interviewed reported the existence of some medicinal and food species that are toxic. In this case, they developed some techniques that resulted from the knowledge inherited from their parents. Two examples are cited, the first is the use of *A. cymbifera*, a medicinal species indicated for stomachache and headaches. According to the interviewed, the ingestion of the raw leaf can cause nausea, vomiting and dizziness. In this case, the "poison" is eliminated through the decoction of the leaves. The second example, is the species *S. americanum*, whose fruit is consumed as food, however it is only ingested when it reaches full maturity, defined by the dark color. If consumed before this stage of maturation, it can cause fever, headache and diarrhea.

Regarding the forms of use, particularly for food plant species, it was observed that fruit species are mostly consumed in its fresh form (*E. uchi, B. acanthocarpa*) and in some cases they are prepared as juices (*O. bacaba, O. mapora*). Rhizome-producing species are cooked and usually consumed in the breakfast (*D. trifida, A. xanthorriza*) and vegetables are cooked with other foods (*E. foetidum, H. sabdariffa*).

This survey did not identify the habit of preparing salads with vegetables. However, it was observed that some seeds are used as condiments (*B. orellana*), *paçoca* (*S. orientale*) and consumed in fresh (*B. excelsa*) and, finally, some of these species are consumed in the form of boiled teas (cooking), during breakfast (*C. citratus, C. zeylanicum*).

Regarding the forms of use of medicinal species by the population, there was also a diversity of forms of preparation. They are explained, as it follows:

Beverage: It consists in boiling dry barks of trees and vines. It is indicated for pain, inflammation and different infections in the body. Another way to prepare the beverage is to expose the preparation (water + plant) to the sunlight for 10 to 15 days, until the beverage is completely fermented. The preparation of beverage from medicinal plants is mentioned in several works in the academic literature [51, 53].

Tree bark macerate: Indicated for stomachache, diarrhea and ringworm (topical application). This practice is similar to making teas; however, it is used only with the bark of the trees, and the water is not boiled [35].

Mixture: It is widely used for headache, dizziness, diarrhea, stroke, among other discomforts. It consists of mixing the species indicated for this type of discomfort, fermenting them in alcohol, then putting them in a bottle, and inhaling it. Another form of use for body aches is to massage the sore spot with the mixture.

Bath (maceration): It is used mainly against flu and cold. They consist of mashing the leaves of the plants by hand, immersing them in water, and exposing them in dew overnight. The next morning, wash the head with the beverage. Another possibility for preparing the *baths*: it can be cooked, boil them for approximately one hour, leave it in the dew overnight, and use it the next day [35, 53].

Teas: It is used for medicinal and food purposes, the leaves or peels are immersed in water during boiling. This is the form of use most practiced by rural populations, also known as decoction [51].

Syrup: It is called licker, usually indicated to cure the flu. It is prepared from an oil (*C. guianensis*), using leaves of some medicinal plant indicated for flu and bee honey. Boil everything together for 30 minutes, then let it cool, and gradually take a spoon three times a day [51, 53].

Juice of the leaves and seeds: Indicated for a particular disease, and ingesting it. It is indicated for symptoms of diarrhea, intestinal parasites and anemia, etc. You can also place it on the site of discomfort when it comes to ringworm, ear pain [43].

Tree milk: It is extracted from the stem of forest species for food and medicinal purposes [54]. In relation to food use, the milk is ingested. In a medical case (ulcer, gastritis, inflammation), it can be ingested or placed over the place where the discomfort occurs (vision problems, toothache, blood stasis, insect bites, muscle strain) [55].

Oil: It is used for food and medicinal purposes. It is used as a condiment in the preparation of food. In medicinal use is ingested fresh and in bottles. The oils are extracted from both the stem of forest species and fruits and seeds [56].

Plant sap: Is collected and consumed immediately after it. It is indicated for problems in the spleen, gastritis, malaise and tiredness [56].

Ethnobotanical indices

The *Shannon-Wiener* biological diversity index and the *Pielou* equitability index were equal to 5.02 and 0.90, respectively. It was observed the high richness of species of food and medicinal plants in the region under study, and that the knowledge about the use of these species is widely distributed among users of these plant species. This high diversity of plants may be the result of the high ethnobotanical knowledge that traditional, *quilombola* and indigenous populations develop through a combination of African, Amerindian and European knowledge about plants [33].

The species *E. foetidum* (Apiaceae) and *I. batatas* (Convolvulaceaea) were the most cited by the interviewed (Table 3) in this study. Also, they obtained a relative citation frequency of 19.70 and 19.33, respectively. The fact that these species are the most cited means that they are the best known [34]. By observing the most cited species (Table 3), it is found that they are species grown close to the households, in domestic gardens or in the fields. They occur spontaneously in the orchards next to the residences. The fact that *E. foetidum* (Apiaceae), for example, has a dual purpose of use (food and medicine), it can contribute to making it better known and demanded by the interviewed on a daily basis. These species occur significantly in other studies on food and medicinal resources in the Amazon region [43, 57] and other biomes in Brazil [58].

The Use Value Index of the species (Table 3) is ratified by the number of citations and the relative frequency of citations, that is, it is calculated considering the citations of the species by the number of interviewed in the research. The results show how much the species is demanded. The species with the highest relative frequency of citation will also be those with the highest indices of use value, that is, those most demanded by the feeding strategies and local phytotherapy of these interviewed on a daily basis [32].

It is worth noting that the higher the use value of these species, the greater the pressure of use upon them [59, 60]. In the specific case of this study, this analysis is very relevant, especially for the species found in the forest, whose reproduction process is more complex, and for most of them there is still no elaborated agronomic protocol.

Table 3. Relative frequency (Fr) and Value of Use Index (VUI) of the species of food and medicinal plants found in the Cajari River Extractive Reserve, Amazon, Brazil.

Species	Cit.	Fr	IVU
E. foetidum	53	19.70	0.95
I. batatas	52	19.33	0.93
D. trifida	48	17.84	0.86
C. guianensis	47	17.47	0,84
O. bacaba	45	16.73	0.80
C. villosum	43	15.99	0.77
D. subcymosa	42	15.61	0.75
E. uchi; P. macroloba; T. paniculatum; E. oleracea	40	14.87	0.71
C. langsdorfii	39	14.50	0.70
A. oleracea; C. cyminum; P. angulata; B. potabile	38	14.13	0.68
A. aculeatum	37	13.75	0.66
A. camansi; R. graveolens	36	13.38	0.64
U. tomentosa; C. anguria; Mentha x villosa	35	13.01	0.63
M. flexuosa; C. ambrosioides	34	12.64	0.61
P. amboinicus; O campechianum	33	12.27	0.59
M. esculenta; C. citratus	32	11.90	0.57
S. mombin; I. edulis	29	10.78	0.52
J. curcas; A. occidentale; (P. fasciculata	28	10.41	0.50
H. courbaril; T. vulgare; M. armata; P. grandis; P. insignis	27	10.04	0.48
E. plicata; M. officinalis; S. cumini	26	9.67	0.46
Z. mioga; M. grandiflora; A. vera; P. pilosa	25	9.29	0.45
C. pepo; Z. officinale; A. esperanzae	24	8.92	0.43
X. taioba; A. canelilla; K. brasiliensis; C. limonum; P. barbatus; C. allouia	23	8.55	0.41
B. excelsa	22	8.18	0.39
Talinum triangulare	21	7.81	0.38
H. mariae; F. insipida	20	7.43	0.36
Q. amara; C. zeylanicum	19	7.06	0.34
P. alliacea	18	6.69	0.32
B. rutilans; D. odorata; M. alliacea	17	6.32	0.30
Papagainho - not identified; *T. subincanum*	16	5.95	0.29
J. gossypiifolia; F. chica; O. basilicum; S. globulifera	15	5.58	0.27
V. surinamensis; H. drasticus; L. pisonis; A. esculentus; B. gasipaes; A. muricata; L. alba; J. pectoralis var. *stenophylla*	14	5.20	0.25
P. niruri; P. cablin; P. guajava; Salacia sp.; *C. deodara; L. macrophylla; G. hirsutum*	13	4.83	0.23
C. sinensis; B. alba; C. verticillata	12	4.46	0.21
M. citrifolia; E. victoriana; P. macrophylla; S. aromaticum; C. spicatus; S. trifasciata	11	4.09	0.20
P. americana	10	3.72	0.18
H. brasiliensis; A. aculeata; P. sericea; B. acanthocarpa; C. papaya; Lua - not identified; *E. ayapana; L. operculata; A. xanthorriza*	9	3.35	016
B. orellana; J. pectoralis; P. nitida; M. indica; Copaíba de planta - not identified; *D. dodecaneura*	8	2.97	0.14
S. australis; T. esculenta; C. icaco; C. ferrea; S. indicum; T. minuta; O. diandra; C. nucifera; S. adstringens; M. paradisiaca	7	2.60	0.13
M. arvensis; M. spicata; S. agrestis; O. bataua; B. crassifolia; P. micropetala; S. orientale; A. vulgaris; A. mucosa	6	2.23	0.11
S. dulcis; T. paniculata; B. pinnatum; A. phalerata; P. grandiflora; P. stratiotes; O. vulgare; G. americana; C. calycularis; S. terebinthifolia; S. guianensis; A. giganteum; A. tenella	5	1.86	0.09
J. molissima; P. uncinatum; C. winterianus; P. pellucida; D. bulbifera; M. saccifera; O. mapora; R. officinalis	4	1.49	0.07
H. sabdariffa; A. sorbilis; G. arborescens; C. spruceanum; A. speciosa; P. rohrii; E. triplinerve; I. vulpina; I. sessilis; A. montana; O. selloi; Cumaru de planta - not identified; *C. cujete; A. nitidum; B. caapi; O. coutinhoi; I. batatas; S. guyanensis; P. pachycarpa; P. caimito*	3	1.12	0.05
C. rotundus; C. calisaya; C. articulatus; C. frutescens; H. dulcis; S. versicolor; A. murumuru; E. falcata; P. quadrangularis; L. tomentosa; M. huberi; C. limettiodes; Larém (aralém) - not identified; *C. aurantium; V. guianensis; C. brasiliense; M. maripa; V. faba; S. sessiliflorum; B. exoleta; T. nocturnum; A. carambola; C. americana; E. tirucalli; C. bicolor;* Bolota - not identified; *I. purga; G. madruno; P. grandiflora; H. crepitans; A. glabra; H. suaveolens*	2	0.74	0.04

The other species found in the present study were mentioned only once, with Fr and IVU, equal to 0.37 and 0.02, respectively.

Conclusions

The study showed that the residents of the Cajari River Extractive Reserve use 269 plant species as food and/or medicinal products, associated with high diversity and equitability. These data reveal the large knowledge about the use of plants in this unit, which

constitute a real biocultural heritage of these populations. One of the assets observed in the present study, which differs from others found in this segment, is the interest of the young people in these plants, with a tendency to focus on women and adults and the elderly. This shows the need to register and disseminate the diversity and ways of using these resources, at the risk of losing such knowledge over time. It was also possible to verify the strong relationship of dependence of these populations, since the habitat of most of the species found in the study is the native and riparian forests. Finally, in the last years, the pressure of use on these resources has increased due to the rise in the population, the execution of gardens and fires, which urgently requires the protection, conservation and propagation of many species. These are directly related to the families' survival strategies, and for many of these species, there is still no agronomic protocol that makes it possible to replant them.

Declarations

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Authors' contributions

GXPF and RHSS planned and coordinated the study; GXPF, AFR, AFM and WFP performed the fieldwork; GXPF, WLB and RHSS analyzed the data, discussed the results, wrote and reviewed the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

The authors already included all data in the manuscript collected during the field surveys. The documented plant species were deposited at Herbarium Collection of Amapá State (HAMAB), Macapá, Amapá, Brazil.

Ethics approval and consent to participate

During field work, prior consent of the interviewed was taken conducting these studies. This was done to adhere to the ethical standards of community participation in scientific research.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Figures
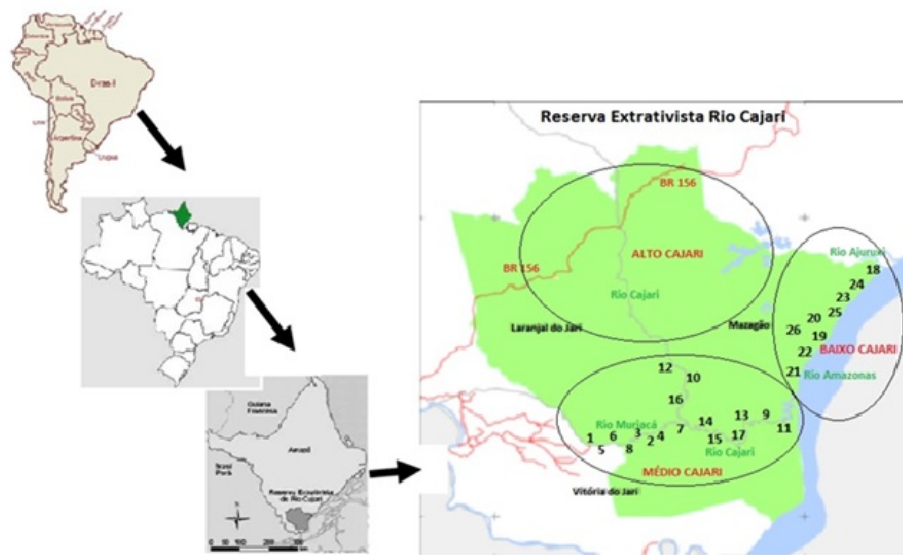
Figure 1

Study area site, Cajari River Extractive Reserve. Municipalities of Mazagão, Laranjal do Jari and Vitória do Jari, State of Amapá, Brazil. Communities: 1 – Aterro do Muriacá; 2 – Boa Vista; 3 – Comércio; 4 – Conceição do Muriacá; 5 – Mirituba; 6 – Santa Helena; 7 – São Luis; 8 – Vila Nova; 9 – Costureira; 10 – Formigueiro; 11 – Paraíso; 12 – Poção; 13 – Santa Rita; 14 – São Sebastião; 15 – Tapereira; 16 – Terra Vermelha; 17 – Vila Santana; 18 – Foz do Rio Ajuruxi; 19 – Rio Ariramba; 20 – Rio Arirambinha; 21 – Rio Bispo; 22 – Rio Capitão; 23 – Rio Carneiro; 24 – Rio Chato; 25 – Rio Mulato; 26 – Vila Betel.