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 conservation unit 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 83 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 potatoes* 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) when compared to other ethnobotanical works carried out in Brazil and in the Amazon.

Conclusions: A wide relationship of use was observed between the species under study and the population of this conservation area. In the environment in which these families are found, of geographical isolation and distance from urban centers, these species become, in many circumstances, 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, the Amazon stands out as the largest and the most preserved Brazilian biome, besides being the largest biodiversity reserve on the planet, occupying 49.29% 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 conservation units 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].

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 [12]. However, in the course of the last few years, due to an accelerated process of exploration of these areas, this knowledge has been lost [13], 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, 14].

In addition to the present study dealing with discussions involving unconventional food plants, the inclusion of medicinal plants is justified due to the multiple purpose that plant species of the Amazonian flora have. It is common to find species that, in addition to being used as a food resource, also have a therapeutic purpose [10]. However, even with the occurrence of factors such as cultural erosion, deforestation and increased urbanization in rural communities, it is asked whether there is still an intense use of these species for food and medicinal purposes by traditional populations? The answer to the following question is what the present study seeks to investigate.

Considering these aspects, the present 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 conservation unit 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 the population residing in this conservation unit.

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 conservation unit, the Rio Cajari Extractive Reserve (01°05'10"S e 51°46'36"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. 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 [15]. 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 conservation unit, 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 (Brazilian nuts, Acai), fishing resources; or even in strategic locations for navigation and local commerce, such as the mouth of rivers and *igarapes*.

The housed of the families can be seen in the communities. They 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 [16].

During the home visits, we sought to identify people recognized as owners of the ethnobotanical knowledge about medicinal and food plants [17]. To reach them, we counted with the help of key informants, 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 [18].

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) [19].

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 conservation unit 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 informants were communicated and authorized by the organizations representing these residents, which were:

1) Association of Agroextractive Producers of the Middle and Low Cajari (ASS. CAJARI), in the Muriacá River region;

2) Association of Residents and Workers in Products of the Sociobiodiversity Chain of the Middle and Lower Cajari and Muriacá river active in RESEX Cajari (ACIOBIO), in the Cajari river region;

3) Association of Agroextractive Residents of the Cajari River (AMAEX-CA), in the Amazon River region.

Ethnobotanical data collection

Ethnobotanical information was collected through interviews with local experts who were appointed by the key-informants. In the interviews, semi-structured questionnaires containing pre-defined topics were applied, allowing the rise of new questions during the dialogue and the informants could spontaneously express their ideas about the use of plants for food and medicinal purposes [20].

Before starting the interviews, a pre-test of the interview script was carried out, with a group of five informants, 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 informant, using the technique known as "guided tour" [21], in order to obtain the identification and more accurate information about the indicated species, following the methodological standards defined for ethnobotanical studies [22].

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 [23, 24] and consultation with botanical specialists. 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') [25, 26]. These indices are used to assess the species richness in the studied area and the distribution of knowledge about plants among the research informants, 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'):

$$H' = -pi \; \Sigma \; log \; pi,$$

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) [27]. This index is used to assess how well the species are known and used by the local population [28]. 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 informants

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 [25]. 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) [29]. 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 [30], in addition to the forms of use and therapeutic indications in the case of medicinal plants [31].

A classification was made regarding the domestication status of these species in order to verify whether they are cultivated, or whether they propagate spontaneously [30], as well as their production cycles in annual, semi-perennial or perennial.

To compare the ethnobotanical indexes of this study with those of the academic literature, other works were searched in the Scientific Electronic Library Online (http://www.scielo.org/php/index.php), Scopus (http://www.scopus.com/home.url) and Web of Science databases (https://clarivate.com/products/web-of-science/).

Results

Social-cultural characteristics

The survey of non-conventional and medicinal food species was performed along the three main rivers (Muriacá, Cajari and Amazonas) of the Cajari River Extractive Reserve.

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

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 / informant).

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 (Table 1), and with the following social occupations: farmers, extractivists, artisans, builders, fishermen, chestnut collectors, rubber tappers, carpenters, shamans and midwives.

According to the informants, the ethnobotanical knowledge about NCFP and medicinal plants is concentrated in adults. Of the 56 informants, 31 are people aged between 25 and 59 years old, whose average age is 58.9 ± 14.6.

Table 1. Gender and age of the respondents and use category of the plants found in the Cajari River Extractivist Reserve in Amazônia, Brazil.

Respondents	Communities	Gender		Category of use			Average of age ± SD
		M	F	Med.	Food	Med./Food	
56	26	19 (34%)	37 (66%)	131 (48%)	72 (27%)	66 (25%)	58,9 ± 14,6

(M) = Male; (F) = Female; (Med.) = Medicinal; (DP) = Standard Deviation.

Regarding the gender of the survey respondents, there is a predominance of women (Table 1), and the same table shows the diversity of purpose, in which some species have food and also medicinal purposes.

Ethnobotanics data

A total of 269 plant species used for food and medicinal purposes were identified. They were distributed in 83 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. Botanical family, scientific and popular name, category of use, propagation environment, growth habit, forms of use, medicinal indications, domestication stage, vegetative cycle 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.	Veg.	Reg.
Acanthaceae	*Justicia acuminatissima* (Miq.) Bremek	Saratudo	M	Vg, O	He	Leaf tea	Tranquilizer, fever and measles	C, S	Sp	INPA 223272
	Justicia pectoralis Jacq.	Melhoral	M	Vg	He	Leaf tea	Headache	C	Sp	INPA 106185
	Justicia pectoralis var. *stenophylla* Leonard	Anador	M	Vg	He	Leaf tea	Headache and stomachache	C	Sp	INPA 20639
Adoxaceae	*Sambucus australis* Cham. & Schltdl.	Sabugueiro	M	Vg, O	He	Leaf tea	Inflammation	C, S	Sp	INPA 208304
Amaranthaceae	*Alternanthera brasiliana* (L.) Kuntze	Terramicina	M	Vg	He	Leaf tea	Headache	C	Sp	INPA 220460
	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	Sp	INPA 71449
	Chenopodium ambrosioides L.	Mastruz	M	Vg, O	He	Leaf tea with *E. foetidum* and *C. papaya* roots	Worm	C, S	Sp	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	Sp	INPA 81315
Anacardiaceae	*Anacardium giganteum* L.	Caju açu	Mf	Fo	Tr	M: Tree bark tea - F: fresh fruit	Diarrhea	S	P	INPA 61226
	Anacardium occidentale L.	Caju	Mf	O	Tr	M: Tree bark tea - F: fresh fruit	Diarrhea	S	P	CEN 65224
	Curatella americana L.	Caju do mato	F	Fo	Tr	Fresh fruit		S	P	HAMAB 9415
	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	P	INPA 262837
	Schinus terebinthifolia Raddi	Ceru	Mf	Fo	Tr	M: Tree bark tea - F: almond	Gastritis; worm	S	P	INPA 139911
	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	P	INPA 141180
Annonaceae	*Annona glabra* L.	Araticum	F	Fo	Tr	Fresh fruit		S	P	INPA 270299
	Annona montana Macfad.	Conde	F	O	Tr	Fresh fruit		S	P	INPA 246115
	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	P	INPA 2181
	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	P	INPA 75580
Apiaceae	*Arracacia xanthorriza* Bancr.	Batata crioula	F	Ff	Cr	Cooked rhizome		C	A	BOTU 25096
	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	Morning seasickness; labor pain	C	Sp	MFS 006777
	Eryngium foetidum L.	Chicória	Mf	Vg, O	He	M: tea of the roots with *C. papaya* leaves and of *C. ambrosioides* leaves / F: leaves cooked with other foods	Worm	C, S	Sp	INPA 269532
Apocynaceae	*Aspidosperma nitidum* L.	Carapanauba	M	Fo	Tr	Beverage of the bark of the tree	Indisposition in the body	S	P	HAMAB 1341
	Himatanthus drasticus (Mart.)	Sucuuba	M	Fo	Tr	Drinking tree milk	Indisposition in the body	S	P	INPA 102608
	Lacmellea arborescens (M. Arq.)	Guajaraí	F	Fo	Tr	Fresh fruit		S	P	INPA 257566
	Parahancornia fasciculata (Poir) Benoist.	Amapá amargo	M	Fo	Tr	Drinking tree milk	Ulcer and gastritis	S	P	INPA 149037
Araceae	*Caladium bicolor* L.	Brasileirinho	M	Vg	He	Leaf tea	Hypertension	C	Sp	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	P	INPA 40853
	Montrichardia linifera Schott.	Aningueira	M	Fo	Tr	Drink the sap from the stem	Swelling in the spleen (splenomegaly)	S	P	INPA 1442
	Philodendron martianum Engl.	Pacapeá	M	Fo	Tr	Pour the tree milk in the aching tooth	Toothache	S	P	IAN 23267
	Pistia stratiotes L.	Mururé	M	Fo	Tr	Drinking tree milk	Inflammation	S	P	INPA 108940

Family	Species	Common name				Preparation	Use			Voucher
	Xanthosoma taioba E.G. Gonç.	Tajoba	F	Ff, O	He	Leaf, stem and rhizome cooked together with other foods		C, S	Sp	EAFM 11025
Arecaceae	*Acrocomia aculeata* (Jacq.) Lodd. ex Mart.	Mucajá	Mf	Fo	Tr	M: tea with the roots / F: fresh fruit	Urinary tract infection	S	P	INPA 187839
	Astrocaryum aculeatum G. Mey.	Tucumã	Mf	Rf	Tr	M: wash the hair with the seed water / F: fresh fruit	Loss of hair	S	P	INPA 20491
	Astrocaryum murumuru Mart.	Muru muru	Mf	Fo	Tr	M: Pour almond oil over the aching tooth / F: fresh fruit	Toothache	S	P	INPA 172726
	Attalea phalerata Mart. ex Spreng.	Ouricuri	F	Fo	Tr	Fresh fruit		S	P	IAN 181411
	*Attalea speciosa M*art. ex Spreng	Palha preta (babaçu)	F	Rf	Tr	Fresh fruit		S	P	IAN 158491
	Bactris acanthocarpa Mart.	Marajá	F	Fo	Sh	Fresh fruit		S	P	INPA 163347
	Bactris gasipaes (kunth)	Pupunha	Mf	O	Tr	M: massage the body with the fruit oil / F: boiled fruit	Aches over the body	C	P	INPA 206550
	Cocos nucifera L.	Coco	Mf	O	Tr	M: tea with the dry exocarp, with *C. citratus* root and *B. 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	Hepatitis; malaise during pregnancy; bathe woman after childbirth	C	P	INPA 224686
	Elaeis guineensis Jacq.	Dendê	M	Fo	Tr	Beverage of root with *C. langsdorfii* oil and honey	Gastritis	S	P	IAN 44216
	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	P	INPA 50244
	Manicaria saccifera Gaertn.	Buçu	Mf	Fo	Tr	M: drink *C. nucifera* water / F: fresh fruit	Gastritis	S	P	INPA 169645
	Mauritia flexuosa L.f.	Miriti	F	Rf	Tr	Fresh fruit		S	P	INPA 170030
	Mauritiella armata L.	Caranã	F	Rf	Tr	F: fresh fruit		S	P	INPA 45076
	Maximiliana maripa L.	Inajá	F	Fo	Tr	Fresh fruit		S	P	INPA 142748
	Oenocarpus bacaba Mart.	Bacaba	Mf	Fo, O	Tr	M: tea with the roots / F: juice	Worm	S	P	INPA 166040
	Oenocarpus bataua Mart.	Patauá	F	Fo	Tr	Suco		S	P	INPA 172632
	Oenocarpus mapora Karsten	Bacabi	F	Fo	Tr	Juice		S	P	
	Socratea exorrhiza (Mart.)	Paxiuba	M	Fo	Tr	Scrape the bark of the tree and put it under the navel	New-born navel healing	S	P	INPA 70450
	Syagrus romanzoffiana (Cham.) Glassman	Coquinho	M	Fo	Tr	Drink the fruit water	Malaria	S	P	UB 4332
Aristolochiaceae	*Aristolochia cymbifera* Mart. & Zucc.	Urubu-caá	M	Fo	Cl	Tea from the fruit and bark of the tree	Pain (stomachache, headache)	S	P	CEN 55930
	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	P	INPA 200441
Asclepiadaceae	*Elcomarrhiza amylacea* Barb. Rod.	Cumacá	M	Fo	He	Pour plant milk over the eye	Sight problems	S	P	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 with *K. brasiliensis* or *B.*	Swelling, inflammation, low blood pressure; gastritis	C	Sp	INPA 268044

Family	Species	Local name				Preparation	Use			Voucher
						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	Sp	INPA 106256
Asteraceae	*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	Sp	INPA 234141
	Artemisia vulgaris L.	Cibalena	M	Vg	He	Leaf tea	cramps, hemorrhage and fever	C	Sp	INPA 195375
	Chaptalia nutans (L.) Pol.	Língua de vaca	M	O	He	Leaf tea	Hemorrhage	S	P	INPA 139919
	Clibadium surinamense Linn.	Cunambi	M	Ff	He	Seed tea	Pneumonia	C	A	INPA 7304
	Eupatorium ayapana Vent.	Japana branca	M	Vg	He	Leaf tea	Headache	C	Sp	JPB 40991
	Eupatorium triplinerve Vahl.	Japana roxa	M	Vg	He	Leaf tea	Headache	C	Sp	IAN 182445
	Gymnanthemum amygdalinum (Delie)	Boldo africano	M	Vg	He	Leaf tea, with *C. rotundus* and *F. chica* leaves	Malaria, diabetes and cirrhosis	C	Sp	IAN 192804
	Matricaria recutita L.	Camomila	M	Vg	He	Leaf tea	Tranquilizer	C	Sp	UB 25796
	Mikania cordifolia (L.f.) Willd.	Cipó sucuriju	M	Fo	Sh	Beverage of the bark of the vine	Gastritis	S	P	INPA 11390
	Tagetes minuta L.	Cravo de planta	M	Vg	He	Leaf bath	Flu and cold	C	Sp	INPA 208085
	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	Sp	EAFM 11721
Basellaceae	*Basella alba* L.	Couve manteiga	F	Vg	He	Sautéed with other foods		C	Sp	INPA 202567
Bignoniaceae	*Bignonia exoleta* Vell.	Cipó morceguinho (unha de morcego)	M	Fo	Cl	Stem tea	Headache and stomachache	S	P	IAC 25183
	Crescentia cujete L.	Cuia	M	O	Tr	Leaf bath; bath with bark of *nazarana* tree and *C. deodara* with *S. guianensis* leaves	Flu and cold; fever and "evil eye"	S	P	INPA 262772
	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	Sp	INPA 268098
	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	P	INPA 177754
	Tabebuia caraiba (Mart.)	Cariobeira	M	Fo	Tr	Tree bark tea	Inflammation	S	P	INPA 208861
	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	P	INPA 197056
	Tanaecium nocturnum (Barb. Rodr.)	Cipó curimbó	M	Fo	Cl	Leaf and bark tea	Protect against "evil eye"	S	P	IAN 134799
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	Sp	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	Sp	INPA 21589
Burseraceae	*Protium heptaphyllum* (Aubl.) Marchand	Breu branco	M	Fo	Tr	Squeeze the green bark and drink the juice	Amoeba, diarrhea	S	P	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	P	IAN 143972
Caesalpiniaceae	*Martiodendron elatum* (Ducke) Gleason	Jutaicica	M	Fo	Tr	Tree bark tea	Worm	S	P	INPA 2582
	Mora paraensis (Ducke)	Pracuuba	M	Fo	Tr	Tree bark tea	Diarrhea	S	P	INPA 66512
	Tachigalia paniculata Aublet	Taxizeiro	M	Fo	Tr	Beverage of the bark of the tree	Aches over the body	S	P	INPAw 598

Family	Species	Common name				Preparation	Use			Voucher
Calophyllaceae	*Calophyllum brasiliense* Cambess.	Jacareúba	M	Fo	Tr	Put tree bark it in the water until it gets colored and drink it	Diabetes	S	P	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	Sp	INPA 1104
Caryocaraceae	*Caryocar villosum* (Aubl.) Pers.	Pequiá	F	Fo	Tr	Boiled fruit		S	P	INPA 20557
Caryophyllaceae	*Drymaria cordata* (L.) Wild.	Agrião selvagem	F	Vg	He	Leaves cooked with other foods		C	Sp	INPA 216554
Chrysobalanaceae	*Chrysobalanus icaco* L.	Juru	F	Rf	Tr	Fresh fruit		S	P	INPA 13451
	Couepia subcordata Benth.	Marí marí	F	Fo	Tr	Fresh fruit		S	P	INPA 108789
	Licania tomentosa (Benth.) Fritsch	Macucu (oiti)	F	Fo	Tr	Fresh fruit		S	P	INPA 44983
Clusiaceae	*Garcinia brasiliensis* Mart.	Bacuri liso (bacurizinho)	F	Fo	Tr	Fresh fruit and juice		S	P	INPA 98907
	Garcinia madruno (Kunth) Hammel	Bacuri azedo	F	Fo	Tr	Fresh fruit and juice		S	P	INPA 92041
	Platonia grandiflora Plach.	Bacuri açu	F	Fo	Tr	Fresh fruit and juice		S	P	NYBG 2730667
	Platonia insignis Mart.	Bacuri	F	Fo, O	Tr	Fresh fruit and juice		S	P	INPA 23852
	Symphonia globulifera L. f.	Anani	M	Fo	Tr	Use milk to clog the area of the strain	Muscle strain	S	P	INPA 175947
	Vismia guianensis (Aubl.) Pers.	Lacre	M	Fo	Tr	Squeeze the juice from the leaves on the affected area	Mycosis and skin irritation	S	P	INPA 178820
Convolvulaceaea	*Ipomoea batatas* (L.)	Batata doce	F	Ff, O	Cr	Cooked		C, S	A	INPA 3882
	Ipomoea batatas (L.) var.Rainha	Batata rainha	F	Ff, O	Cr	Cooked		C, S	A	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	A	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	Sp	INPA 268099
Crassulaceae	*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	Sp	INPA 268096
	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	Sp	IAN 165540
Cucurbitaceae	*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	A	INPA 56793
	Cucumis anguria L.	Maxixe	Mf	Ff, O	Cr	Fruit cooked with other foods(M/F)	Cholesterol	C, S	A	INPA 1082
	Cucurbita pepo L.	Jerimum (abóbora)	Mf	Ff, O	Cr	M: stem tea / F: fruit cooked with other foods	Rheumatism	C, S	A	INPA 235420
	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	Sp	INPA 224139
	Sicana odorifera (Vell.) Naudin	Melão caipira	F	Ff, O	Cl	Fresh fruit and juice		C, S	A	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	Sp	INPA 21149
	Cyperus rotundus L.	Tiririca	M	Fo	He	Leaf tea, with *P. barbatus* and from *F. chica* leaves	Diabetes	S	P	INPA 2202
Dioscoreaceae	*Dioscorea altissima* Lam.	Cará mão de onça	F	Ff, O	Cl	Cooked rhizome		C, S	Sp	INPA 200524
	Dioscorea bulbifera L.	Cará do ar	F	Ff, O	Cl	Boiled fruit		C, S	Sp	MFS 8146
	*Dioscorea dodecaneura*Vell.	Cará branco	F	Ff, O	Cl	Cooked rhizome		C, S	Sp	INPA 192411
	Dioscorea trifida L.f.	Cará roxo	F	Ff, O	Cl	Cooked rhizome		C, S	Sp	INPA 234412
Euphorbiaceae	*Croton calycularis* Huber	Esturaque	M	O	He	Syrup with honey, *D. odorata*seed with *P. amboinicus* leaves	Flu and cold	S	Sp	INPAw 1877

	Species	Common name				Preparation	Use			Voucher
	Euphorbia tirucalli L.	Cachorro pelado	M	Ff, O	He	Drink the tree milk diluted in water	Combat and avoid cancer	C, S	Sp	HAMAB 016898
	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	P	INPA 54796
	Hura crepitans L.	Assacu	M	Fo	Tr	Drink the tree milk diluted in water	Combat and avoid cancer	S	P	INPAw 9850
	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	Sp	INPA 224670
	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	Sp	INPA 187526
	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	Sp	EAC 160
	Manihot esculenta Crantz.	Macaxeira	F	Ff	Sh	Roots cooked with other foods		C	A	INPA 17931
	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	P	INPA 39142
	Sapium taburu Ule	Murupita	M	Fo	Tr	Spread the tree milk over the affected area	Stingray sting (*Brycon* sp.)	S	P	INPA 206577
Fabaceae - caesalpinioideae	*Bauhinia rutilans* Spruce ex Benth.	Escada de jabuti	M	Fo	Cl	Tea or beverage of vine	Aches over the body	S	P	HAMAB 9721
	Bauhinia splendens Kunth	Macaco cipó	M	Fo	Cl	Use milk to clog the area of the strain	Muscle strain	S	P	INPA 88854
	Caesalpinia ferrea var. *cearensis* Huber.	Jucá	M	Fo	Tr	Leaf tea	Stomachache	S	P	IAN 11254
	Copaifera langsdorfii Desf.	Copaíba	M	Fo	Tr	Beverage of the tree oil with *E. guineensis* roots and honey	Gastritis	S	P	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	P	INPA 143023
	Senna alata (L.) Roxb.	Mata-pasto	M	Rf	Sh	Flower tea	Worm	S	P	INPA 192128
	Tamarindus indica L.	Tamarindo	F	Fo	Tr	Fresh fruit		S	P	INPA 40979
Fabaceae - faboideae	*Canavalia boliviana* Piper.	Papo de mutum	F	Fo	Tr	Fresh fruit		S	P	EAC 24200
	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	P	INPA 171369
	Erythrina falcata Benth.	Molongó	Mf	Fo	Tr	M: spread the tree milk on the affected area / F: fresh fruit	Eliminate the skin bug	S	P	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	P	INPA 3358
	Vicia faba L.	Faveira	M	Fo	Tr	Squeeze the seed oil into the skin with ringworm	Ringworm	S	P	MAR 1293
Fabaceae - leguminosae	*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.*	Gastritis and anemia	S	P	INPA 248892

Family	Species	Common name				Use/preparation	Ailment			Voucher
						tomentosa and S. adstringens				
	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	P	INPA 140000
	Vouacapoua americana Aubl.	Acapu	M	Fo	Tr	Tree bark tea	Amoeba	S	P	INPA 266591
Fabaceae - mimosoideae	Inga cinnamomea Spruce Ex Benth.	Ingá pracuúba	F	Fo	Tr	Fresh fruit		S	P	INPA 10285
	Inga edulis Mart.	Ingá cipó	F	Rf	Tr	Fresh fruit		S	P	INPA 221912
	Inga sessilis (Vell.) Mart.	Ingá macaco	F	Fo	Tr	Fresh fruit		S	P	VIC 52305
	Inga vulpina Benth.	Ingá peludo	F	Fo	Tr	Fresh fruit		S	P	INPA 200956
	Pentaclethra macroloba Wild. Kuntze	Pracaxi	M	Fo	Tr	Apply the oil over the infection	Skin infection	S	P	INPA 1356
	Stryphnodendron adstringens (Mart.) Covile	Barbatimão	M	Fo	Tr	Beverage of the bark tree with bark of espinheira santa, U. tomentosa and D. subcymosa	Gastritis	S	P	INPA 220296
Fabaceae - papilionoideae	Ateleia glazioveana Baillon	Timbó	M	O	He	Rub the leaf milk over the distended area	Muscle strain	S	Sp	INPA 2626
Goupiaceae	Goupia glabra Aubl.	Cupiuba	M	Fo	Tr	Drink the tree milk	Diabetes	S	P	INPA 68431
Hippocrateaceae	Salacia sp.	Gogó de guariba	F	Fo	Sh	Fresh fruit		S	P	INPA 188715
Humiriaceae	Endopleura uchi (Huber) Cuatrec.	Uxi	Mf	Fo	Tr	M: Tree bark tea / F: fresh fruit	Diarrhea	S	P	INPA 125538
	Sacoglottis amazonica Benth.	Uxirana	F	Fo	Tr	Fresh fruit		S	P	INPA 149064
	Sacoglottis guianensis Benth.	Achuá (chuá)	F	Fo	Tr	Fresh fruit		S	P	INPA 264871
Icacinaceae	Poraqueiba sericea Tul	Marí	F	Fo	Tr	Fresh fruit		S	P	INPA 211642
Iridaceae	Eleutherine plicata Herb.	Marupá (marupazinho)	M	Vg	He	Root tea; leaf tea, with P. pilosa leaves	Worm; diarrhea	C	Sp	INPA 106195
Lamiaceae	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	Sp	INPA 199432
	Marrubium vulgare L.	Desinflama	M	Vg, O	He	Leaf tea	Indisposition in the body	C, S	Sp	IAN 167767
	Melissa officinalis L.	Erva cidreira	Mf	Vg, O	He	M: leaf tea / F: cooked with other foods	Tranquilizer	C, S	Sp	IAN 35950
	Mentha arvensis L.	Vique pequeno	M	Vg, O	He	Leaf tea	Headache	C, S	Sp	IAN 112431
	Mentha spicata L.	Vique grande	M	Vg, O	He	Leaf tea	Headache	C, S	Sp	INPA 233360
	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	Sp	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	Sp	HFSL 2735
	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	Sp	INPA 106235
	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	Sp	IAC 44399
	Origanum vulgare L.	Manjerona	M	Vg, O	He	Leaf tea	Headache	C, S	Sp	INPA 147733
	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	Sp	INPA 268057
	Plectranthus barbatus Andrews	Boldo grande	M	Vg, O	He	Leaf tea, with leaves C. rotundus and F. chica	Diabetes	C, S	Sp	INPA 224638

Family	Species	Common name				Preparation	Indication			Voucher
	Plectranthus grandis (Cramer) R. Willense	Boldo pequeno	M	Vg, O	He	Leaf tea, with leaves *C. rotundus* and *F. chica*	Diabetes	C, S	Sp	HPL 3629
	Pogostemon cablin Benth.	Oriza	M	Vg, O	He	Leaf tea	Aches over the body	C, S	Sp	INPA 187521
	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	Sp	EAFM 12462
	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	Sp	INPA 235447
	Tetradenia riparia (Hochst.) Codd	Pluma	M	Vg, O	He	Leaf tea	Stomachache	C, S	Sp	EAFM 12123
Lauraceae	*Aniba canelilla* (Kunth)	Preciosa	Mf	O	Tr	Leaf tea (M/F)	Stomachache	S	P	IAN 146413
	Cinnamomum zeylanicum Blume	Canela	Mf	O	Tr	Leaf tea (M/F)	Tranquilizer	S	P	EAFM 13320
	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	P	INPA 280645
Lecythidaceae	*Bertholletia excelsa* H.B.K.	Castanha-do-brasil	Mf	Fo	Tr	M: put tree bark 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	Amoeba; hepatitis	S	P	INPAw 7785
	Couroupita guianensis Aubl.	Curupita	M	Fo	Tr	Spread the tree milk under the affected area	Stingray sting (*Brycon* sp.), scorpion and snake	S	P	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	P	INPA 161763
Loganiaceae	*Spigelia anthelmia* L.	Lombrigueira	M	Fo	He	Leaf tea	Worm	S	P	INPA 104116
Malpighiaceae	*Banisteria caapi* (Spruce ex Griseb.)	Cabi	M	Fo	Tr	Leaf tea with *J. gossypiifolia* and *P. alliacea* leaves	"evil eye"	S	P	RFA 5243
	Byrsonima crassifolia (L.) Kunth	Muruci	F	Fo	Tr	Fresh fruit and juice		S	P	INPA 187250
Malvaceae	*Abelmoschus esculentus* L. Moench	Quiabo	Mf	Ff, Vg	Sh	M: dried fruit tea / F: cooked with other foods	Postpartum treatment	C	A	EAFM 10867
	Althaea officinalis L.	Malvarisco	M	Vg	He	Grind the leaf, spread the gel on the place and tie with cloth	Stop injury blood	C	Sp	IAC 56164
	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	Sp	INPA 106310
	Herrania mariae (Mart.) Decne. ex Goudot	Cacauí (cacau jacaré)	F	Fo	Tr	Fresh fruit		S	P	INPA 3788
	Hibiscus sabdariffa L.	Vinagreira	Mf	O	Sh	M: dried fruit tea / F: cooked with other foods	Tranquilizer	S	Sp	INPA 57076
	Pachira aquatica Aubl.	Mamorana	F	Fo	Tr	Boiled almonds		S	P	INPA 212659
	Theobroma subincanum Mart.	Cupuí	F	Fo	Tr	Fresh fruit		S	P	INPA 200343
Marantaceae	*Calathea allouia* (Aubl.) Lindl	Ariá	F	Ff	He	Cooked rhizome		C	A	EAFM 5247
Melastomataceae	*Mouriri grandiflora* D.C.	Camutim	F	Fo	Sh	Fresh fruit		S	P	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	P	INPA 158520
	Guarea guidonia (L.) Sleumer	Jataúba	M	Fo	Tr	Cooked root with other foods	To clean the intestine	S	P	INPA 118374
Menispermaceae	*Abuta grandifolia* L.	Bôta	M	Rf	Cl	Leaf tea with *P. angulata* root, *Q. amara* leaf and *L. operculata* fruit dried	Malaria	S	P	INPA 94362
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	Sp	INPA 165827

Family	Species	Common name				Preparation	Use			Voucher
Moraceae	*Artocarpus camansi* Blanco	Fruta pão	Mf	Fo	Tr	M: Use milk to clog the area of the strain / F: cooked fruit	Muscle strain	S	P	INPA 280857
	Artocarpus heterophyllus Lam.	Jaca	F	O	Tr	Fresh fruit		S	P	INPA 192145
	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	P	INPA 7638
	Ficus insipida Willd.	Apuí (caxinguba)	M	Fo	Tr	Use milk to clog the area of the strain	Muscle strain	S	P	INPA 39967
Musaceae	*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	Sp	OUPR 30362
	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	Sp	INPA 199519
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	P	INPA 57328
Myrtaceae	*Eugenia victoriana* Cuatrec.	Ginja	F	Rf	Tr	Fresh fruit		S	P	HPL 6127
	Psidium cattleianum Sabine	Araçá	F	O	Sh	Fresh fruit		S	P	EAFM 12223
	Psidium guajava L.	Goiaba	Mf	O	Sh	M: tree bark tea / F: fresh fruit	Diarrhea	S	P	INPA 237204
	Syzygium aromaticum (L.) Merr. & L.M. Perry	Cravo arvore	Mf	Fo	Tr	Tree bark tea (M/F)	Stomachache, intestinal constipation	S	P	IAC 5345
	Syzygium cumini (L.) Skeels	Ameixa	Mf	O	Tr	M: tree bark tea / F: fresh fruit	Diarrhea	S	P	INPA 268285
	Syzygium malaccense (L.) Merr. & L.M. Perry	Jambo	F	O	Tr	Fresh fruit		S	P	INPA 214039
Olacaceae	*Ptychopetalum uncinatum* Anselmino	Marapuama	M	Rf	Tr	Mixture of the tree bark with alcohol and massage	Crab and rheumatism	S	P	INPA 95874
Oxalidaceae	*Averrhoa bilimbi* L.	Limão caiana	F	O	Sh	Food flavoring		S	P	
	Averrhoa carambola L.	Carambola	F	O	Sh	Fresh fruit and juice		S	P	INPA 224146
Passifloraceae	*Passiflora micropetala* Mart. ex Mast.	Maracujá de paca	F	O	Cl	Fresh fruit		S	Sp	EAFM 279
	Passiflora nitida Kunth	Maracujá do mato (de cheiro)	F	Fo	Cl	Fresh fruit		S	Sp	INPA 154814
	Passiflora quadrangularis L.	Maracujá peroba	F	Ff	Cl	Fresh fruit		C	Sp	INPA 69856
Pedaliaceae	*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	A	INPA 206973
	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	A	EAFM 4722
Phyllanthaceae	*Petiveria alliacea* L.	Mucuracaá	M	Vg	He	Leaf tea with *J. gossypiifolia* and *B. caapi* leaves; beverage with leaves	"evil eye"; gastritis	C	Sp	INPA 259176
	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	Sp	INPA 193468
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	P	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	A	INPA 33834
	Piper callosum Ruiz & Pav.	Óleo elétrico	M	O	He	Leaf tea	Migraine and sting of insects	S	Sp	INPA 243162
Plantaginaceae	*Scoparia dulcis* L.	Vassourinha	M	O	He	Squeeze the juice from the leaves on the	Mycosis and skin irritation	S	Sp	INPA 58086

Family	Species	Common name								Voucher
						affected area				
Poaceae	*Bambusa vulgaris* Schrad.	Bambu	M	Fo	Tr	Leaf tea	Arterial hypertension	S	P	IAN 197468
	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* root, and *C. nucifera* and *B. excelsa* peel / F: leaf tea	Bathe woman after childbirth; hepatitis	C	Sp	INPA 268065
	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	Sp	IAN 194324
	Guadua weberbaueri Pilg.	Tabuqui	M	Fo	Sh	Chew and swallow the apical bud of the plant	Sting of insects	S	P	INPA 26135
	Saccharum spp. L.	Cana	Mf	Ff	Sh	Drink the juice from the stem (M/F)	Malaise and indisposition	C	Sp	IAN 62600
Portulacaceae	*Portulaca grandiflora* L.	Onze-horas	M	Vg	He	Leaf tea	Arterial hypertension	C	Sp	INPA 56716
	Portulaca pilosa L.	Amor crescido	M	Vg	He	leaf tea with *E. plicata* leaves	Diarrhea	C	Sp	INPA 177381
Rhamnaceae	*Houvenia dulcis* Thunberg.	Pau doce	M	Fo	Tr	Bark tea	Headache	S	P	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	P	IAN 11348
Rubiaceae	*Alibertia sorbilis* Ducke	Puruí	F	Rf	Tr	Fresh fruit		S	P	INPA 16548
	Calycophyllum spruceanum (Benth.) K.	Pau mulato	M	O	Tr	Bark tea	Stomachache and amoeba	S	P	INPA 253827
	Cinchona calisaya Weed.	Quinarana	M	Fo	Tr	Root tea	Fever	S	P	IAC 6280
	Genipa americana L.	Jenipapo	Mf	Fo	Tr	Fresh fruit and juice (M/F)	Cholesterol	S	P	INPA 1871
	Morinda citrifolia L.	Noni	M	O	Sh	Leaf tea	Aches over the body	S	P	INPA 237845
	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	P	INPA 55269
Rutaceae	*Citrus aurantium* L.	Laranja da terra	M	O	Tr	Eat the fresh fruit with bee honey	Anemia	S	P	INPA 40936
	Citrus limettioides Tan	Lima	Mf	O	Tr	M: tree bark tea / F: fresh fruit	Arterial hypertension	S	P	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 day / F: use it in sauces and broths	Flu and cold	S	P	MAR 3171
	Citrus sinensis L. Osb.	Laranja	Mf	O	Tr	M: leaf tea with *A. esperanzae* / F: fresh fruit and juice	Gases	S	P	INPA 161639
	Ruta graveolens L.	Arruda	M	Vg	He	Leaves mixture with alcohol, leaves from *T. vulgare* and *O. campechianum,* and *Sesamum* seeds	Diarrhea; stroke	C	Sp	INPA 100963
Sapindaceae	*Talisia esculenta* (A.St.-Hil.) Radlk	Pitomba	F	Fo	Sh	Fresh fruit		S	P	INPA 12607
Sapotaceae	*Pouteria caimito* (Ruiz & Pav.) Radlk.	Abiu	F	Fo	Tr	Fresh fruit		S	P	INPA 10714
	Pouteria macrophylla (Lam.) Eyma	Cutite	F	Fo	Sh	Fresh fruit		S	P	INPA 130432
	Pouteria pachyphylla Pires	Abiurana	F	Fo	Tr	Fresh fruit		S	P	INPA 45784
Sapotaceae	*Manilkara huberi* (Ducke) Stand.	Maçaranduba	Mf	Fo	Tr	M: drink the tree milk / F: fresh fruit	Improves the sight	S	P	INPA 10320
Simaroubaceae	*Quassia amara* L.	Quina	M	Fo	Tr	Leaf and bark tea	Malaria	S	P	INPA 4159
	Simarouba amara Aubl.	Jaruba (aruba, marupá)	M	Fo	Tr	Bark tea	Worm	S	P	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	P	INPA 12499
Solanaceae	*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	Sp	MIRR 5805
	Physalis angulata L.	Camapu	Mf	Ff	He	Root tea, leaves from *Q. amara* and *A.*	Malaria	S	A	INPA 106301

Family	Species	Common name	Cat.	Env.	Grow.	Use form	Medicinal indication	Dom.	Veg.	Reg.
						grandifolia, and *L. operculata* fruit dried				
	Solanum americanum Mill.	Pretinha	F	Rf	He	Fresh fruit		S	P	INPA 109121
	Solanum sessiliflorum Dunal	Cubiu	F	Fo	Sh	Fresh fruit		S	P	INPA 20716
Talinaceae	*Talinum paniculatum* (Jacq.) Gaertn.	Cariru grande	F	Vg, Ff	He	Leaf cooked with other foods		C	Sp	INPA 163212
	Talinum triangulare (Jacq.) Willd.	Cariru pequeno	F	Vg, Ff	He	Leaf cooked with other foods		C	Sp	INPA 259147
Urticaceae	*Cecropia pachystachya* Trécul	Embaúba	M	Rf	Tr	Grind the leaf, put it in the water and drink it	Diabetes	S	P	INPA 109923
Verbenaceae	*Lippia alba* (Mill.) N.E. Br.	Carmelitana	Mf	Vg	He	M: leaf tea / F: leaf cooked with other foods	Headache	C	Sp	EAFM 12165
Vitaceae	*Cissus sicyoides* L.	Insulina	M	Vg	He	Leaf tea	Diabetes	C	Sp	EAFM 13214
	Cissus verticillata (L.) Nicolson & C.E. Jarvis	Cipó pucá	M	Fo	Cl	Bark tea	Stomachache	S	P	INPA 167873
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	Sp	INPA 5706
	Zingiber officinale Roscoe	Gengibre pequena	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	Sp	INPA 186157
Not identified	Not identified	Aririmba (ariramba)	F	Fo	Tr	Fresh fruit		S	P	--
Not identified	Not identified	Bolota	F	Fo	Sh	Fresh fruit		S	P	--
Not identified	Not identified	Copaíba de planta	M	Vg	He	Tea and syrup of the leaves	Headache and cough	C	Sp	--
Not identified	Not identified	Cumaru de planta	M	Vg	He	Syrup of the leaves	Pneumonia	C	Sp	--
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	P	--
Not identified	Not identified	Japá	M	Fo	Tr	Drink the tree milk	Gastritis	S	P	--
Not identified	Not identified	Larém (aralém)	M	Vg	He	Leaf tea	Malaria	C	Sp	--
Not identified	Not identified	Lua	F	Rf	Cl	Fresh fruit		S	P	--
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	P	--
Not identified	Not identified	Papagainho	M	Vg	He	Leaf tea	Worm	C	Sp	--
Not identified	Not identified	Pichona	F	Fo	Sh	Fresh fruit		S	P	--
Not identified	Not identified	Pracapeá	F	Rf	Tr	Fresh fruit		S	P	--
Not identified	Not identified	Pranari	F	Rf	Tr	Fresh fruit		S	P	--

(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, (P) = Perennial, (Sp) = Semi-perennial, (A) = Annual.

The informants 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 informants, 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*).

Relative frequency and Value of Use Index

The species *E. foetidum* (Apiaceae) and *I. batatas* (Convolvulaceaea) were the most cited by the informants (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 [30]. 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 informants on a daily basis. These species occur significantly in other studies on food and medicinal resources in the Amazon region [32, 33] and other biomes in Brazil [34].

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 informants 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 informants on a daily basis [28].

It is worth noting that the higher the use value of these species, the greater the pressure of use upon them [35, 36]. 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
Chicória (*Eryngium foetidum*)	53	19.70	0.95
Batata doce (*Ipomoea batatas*)	52	19.33	0.93
Cará roxo (*Dioscorea trifida*)	48	17.84	0.86
Andiroba (*Carapa guianensis*)	47	17.47	0,84
Bacaba (*Oenocarpus bacaba*)	45	16.73	0.80
Pequiá (*Caryocar villosum*)	43	15.99	0.77
Cipó verônica (*Dalbergia subcymosa*)	42	15.61	0.75
Uxi (*Endopleura uchi*); Pracaxi (*Pentaclethra macroloba*); Cariru grande (*Talinum paniculatum*); Açaí (*Euterpe oleracea*)	40	14.87	0.71
Copaíba (*Copaiba langsdorfii*)	39	14.50	0.70
Jambu (*Acmella oleracea*); Cominho (*Cuminum cyminum*); Camapu (*Physalis angulata*); Amapá doce (*Brosimum potabile*)	38	14.13	0.68
Tucumã (*Astrocaryum aculeatum*)	37	13.75	0.66
Fruta pão (*Artocarpus camansi*); Arruda (*Ruta graveolens*)	36	13.38	0.64
Unha de gato (jupindá) (*Uncaria tomentosa*); Maxixe (*Cucumis anguria*); Hortelanzinho (*Mentha x villosa*)	35	13.01	0.63
Miriti (*Mauritia flexuosa*); Mastruz (*Chenopodium ambrosioides*)	34	12.64	0.61
Hortelã grande (*Plectranthus amboinicus*); Alfavaca (*Ocimum campechianum*)	33	12.27	0.59
Macaxeira (*Manihot esculenta*); Capim marinho (capim santo) (*Cymbopogon citratus*)	32	11.90	0.57
Taperebá (cajá) (*Spondias mombin*); Ingá cipó (*Inga edulis*)	29	10.78	0.52
Peão branco (*Jatropha curcas*); Caju (*Anacardium occidentale*); Amapá amargo (*Parahancornia fasciculata*)	28	10.41	0.50
Jatobá (jutaí) (*Hymenaea courbaril*); Catinga de mulata (*Tanacetum vulgare*); Caranã (*Mauritiella armata*); Boldo pequeno (*Plectranthus grandis*); Bacuri (*Platonia insignis*)	27	10.04	0.48
Marupá (marupazinho) (*Eleutherine plicata*); Erva cidreira (*Melissa officinalis*); Ameixa (*Syzygium cumini*)	26	9.67	0.46
Gengibre grande (*Zingiber mioga*); Camutim (*Mouriri grandiflora*); Babosa pequena (*Aloe vera*); Amor crescido (*Portulaca pilosa*)	25	9.29	0.45
Jerimum (abóbora) (*Cucurbita pepo*); Gengibre pequena (*Zingiber officinale*); Cipó pra tudo (*Aristolochia esperanzae*)	24	8.92	0.43
Tajoba (*Xanthosoma taioba*); Preciosa (*Aniba canelilla*); Pirarucu branco (são raimundo) (*Kalanchoe brasiliensis*); Limão (*Citrus limonum*); Boldo grande (*Plectranthus barbatus*); Ariá (*Calathea allouia*)	23	8.55	0.41
Castanha-do-pará (*Bertholletia excelsa*)	22	8.18	0.39
Cariru pequeno (*Talinum triangulare*)	21	7.81	0.38
Cacauí (cacau jacaré) (*Herrania mariae*); Apuí (caxinguba) (*Ficus insipida*)	20	7.43	0.36
Quina (*Quassia amara*); Canela (*Cinnamomum zeylanicum*)	19	7.06	0.34
Mucuracaá (*Petiveria alliacea*)	18	6.69	0.32
Escada de jabuti (*Bauhinia rutilans*); Cumaru (*Dipteryx odorata*); Cipó alho (*Mansoa alliacea*)	17	6.32	0.30
Papagainho - not identified; Cupuí (*Theobroma subincanum*)	16	5.95	0.29
Peão roxo (*Jatropha gossypiifolia*); Pariri (crajiru, bariri) (*Fridericia chica*); Manjericão (*Ocimum basilicum*); Anani (*Symphonia globulifera*)	15	5.58	0.27
Virola (ucuuba, bucuuba) (*Virola surinamensis*; Sucuuba (*Himatanthus drasticus*); Sapucaia (*Lecythis pisonis*); Quiabo (*Abelmoschus esculentus*); Pupunha (*Bactris gasipaes*); Graviola (*Annona muricata*); Carmelitana (*Lippia alba*); Anador (*Justicia pectoralis stenophylla*)	14	5.20	0.25
Quebra pedra (*Phyllanthus niruri*); Oriza (*Pogostemon cablin*); Goiaba (*Psidium guajava*); Gogó de guariba (*Salacia* sp.); Cedro (*Cedrus deodara*); Anauerá (*Licania macrophylla*); Algodão branco (*Gossypium hirsutum*)	13	4.83	0.23
Laranja (*Citrus sinensis*); Couve manteiga (*Basella alba*); Cipó puçá (*Cissus verticillata*)	12	4.46	0.21
Noni (*Morinda citrifolia*); Ginja (*Eugenia victoriana*); Cutite (*Pouteria macrophylla*); Cravo arvore (*Syzygium aromaticum*); Cana ficha (*Costus spicatus*); Babosa grande (*Sansevieria trifasciata*)	11	4.09	0.20
Abacate (*Persea americana*)	10	3.72	0.18
Seringueira (*Hevea brasiliensis*); Mucajá (*Acrocomia aculeata*); Marí (*Poraqueiba sericea*); Marajá (*Bactris acanthocarpa*); Mamão (*Carica papaya*); Lua - not identified; Japana branca (*Eupatorium ayapana*); Buchinha (cabacinha) (*Luffa operculata*); Batata crioula (*Arracacia xanthorriza*)	9	3.35	016
Urucum (*Bixa orellana*); Melhoral (*Justicia pectoralis*); Maracujá do mato (maracujá de cheiro) (*Passiflora nitida*); Manga (*Mangifera indica*); Copaíba de planta - not identified; Cará branco (*Dioscorea dodecaneura*)	8	2.97	0.14
Sabugueiro (*Sambucus australis*); Pitomba (*Talisia esculenta*); Juru (*Chrysobalanus icaco*); Jucá (*Caesalpinia ferrea* var. *cearensis*); Gergelim preto (*Sesamum indicum*); Cravo de planta (*Tagetes minuta*); Comadre do azeite (mãe de azeite) (*Omphalea diandra*); Coco (*Cocos nucifera*); Barbatimão (*Stryphnodendron adstringens*); Banana (bananeira) (*Musa paradisiaca*)	7	2.60	0.13
Vique pequeno (*Mentha arvensis*); Vique grande (*Mentha spicata*); Trevo roxo (panana) (*Scutellaria agrestis*); Patauá (*Oenocarpus bataua*); Muruci (*Byrsonima crassifolia*); Maracujá de paca (*Passiflora micropetala*); Gergelim branco (*Sesamum orientale*); Cibalena (*Artemisia vulgaris*); Biribá (*Annona mucosa*)	6	2.23	0.11
Vassourinha (*Scoparia dulcis*); Taxizeiro (*Tachigalia paniculata*); Pirarucu roxo (são raimundo) (*Bryophyllum pinnatum*); Ouricuri (*Attalea phalerata*); Onze-horas (*Portulaca grandiflora*); Mururé (*Pistia stratiotes*); Manjerona (*Origanum vulgare*); Jenipapo (*Genipa americana*); Esturaque (*Croton calycularis*); Ceru (*Schinus terebinthifolia*); Capitiú (*Siparuna guianensis*); Caju açu (*Anacardium giganteum*); Ampicilina de planta (*Alternanthera tenella*)	5	1.86	0.09
Peão pajé (*Jatropa molissima*); Marapuama (*Ptychopetalum uncinatum*); Eucalipto (*Cymbopogon winterianus*); Comida de jabuti (*Peperomia pellucida*); Cará do ar (*Dioscorea bulbifera*); Buçu (*Manicaria saccifera*); Bacabi (*Oenocarpus mapora*); Alecrim (*Rosmarinus officinalis*)	4	1.49	0.07
Vinagreira (*Hibiscus sabdariffa*); Puruí (*Alibertia sorbilis*); Penicilina (*Gomphrena arborescens*); Pau mulato (*Calycophyllum spruceanum*); Palha preta (babaçu) (*Attalea speciosa*); Mututi (*Pterocarpus rohrii*); Japana roxa (*Eupatorium triplinerve*); Ingá peludo (*Inga vulpina*); Ingá macaco (*Inga sessilis*); Fruta do conde (*Annona montana*); Elixir paregórico (*Ocimum selloi*); Cumaru de planta - not identified; Cuia (*Crescentia cujete*); Carapanauba (*Aspidosperma nitidum*); Cabi (*Banisteria caapi*); Buiuçú (*Ormosia coutinhoi*); Batata rainha (*Ipomoea batatas* var. Rainha); Achuá (chuá) (*Sacoglottis guyanensis*); Abiurana (*Pouteria pachycarpa*); Abiu (*Pouteria caimito*)	3	1.12	0.05
Tiririca (*Cyperus rotundus*); Quinarana (*Cinchona calisaya*); Pripioca (*Cyperus articulatus*); Pimenta malagueta (*Capsicum frutescens*); Pau doce (*Houvenia dulcis*); Pau chave (*Simarouba versicolor*); Muru muru (*Astrocaryum murumuru*); Molongó (*Erythrina falcata*); Maracujá peroba (*Passiflora quadrangularis*); Macucu (oiti) (*Licania tomentosa*); Maçaranduba (*Manilkara huberi*); Lima (*Citrus limettiodes*); Larém (aralém) - not identified; Laranja da terra (*Citrus aurantium*); Lacre (*Vismia guianensis*); Jacareúba (*Calophyllum brasiliense*); Inajá (*Maximiliana maripa*); Faveira (*Vicia faba*); Cubiu (*Solanum sessiliflorum*); Cipó morceguinho (unha de morcego) (*Bignonia exoleta*); Cipó curimbó (*Tanaecium nocturnum*); Carambola (*Averrhoa carambola*); Caju do mato (*Curatella americana*); Cachorro pelado (*Euphorbia tirucalli*); Brasileirinho (*Caladium bicolor*); Bolota - not identified; Batatão (*Ipomoea purga*); Bacuri azedo (*Garcinia madruno*); Bacuri açu (*Platonia grandiflora*); Assacu (*Hura crepitans*); Araticum (*Annona glabra*); Alfazema (*Hyptis 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.

Discussion

The Tapereira *quilombola* community stood out with the largest number of informants, as it has historically accumulated an inheritance in the use of plant resources based on the knowledge inherited from their African ancestors [29]. This community contributed to the eminence of Cajari river regarding the greater number of informants. The communities of Conceição do Muriacá and Foz do Ajuruxi are the most populous within the unit. Both are located in the inlets of the Muriacá and Cajari rivers, and Ajuruxi and Amazonas, respectively. They have a larger population contingent, serving as a market center for for products and people, with villages where schools, stores and health units are located, standing out among the other communities.

The number of informants per community is directly related to citations of plant species. The Tapereira community resulted in the highest number of species citations. However, the best citation average was generated in the Santana community as the informants in this community are familiar with a greater number of species of food and medicinal plants.

About the ethnobotanical knowledge, although there are many elderly people, these results differ from other studies found in the literature in which they show that ethnobotanical knowledge about NCFP and medicinal plants is concentraded in the elderly [30, 37, 38]. It is worth mentioning that the average age in the state of Amapá is 73.9 years [39], which is 20% higher than the average age of the informants 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 [40], denominated Cultural Erosion by some authors [41]. However, it was possible to observe through the reports by the informants 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 women develop better knowledge about these plant species, as many of them are traditional cooks and some are midwives, who are responsible for preparing food and for the health of the family, while men are more explorers of the forest, involved in hunting and fishing, as observed in other works carried out with traditional communities [42, 43].

As for the category of use, ¼ of these species have a dual purpose (food and medicinal use). However, almost half of them are for medical use and the rest are for food use only, as observed in other studies conducted in Brazil [44], and in other countries in South America, Europe and Oceania [45, 46]. 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 [47, 48].

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 [32]. 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 [49].

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 conservation unit 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 [50]. 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 [32, 49].

It is observed a relationship between the propagation environment and the growth habit of these species, since among those found in the present study, 127 are of tree growth and 83 are herbaceous. The rest are distributed among those with shrub, climbing and creeping growth. Tree species propagate in upland forests, and herbaceous plants are grown in hanging gardens. Regarding the stage of domestication, the tree species are perennial native trees, found in the forest and riparian forests, and their food or medicinal resource are obtained spontaneously through collection. The other species are cultivated and grown in the suspended and cleared gardens, being species of annual and semi-perennial cycles. In the orchards are found the cultivated and spontaneous species.

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) [12]. 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 [51]. The species located in the forest are seasonal, which makes them to be obtained, making them less required [51].

According to the informants' report, the number of NCFP species and medicinal plants is decreasing and are found with more difficulties, mainly forest species with wood and food value, such as *E. uchi*, *C. villosum*, *B. excelsa*, *T. roseoalba*) 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 [52]. This situation was observed in this study, since the forest provides many fruit food species, however they are only available during the Amazonian winter (February to June). After this period, the main food species are grown in the family farms (particularly 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 [12, 49], together with cassava flour (*M. esculenta*) and fish [53, 54]. Also, the consumption of vegetables is low among this population group, as highlighted by Adams, Murrieta, Sanches [55].

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 (*J. pectoralis stenophylla*), *melhoral* (*J. pectoralis* Jacq.), Ampicillin (*A. tenella*), penicillin (*G. arborescens*), terramycin (*A. brasiliana*), cybalene (*A. vulgaris*), paregoric elixir (*O. selloi*), insulin (*C. sicyoides*), large vique (*M. spicata*) and small vique (*M. arvensis*). 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 [56]. 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 [56, 57]. 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. The boiling process takes around 1 hour. After boiling, it is allowed to cool to room temperature overnight and then it is consumed. It is usually 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. It has been even carried out by community members in the wake of a conservation unit in the Caatinga [56, 59].

Tree bark sauce: It is widely used for stomachache, diarrhea and ringworm (in this case, the use does not occur through ingestion, but by 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. It should be observed that the bark must be immediately removed from the plant and immersed in water, remaining long enough to color the water using the plant's natural dye, and then it is ingested [36].

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. This method is similar to the *garrafada*, the difference is that the fermentation of the beverage occurs in alcohol, while the fermentation takes place in water, under boiling or at room temperature.

Bath (maceration): It is used mainly against flu and cold. They consist of mashing the leaves of the species indicated for this discomfort 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, with the leaves mashed using the hands, boil them for approximately one hour, leave it in the dew overnight, and use it the next day. It is a form widely used in several regions in Brazil [36, 59].

Teas: It is used for medicinal and food purposes. Preparation: leaves or peels are immersed in water during boiling. Generally, medicinal teas are prepared with leaves of various species indicated for a certain discomfort, and in food teas, with one species. This is the form of use most practiced by rural populations, also known as decoction [56].

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 [56, 59].

Juice of the leaves and seeds: It consists of grinding the leaf or seed of the species 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, etc. This form of use of medicinal plants was observed in riverside communities in the municipality of Manacapuru, state of Amazonas, Brazil [32].

Tree milk: It is extracted from the stem of forest species for food and medicinal purposes [60]. 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). It is noteworthy the use of this resource as medicinal to treat muscle strain [61].

Oil: It is used for food and medicinal purposes. It is generally used as a condiment in the preparation of food and frying. In medicinal use, it is ingested both fresh and in bottles. The oils are extracted from both the stem of forest species and fruits and seeds. Its use is quite common in popular medicine in the Brazilian Amazon [62].

Plant sap: It can be either the stem sap (*M. linifera*, *Saccharum* spp. L.), or the leaves (*C. pachytachya*). They are collected from the plant species and consumed immediately after it. It is indicated for problems in the spleen, gastritis, malaise and indisposition in the body [62].

In this regard, the results of the present study show that in terms of wild plants, the traditional populations of the Rio Cajari Extractive Reserve still maintain their food base using the available forest resources, the NCFP, which are obtained through collection and cultivation.

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 socio-cultural 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, despite the observation that such interest is decreasing and 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 informants 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
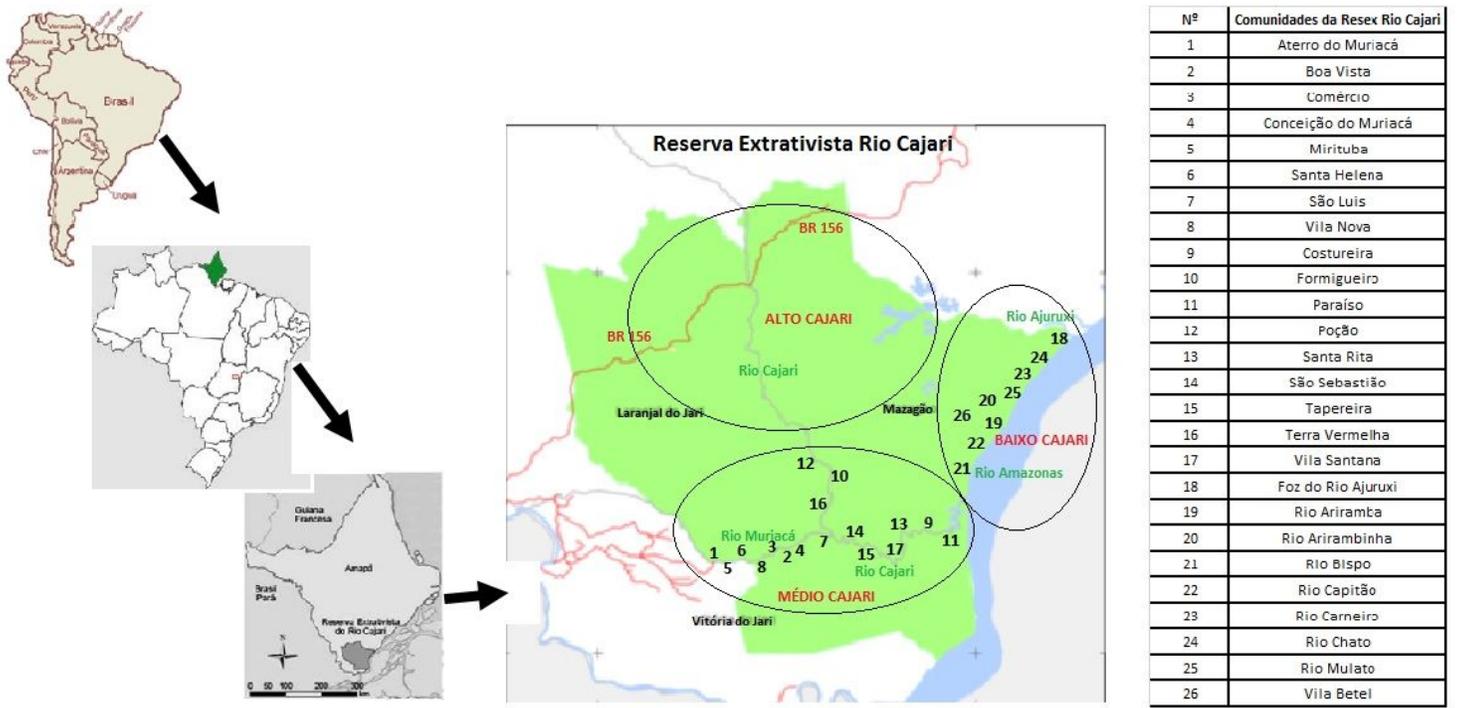
Figure 1

Study area site, Cajari River Extractive Reserve. Municipalities of Mazagão, Laranjal do Jari and Vitória do Jari, State of Amapá, Brazil.