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Ethnobotanical knowledge on non-conventional food plants and medicinal plants in Extractivist Reserve in the Brazilian Amazon

[Conocimiento etnobotánico sobre plantas alimenticias no convencionales y plantas medicinales en una Reserva Extractivista en la Amazonía Brasileña]

Galdino X. de Paula Filho[1], Adivair F. Ribeiro[1], Alcidete F. Moraes[1], Willis F. Penha[1], Wardsson L. Borges[2] & Ricardo H. S. Santos[3]

[1]Federal University of Amapá, Campus Mazagão, Mazagão, Amapá, Brazil.
[2]Brazilian Agricultural Research Corporation, Macapá, Amapá, Brazil.
[3]Federal University of Viçosa, Department of Agronomy, Viçosa, Minas Gerais, Brazil

Reviewed by:
Alfred Maroyi
University of Fort Hare
South Africa

Julio Vilaboa
Universidad Politécnica de Huatusco
Mexico

Correspondence:
Galdino Xavier DE PAULA FILHO
galdinoxavier@yahoo.com.br

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Abstract: Information on the knowledge 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 food sovereignty of these groups. This study was conducted using semi-structured interviews applied to local respondents. A total of 269 species of both non-conventional food plants and medicinal plants were identified, distributed in 83 botanical families and 198 genera. The Arecaceae and Lamiaceae families had the highest species richness (11 and 7, 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. In the environment in which these families are found, these species become the only food and medicinal resources available.

Keywords: Ethnobotany; Food safety; Homemade medicine; Traditional populations; Natural resources.

Resumen: La información sobre los saberes y formas de uso de las plantas alimenticias y medicinales por parte de las poblaciones tradicionales, agricultores familiares e indígenas brasileños en la Amazonía es fundamental para garantizar la soberanía alimentaria de estos grupos. Este estudio se realizó utilizando entrevistas semiestructuradas aplicadas a encuestados locales. Se identificaron un total de 269 especies tanto de plantas alimenticias no convencionales como de plantas medicinales, distribuidas en 83 familias botánicas y 198 géneros. Las familias Arecaceae y Lamiaceae tuvieron la mayor riqueza de especies (11 y 7, respectivamente). Los índices de diversidad de Shannon-Wiener (H') y Pielou (J') fueron considerados altos (5,02 y 0,9, respectivamente) en comparación con otros trabajos etnobotánicos. En el ambiente en que se encuentran estas familias, estas especies se convierten en los únicos recursos alimenticios y medicinales disponibles.

Palabras clave: Etnobotánica; Seguridad alimenticia; medicina casera; Poblaciones tradicionales; Recursos naturales.

INTRODUCTION

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 49.3% of the national territory (Paiva *et al.*, 2020). 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 the available natural resources, especially non-conventional food plants and medicinal plants (Newton *et al.*, 2011; Silva & Simonian, 2015).

It is a region of low demographic density, cut by countless rivers and lakes (Brasil, 2010; Latrubesse *et al.*, 2010), 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, whose estimated value of deforestation last year for this region was 11,568 km^2 (Barona *et al.*, 2020; MCTI-BRAZIL, 2022). The population has a low level of education (only the initial grades of the elementary level) besides being located in isolated places with difficult access and far from urban centers (Andrade *et al.*, 2011; Guedes *et al.*, 2012), where people find in the forest resources, especially non-conventional and medicinal food plants, the main food and medicinal resources, respectively (Oliveira *et al.*, 2012; Santos *et al.*, 2012).

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 (Couly & Sist, 2013). However, in the course of the last few fourty years, mainly in rainforest regions, due to an accelerated process of exploration of these areas, traditional knowledge about wild foods has been lost (Broegaard *et al.*, 2017), 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 (Oliveira *et al.*, 2012, Oliveira *et al.*, 2015).

The concept of unconventional food plants (NCFP) is still under construction, there is controversy over the level of conventionality of the same. It happens that, some species have parts that are used in a conventional way, but others are used in an unconventional way, as food by traditional populations, like the *Musa* spp. (Musaceae) where the fruit is grown commercially, and the "banana navel" (pendulum that forms below the last bunch of banana. Cone-shaped and purple in color) is food consumed by rural population in the Amazon (Tagliapietra *et al.*, 2021).

In the present study will be defined, according to Kinupp & Lorenzi (2014), as non-conventional food plants the plant species widely used as food by rural populations. Those that spread spontaneously, and they have a broad relationship with the food security of many families that consume them. 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. While medicinal plants are considered the 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 (Lorenzi & Matos, 2008). The hypothesis that guides the present study is that there is a high diversity of these species in rural areas of the Brazilian Amazon, and that they are widely used by the local population for food and medicinal purposes.

In addition to the focus in 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 (Oliveira *et al.*, 2012). It should be noted that, throughout the legal Amazon, around 650 plant species used for medicinal purposes have already been identified (Cechinel Filho & Yunes, 1998). 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.

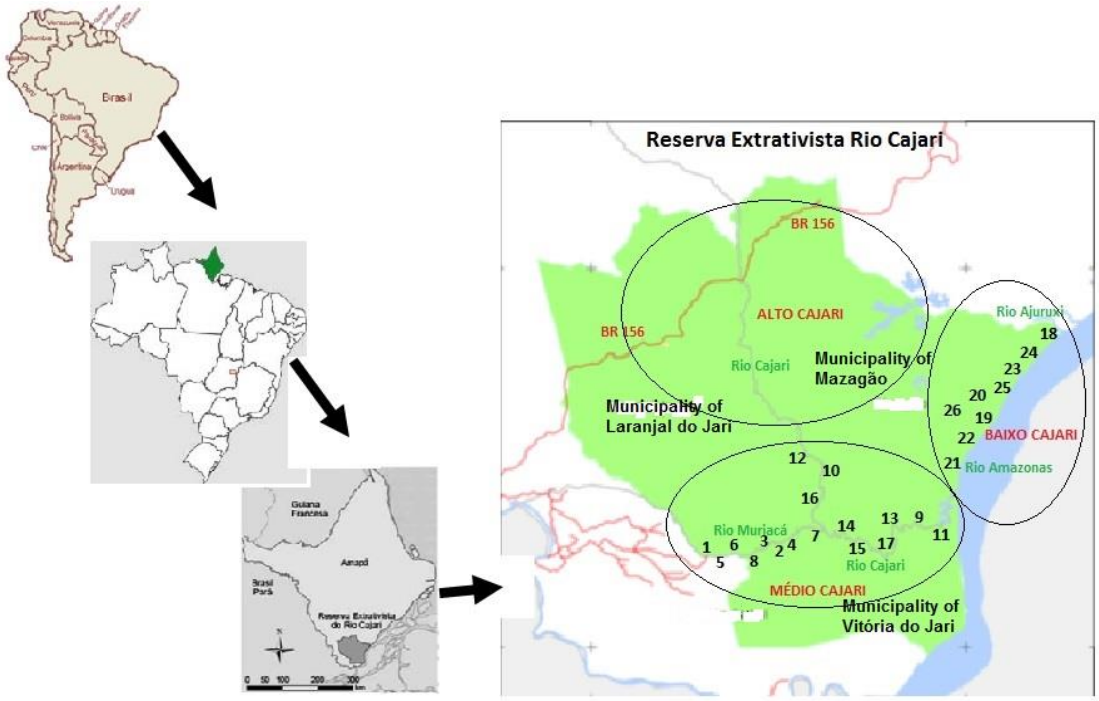
Considering these aspects, the present study investigated the diversity, knowledge and ways of

using non-conventional food plants and medicinal plants by traditional populations (collectors, family farmers, agro-collectors, *quilombolas* (Brazilians descended from African slaves. Recognized and protected by law), 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 was carried out in a sustainable use conservation unit, the Rio Cajari Extractive Reserve (01º05'10''S e 51º46'36''W) (Figure No. 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 (Brasil, 1990). 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.



Nº	Comunidades da Resex Rio Cajari
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

Figure No. 1
Study area site, Cajari River Extractive Reserve
Municipalities of Mazagão, Laranjal do Jari and Vitória do Jari, State of Amapá, Brazil (Paiva, 2009; IEF-Amapá, 2013. Adaptações e elaboração do autor).

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 (Freitas, 2013). 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 local climate is humid tropical, with little climatic variations. Annual precipitation is around 2,500 mm and the average annual temperature ranges from 25 to 30ºC. As for the local hydrography, the unit is located on the left bank of the Amazon River. In its interior, the basins of the Cajari and Ajuruxi rivers stand out, as well as other rivers and streams. The vegetation is formed by an extensive area of Terra Firme Forest, whose altitude is around 150 m, and the Várzea Forest, those at lower altitudes, along rivers and streams (Vilhena *et al.*, 2018).

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 (Etkin, 1993).

During the home visits, we sought to identify people recognized as owners of the ethnobotanical knowledge about medicinal and food plants. 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 (Albuquerque & Hanazaki, 2010).

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, via Brazil Platform (Authorization number for carrying out the study: 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 (Brasil, 2015).

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.

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: i) Association of Agroextractive Producers of the Middle and Low Cajari (ASS. CAJARI); ii) 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); and iii) Association of Agroextractive Residents of the Cajari River (AMAEX-CA).

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 (Pretty *et al.*, 1995).

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.

Data related to the diversity of plants used for food and medicinal purposes were collected, the common name of these species, your purposes of use, the environment in which they develop, beyond your growth habit, and also if they are submitted to some

cultivation management, or collected directly from wild environments. The ways in which these plant species are prepared for consumption were investigated, and in the case of those for medicinal use, for which diseases they are indicated. Finally, the development cycle and perenniality of the species was investigated.

Plant species collection and identification

The collections of plant species were performed in wild environments, with the participation of the informant, using the technique known as "guided tour" (Albuquerque & Lucena, 2004), in order to obtain the identification and more accurate information about the indicated species, following the methodological standards defined for ethnobotanical studies (Ming, 1996).

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 Amapa State (HAMAB), specialized bibliographies (Lorenzi & Matos, 2008; Kinupp & Lorenzi, 2014) and consultation with botanical specialists. Subsequently, the boards with the dehydrated plants 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') (Magurran, 1988; Begossi, 1996). 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'):

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

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) (Rossato *et al.*, 1999). This index is used to assess how well the species are known and used by the local population (Lucena *et al.*, 2013). The IVU was obtained using the following equation:

$$IVU = \sum U / n$$

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 (Begossi, 1996). 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) (Conde *et al.*, 2017). 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 (Barreira *et al.*, 2015), in addition to the forms of use and therapeutic indications in the case of medicinal plants (Moreira & Guarim-Neto, 2009).

A classification was made regarding the domestication status of these species to verify whether they are cultivated, or whether they propagate spontaneously (Barreira *et al.*, 2015), 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:
Scielo (http://www.scielo.org/php/index.php),
Scopus (http://www.scopus.com/home.url)
WoS (https://clarivate.com/products/web-of-science)

RESULTS

Social-cultural characteristics

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, are shown in Table No. 1.

Table No. 1
Communities and respondents about food and medicinal plants in the Cajari River Extractive Reserve, Amazon, Brazil

Communities	Respondents / community	Citations / community	Average of citations / community
Aterro do Muriacá	3	170	56,7
Boa Vista	2	89	44,5
Comércio	1	44	44
Conceição do Muriacá	6	329	54,8
Morituba	1	35	35
Santa Helena	1	42	42
São Luis	1	45	45
Vila Nova	1	49	49
Costureira	1	39	39
Formigueiro	2	97	48,5
Paraíso	2	127	63,5
Poção	2	76	38
Santa Rita	3	144	48
São Sebastião	3	141	47
Tapereira	7	357	51
Terra Vermelha	1	66	66
Vila Santana	2	168	84
Foz do Rio Ajuruxi	4	268	67
Rio Ariramba	1	38	38
Rio Arirambinha	2	76	38
Rio Bispo	1	53	53
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	**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 (Table No. 2), and with the following social occupations: farmers, extractivists (ethnic groups residing in the forest; they collect plants, slaughter wild animals and fish for their survival. They have a peculiar way of life and their territories are protected by law), artisans, builders, fishermen, chestnut collectors, rubber tappers, carpenters, shamans and midwives.

Table No. 2
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.

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 *Eryngium foetidum* (Apiaceae) and *Ipomoea 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 No. 3).

Table No. 3
Ethnobotanical information about 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 and consumption	Medicinal indications	Voucher number
Acanthaceae	*Justicia pectoralis* Jacq. var. *stenophylla* Leonard	Anador	M	Vg	He	Ingestion of leaf tea	Headache and stomachache	INPA 20639
	Justicia pectoralis Jacq.	Melhoral	M	Vg	He	Ingestion of leaf tea	Headache	INPA 106185
	Justicia acuminatissima (Miq.) Bremek	Saratudo	M	Vg, O	He	Ingestion of leaf tea	Tranquilizer, fever and measles	INPA 223272
Adoxaceae	*Sambucus australis* Cham. & Schltdl.	Sabugueiro	M	Vg, O	He	Ingestion of leaf tea	Inflammation	INPA 208304
Amaranthaceae	*Alternanthera tenella* Colla	Ampicilina de planta	M	Vg	He	Ingestion of leaf tea with *C. spicatus*, *P. niruri* and *A. muricata* leaves	Stomachache; urinary tract infection	INPA 71449
	Chenopodium ambrosioides L.	Mastruz	M	Vg, O	He	Ingestion of leaf tea with *E. foetidum* and *C. papaya* roots	Worm	INPA 277507

	Gomphrena arborescens L.f.	Penicilina	M	Vg	He	Leaf tea with *C. spicatus*, *P. niruri* and *A. muricata* leaves	Urinary tract infection	INPA 81315
	Alternanthera brasiliana (L.) Kuntze	Terramicina	M	Vg	He	Ingestion of leaf tea	Headache	INPA 220460
Anacardiaceae	*Anacardium occidentale* L.	Caju	Mf	O	Tr	M: Ingestion of tree bark tea - F: fresh fruit	Diarrhea	CEN 65224
	Anacardium giganteum L.	Caju açu	Mf	Fo	Tr	M: Ingestion of tree bark tea - F: fresh fruit	Diarrhea	INPA 61226
	Curatella americana L.	Caju do mato	F	Fo	Tr	Fresh fruit		HAMAB 9415
	Schinus terebinthifolia Raddi	Ceru	Mf	Fo	Tr	M: Ingestion of tree bark tea - F: almond	Gastritis; worm	INPA 139911
	Mangifera indica L.	Manga	Mf	O	Tr	M: Ingestion of 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	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	INPA 141180
Annonaceae	*Annona glabra* L.	Araticum	F	Fo	Tr	Fresh fruit		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: eat fresh fruit and drink juice	Sore throat	INPA 2181
	Annona montana Macfad.	Conde	F	O	Tr	Fresh fruit		INPA 246115
	Annona muricata L.	Graviola	Mf	O	Tr	M: Ingestion of leaf tea with *A. tenella* leaves, *P. niruri* and *C. spicatus* / F: eat fresh fruit and drink juice	Aches over the body; urinary tract infection	INPA 75580
Apiaceae	*Arracacia xanthorriza* Bancr.	Batata crioula	F	Ff	Cr	Cooked rhizome		BOTU 25096
	Eryngium foetidum L.	Chicória	Mf	Vg,	He	M: tea of the	Worm	INPA

				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: Ingestion of leaf tea; grind the leaf with *C. frutescens* leaves and *P. nigrum* seed / F: leaves cooked with other foods	Morning seasickness; labor pain	MFS 006777
Apocynaceae	*Parahancornia fasciculata* (Poir) Benoist.	Amapá amargo	M	Fo	Tr	Drinking tree milk	Ulcer and gastritis	INPA 149037
	Allamanda cathartica L.	Buiuçú	Mf	Fo	Sh	M: put tree bark it in the water until it gets colored and drink it / F: fresh fruit	"evil eye"	INPA 140000
	Aspidosperma nitidum L.	Carapanauba	M	Fo	Tr	Beverage of the bark of the tree	Indisposition in the body	HAMAB 1341
	Lacmellea arborescens (M. Arq.)	Guajaraí	F	Fo	Tr	Fresh fruit		INPA 257566
	Himatanthus drasticus (Mart.)	Sucuuba	M	Fo	Tr	Drinking tree milk	Indisposition in the body	INPA 102608
Araceae	*Montrichardia linifera* Schott.	Aningueira	M	Fo	Tr	Drink the sap from the stem	Swelling in the spleen (splenomegaly)	INPA 1442
	Caladium bicolor L.	Brasileirinho	M	Vg	He	Ingestion of leaf tea	Hypertension	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.)	INPA 40853
	Pistia stratiotes L.	Mururé	M	Fo	Tr	Drinking tree milk	Inflammation	INPA 108940
	Philodendron martianum Engl.	Pacapeá	M	Fo	Tr	Pour the tree milk in the aching tooth	Toothache	IAN 23267
	Xanthosoma taioba E.G. Gonç.	Tajoba	F	Ff, O	He	Leaf, stem and rhizome cooked together with other foods		EAFM 11025
Arecaceae	*Euterpe oleracea* Mart.	Açaí	Mf	O, Rf	Tr	M: tea with the roots, with *C. citratus* root, dry *C. nucifera*	Hepatitis; malaise during pregnancy; bathe woman	INPA 50244

					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	after childbirth	
Oenocarpus bacaba Mart.	Bacaba	Mf	Fo, O	Tr	M: tea with the roots / F: juice	Worm	INPA 166040
Oenocarpus mapora Karsten	Bacabi	F	Fo	Tr	Juice		INPA 237380
Manicaria saccifera Gaertn.	Buçu	Mf	Fo	Tr	M: drink *C. nucifera* water / F: fresh fruit	Gastritis	INPA 169645
Mauritiella armata L.	Caranã	F	Rf	Tr	F: fresh fruit		INPA 45076
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	INPA 224686
Syagrus romanzoffiana (Cham.) Glassman	Coquinho	M	Fo	Tr	Drink the fruit water	Malaria	UB 4332
Elaeis guineensis Jacq.	Dendê	M	Fo	Tr	Beverage of root with *C. langsdorfii* oil and honey	Gastritis	IAN 44216

	Maximiliana maripa L.	Inajá	F	Fo	Tr	Fresh fruit		INPA 142748
	Bactris acanthocarpa Mart.	Marajá	F	Fo	Sh	Fresh fruit		INPA 163347
	Mauritia flexuosa L.f.	Miriti	F	Rf	Tr	Fresh fruit		INPA 170030
	Acrocomia aculeata (Jacq.) Lodd. Ex Mart.	Mucajá	Mf	Fo	Tr	M: tea with the roots / F: fresh fruit	Urinary tract infection	INPA 187839
	Astrocaryum murumuru Mart.	Muru muru	Mf	Fo	Tr	M: Pour almond oil over the aching tooth / F: fresh fruit	Toothache	INPA 172726
	Attalea phalerata Mart. Ex Spreng.	Ouricuri	F	Fo	Tr	Fresh fruit		IAN 181411
	*Attalea speciosa M*art. Ex Spreng	Palha preta (babaçu)	F	Rf	Tr	Fresh fruit		IAN 158491
	Oenocarpus bataua Mart.	Patauá	F	Fo	Tr	Suco		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	INPA 70450
	Bactris gasipaes (kunth)	Pupunha	Mf	O	Tr	M: massage the body with the fruit oil / F: boiled fruit	Aches over the body	INPA 206550
	Astrocaryum aculeatum G. Mey.	Tucumã	Mf	Rf	Tr	M: wash the hair with the seed water / F: fresh fruit	Loss of hair	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	INPA 200441
	Aristolochia cymbifera Mart. & Zucc.	Urubu-caá	M	Fo	Cl	Tea from the fruit and bark of the tree	Pain (stomachache, headache)	CEN 55930
Asclepiadaceae	*Elcomarrhiza amylacea* Barb. Rod.	Cumacá	M	Fo	He	Pour plant milk over the eye	Sight problems	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. pinnatum*	Swelling, inflammation, low blood pressure; gastritis	INPA 268044

						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	INPA 106256
Asteraceae	*Gymnanthemum amygdalinum* (Delie)	Boldo africano	M	Vg	He	Ingestion of leaf tea, with *C. rotundus* and *F. chica* leaves	Malaria, diabetes and cirrhosis	IAN 192804
	Matricaria recutita L.	Camomila	M	Vg	He	Ingestion of leaf tea	Tranquilizer	UB 25796
	Tanacetum vulgare L.	Catinga de mulata	M	Vg	He	Ingestion of leaf tea. Leaf mixture with alcohol, leaves from *R. officinalis*, *R. graveolens* and *S. orientale* seed	Headache; diarrhea, stroke	EAFM 11721
	Artemisia vulgaris L.	Cibalena	M	Vg	He	Ingestion of leaf tea	cramps, hemorrhage and fever	INPA 195375
	Mikania cordifolia (L.f.) Willd.	Cipó sucuriju	M	Fo	Sh	Beverage of the bark of the vine	Gastritis	INPA 11390
	Tagetes minuta L.	Cravo de planta	M	Vg	He	Ingestion of leaf bath	Flu and cold	INPA 208085
	Clibadium surinamense Linn.	Cunambi	M	Ff	He	Seed tea	Pneumonia	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	INPA 234141
	Eupatorium ayapana Vent.	Japana branca	M	Vg	He	Ingestion of leaf tea	Headache	JPB 40991
	Eupatorium triplinerve Vahl.	Japana roxa	M	Vg	He	Ingestion of leaf tea	Headache	IAN 182445
	Chaptalia nutans (L.) Pol.	Língua de vaca	M	O	He	Ingestion of leaf tea	Hemorrhage	INPA 139919

Basellaceae	*Basella alba* L.	Couve manteiga	F	Vg	He	Sautéed with other foods		INPA 202567
Bignoniaceae	*Tabebuia caraiba* (Mart.)	Cariobeira	M	Fo	Tr	Ingestion of tree bark tea	Inflammation	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	INPA 177754
	Tanaecium nocturnum (Barb. Rodr.)	Cipó curimbó	M	Fo	Cl	Leaf and bark tea	Protect against "evil eye"	IAN 134799
	Bignonia exoleta Vell.	Cipó morceguinho (unha de morcego)	M	Fo	Cl	Stem tea	Headache and stomachache	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"	INPA 262772
	Fridericia chica (Humb. & Bonpl.)	Pariri (crajiru, bariri)	M	Vg	He	Ingestion of 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	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	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	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	INPA 21589
Burseraceae	*Protium heptaphyllum* (Aubl.) Marchand	Breu branco	M	Fo	Tr	Squeeze the green bark and drink the juice	Amoeba, diarrhea	INPA 48621
Cactaceae	*Hylocereus undatus* (Haw.) Britton & Rosa	Pitaíca	M	Fo	Tr	Spread plant milk on the cut	Stop cutting blood, wound	IAN 143972

						or wound. In relation to hemorrhage, drink the milk	and bleeding	
Calophyllaceae	*Calophyllum brasiliense* Cambess.	Jacareúba	M	Fo	Tr	Put tree bark it in the water until it gets colored and drink it	Diabetes	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	INPA 1104
Caryocaraceae	*Caryocar villosum* (Aubl.) Pers.	Pequiá	F	Fo	Tr	Boiled fruit		INPA 20557
Caryophyllaceae	*Drymaria cordata* (L.) Wild.	Agrião selvagem	F	Vg	He	Leaves cooked with other foods		INPA 216554
Chrysobalanaceae	*Chrysobalanus icaco* L.	Juru	F	Rf	Tr	Fresh fruit		INPA 13451
	Licania tomentosa (Benth.) Fritsch	Macucu (oiti)	F	Fo	Tr	Fresh fruit		INPA 44983
	Couepia subcordata Benth.	Marí marí	F	Fo	Tr	Fresh fruit		INPA 108789
Clusiaceae	*Symphonia globulifera* L. f.	Anani	M	Fo	Tr	Use milk to clog the area of the strain	Muscle strain	INPA 175947
	Platonia insignis Mart.	Bacuri	F	Fo, O	Tr	Fresh fruit and juice		INPA 23852
	Platonia grandiflora Plach.	Bacuri açu	F	Fo	Tr	Fresh fruit and juice		NYBG 2730667
	Garcinia madruno (Kunth) Hammel	Bacuri azedo	F	Fo	Tr	Fresh fruit and juice		INPA 92041
	Garcinia brasiliensis Mart.	Bacuri liso (bacurizinho)	F	Fo	Tr	Fresh fruit and juice		INPA 98907
	Vismia guianensis (Aubl.) Pers.	Lacre	M	Fo	Tr	Squeeze the juice from the leaves on the affected area	Mycosis and skin irritation	INPA 178820
Convolvulaceaea	*Ipomoea batatas* (L.)	Batata doce	F	Ff, O	Cr	Cooked		INPA 3882
	Ipomoea batatas (L.) *var.* Rainha	Batata rainha	F	Ff, O	Cr	Cooked		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	MBM 214631
Costaceae	*Costus spicatus* (Jacq.)	Cana ficha	M	O	Sh	Leaf and stem	Urinary tract	INPA

	Sw.					tea with *A. tenella* leaves, of *P. niruri* and of *A. muricata*; beverage of *V. surinamensis* bark with "mangangá" *M. acuminata*	infection; uterine infection	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	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	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	INPA 224139
	Cucurbita pepo L.	Jerimum (abóbora)	Mf	Ff, O	Cr	M: stem tea / F: fruit cooked with other foods	Rheumatism	INPA 235420
	Cucumis anguria L.	Maxixe	Mf	Ff, O	Cr	Fruit cooked with other foods (M/F)	Cholesterol	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	INPA 56793
	Sicana odorifera (Vell.) Naudin	Melão caipira	F	Ff, O	Cl	Fresh fruit and juice		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	INPA 21149
	Cyperus rotundus L.	Tiririca	M	Fo	He	Ingestion of leaf tea, with *P. barbatus* and from *F. chica* leaves	Diabetes	INPA 2202
Dioscoreaceae	*Dioscorea dodecaneura* Vell.	Cará branco	F	Ff, O	Cl	Cooked rhizome		INPA 192411
	Dioscorea bulbifera L.	Cará do ar	F	Ff, O	Cl	Boiled fruit		MFS 8146

	Dioscorea altissima Lam.	Cará mão de onça	F	Ff, O	Cl	Cooked rhizome		INPA 200524
	Dioscorea trifida L.f.	Cará roxo	F	Ff, O	Cl	Cooked rhizome		INPA 234412
Euphorbiaceae	*Hura crepitans* L.	Assacu	M	Fo	Tr	Drink the tree milk diluted in water	Combat and avoid cancer	INPAw 9850
	Euphorbia tirucalli L.	Cachorro pelado	M	Ff, O	He	Drink the tree milk diluted in water	Combat and avoid cancer	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	INPA 39142
	Croton calycularis Huber	Esturaque	M	O	He	Syrup with honey, *D. odorata* seed with *P. amboinicus* leaves	Flu and cold	INPAw 1877
	Manihot esculenta Crantz.	Macaxeira	F	Ff	Sh	Roots cooked with other foods		INPA 17931
	Sapium taburu Ule	Murupita	M	Fo	Tr	Spread the tree milk over the affected area	Stingray sting (*Brycon* sp.)	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	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	EAC 160
	Jatropha gossypiifolia L.	Pião roxo	M	O	Sh	Tea and bath of the leaves,	Migraine; wound healing;	INPA 187526

						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	flu and cold; "evil eye"	
	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	INPA 54796
Fabaceae – caesalpinioideae	*Vouacapoua americana* Aubl.	Acapu	M	Fo	Tr	Ingestion of tree bark tea	Amoeba	INPA 266591
	Copaifera langsdorfii Desf.	Copaíba	M	Fo	Tr	Beverage of the tree oil with *E. guineensis* roots and honey	Gastritis	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	INPA 143023
	Caesalpinia ferrea var. *cearensis* Huber.	Jucá	M	Fo	Tr	Ingestion of leaf tea	Stomachache	IAN 11254
	Martiodendron elatum (Ducke) Gleason	Jutaicica	M	Fo	Tr	Ingestion of tree bark tea	Worm	INPA 2582
	Mora (Ducke)	Pracuuba	M	Fo	Tr	Ingestion of tree bark tea	Diarrhea	INPA 66512
	Senna alata (L.) Roxb.	Mata-pasto	M	Rf	Sh	Flower tea	Worm	INPA 192128
	Tachigalia paniculata Aublet	Taxizeiro	M	Fo	Tr	Beverage of the bark of the tree	Aches over the body	INPAw 598
	Tamarindus indica L.	Tamarindo	F	Fo	Tr	Fresh fruit		INPA 40979
Fabaceae – cercideae	*Bauhinia rutilans* Spruce ex Benth.	Escada de jabuti	M	Fo	Cl	Tea or beverage of vine	Aches over the body	HAMAB 9721
	Bauhinia splendens Kunth	Macaco cipó	M	Fo	Cl	Use milk to	Muscle strain	INPA

						clog the area of the strain		88854
Fabaceae – faboideae	*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	INPA 171369
	Vicia faba L.	Faveira	M	Fo	Tr	Squeeze the seed oil into the skin with ringworm	Ringworm	MAR 1293
	Erythrina falcata Benth.	Molongó	Mf	Fo	Tr	M: spread the tree milk on the affected area / F: fresh fruit	Eliminate the skin bug	UB 141887
	Pterocarpus rohrii Vahl	Mututi	M	Fo	Tr	Tea; put it in the water until it gets colored and drink it	Anti-inflammatory	INPA 3358
	Canavalia boliviana Piper.	Papo de mutum	F	Fo	Tr	Fresh fruit		EAC 24200
Fabaceae – mimosoideae	*Pentaclethra macroloba* Wild. Kuntze	Pracaxi	M	Fo	Tr	Apply the oil over the infection	Skin infection	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	INPA 220296
	Inga edulis Mart.	Ingá cipó	F	Rf	Tr	Fresh fruit		INPA 221912
	Inga sessilis (Vell.) Mart.	Ingá macaco	F	Fo	Tr	Fresh fruit		VIC 52305
	Inga vulpina Benth.	Ingá peludo	F	Fo	Tr	Fresh fruit		INPA 200956
	Inga cinnamomea Spruce Ex Benth.	Ingá pracuúba	F	Fo	Tr	Fresh fruit		INPA 10285
Fabaceae – papilionoideae	*Ateleia glazioveana* Baillon	Timbó	M	O	He	Rub the leaf milk over the distended area	Muscle strain	INPA 2626
Goupiaceae	*Goupia glabra* Aubl.	Cupiuba	M	Fo	Tr	Drink the tree milk	Diabetes	INPA 68431
Hippocrateaceae	*Salacia* sp.	Gogó de guariba	F	Fo	Sh	Fresh fruit		INPA 188715
Humiriaceae	*Sacoglottis guianensis* Benth.	Achuá (chuá)	F	Fo	Tr	Fresh fruit		INPA 264871
	Endopleura uchi (Huber) Cuatrec.	Uxi	Mf	Fo	Tr	M: ingestion of tree bark tea /	Diarrhea	INPA 125538

						F: fresh fruit		
	Sacoglottis amazonica Benth.	Uxirana	F	Fo	Tr	Fresh fruit		INPA 149064
Icacinaceae	*Poraqueiba sericea* Tul	Marí	F	Fo	Tr	Fresh fruit		INPA 211642
Iridaceae	*Eleutherine plicata* Herb.	Marupá (marupazinho)	M	Vg	He	Root tea; leaf tea, with *P. pilosa* leaves	Worm; diarrhea	INPA 106195
Lamiaceae	*Rosmarinus officinalis* L.	Alecrim	Mf	Vg	He	M: ingestion of 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	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	INPA 106235
	Hyptis suaveolens (L.) Poit.	Alfazema	M	Vg	He	Ingestion of leaf tea, with leaves *R. officinalis* and *O. selloi*; mixture with leaves, alcohol, leaves *T. vulgare* and *R. graveolens;* and *Sesamum* seeds	Diarrhea; stroke	INPA 199432
	Plectranthus barbatus Andrews	Boldo grande	M	Vg, O	He	Ingestion of leaf tea, with leaves *C. rotundus* and *F. chica*	Diabetes	INPA 224638
	Plectranthus grandis (Cramer) R. Willense	Boldo pequeno	M	Vg, O	He	Ingestion of leaf tea, with leaves *C. rotundus* and	Diabetes	HPL 3629

					F. chica		
Marrubium vulgare L.	Desinflama	M	Vg, O	He	Ingestion of leaf tea	Indisposition in the body	IAN 167767
Ocimum selloi Benth.	Elixir paregórico	M	Vg, O	He	Ingestion of leaf tea, with leaves *R. officinalis* and *R. officinalis*; mixture with leaves, alcohol, leaves *T. vulgare* and *R. graveolens;* and *Sesamum* seeds	Diarrhea; stroke	IAC 44399
Melissa officinalis L.	Erva cidreira	Mf	Vg, O	He	M: ingestion of leaf tea / F: cooked with other foods	Tranquilizer	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	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	EAC 54138
Ocimum basilicum L.	Manjericão	Mf	Vg, O	He	M: Ingestion of leaf tea and bath to wash your head / F: cooked with other foods	Flu and cold	HFSL 2735
Origanum vulgare L.	Manjerona	M	Vg, O	He	Ingestion of leaf tea	Headache	INPA 147733
Pogostemon cablin Benth.	Oriza	M	Vg, O	He	Ingestion of leaf tea	Aches over the body	INPA 187521
Tetradenia riparia (Hochst.) Codd	Pluma	M	Vg, O	He	Ingestion of leaf tea	Stomachache	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	INPA 235447
Mentha spicata L.	Vique grande	M	Vg, O	He	Ingestion of leaf tea	Headache	INPA 233360
Mentha arvensis L.	Vique pequeno	M	Vg, O	He	Ingestion of leaf tea	Headache	IAN 112431

Lauraceae	*Persea americana* Mill.	Abacate	Mf	O	Tr	M: ingestion of 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	INPA 280645
	Cinnamomum zeylanicum Blume	Canela	Mf	O	Tr	Ingestion of leaf tea (M/F)	Tranquilizer	EAFM 13320
	Aniba canelilla (Kunth)	Preciosa	Mf	O	Tr	Ingestion of leaf tea (M/F)	Stomachache	IAN 146413
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	INPAw 7785
	Couroupita guianensis Aubl.	Curupita	M	Fo	Tr	Spread the tree milk under the affected area	Stingray sting (*Brycon* sp.), scorpion and snake	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	INPA 161763
Loganiaceae	*Spigelia anthelmia* L.	Lombrigueira	M	Fo	He	Ingestion of leaf tea	Worm	INPA 104116
Malpighiaceae	*Banisteria caapi* (Spruce ex Griseb.)	Cabi	M	Fo	Tr	Ingestion of leaf tea with *J. gossypiifolia* and *P. alliacea* leaves	"evil eye"	RFA 5243
	Byrsonima crassifolia (L.) Kunth	Muruci	F	Fo	Tr	Fresh fruit and juice		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	INPA 106310
	Herrania mariae (Mart.)	Cacauí (cacau	F	Fo	Tr	Fresh fruit		INPA

	Decne. Ex Goudot	jacaré)						3788
	Theobroma subincanum Mart.	Cupuí	F	Fo	Tr	Fresh fruit		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	IAC 56164
	Pachira aquatica Aubl.	Mamorana	F	Fo	Tr	Boiled almonds		INPA 212659
	Abelmoschus esculentus L. Moench	Quiabo	Mf	Ff, Vg	Sh	M: dried fruit tea / F: cooked with other foods	Postpartum treatment	EAFM 10867
	Hibiscus sabdariffa L.	Vinagreira	Mf	O	Sh	M: dried fruit tea / F: cooked with other foods	Tranquilizer	INPA 57076
Marantaceae	*Calathea allouia* (Aubl.) Lindl	Ariá	F	Ff	He	Cooked rhizome		EAFM 5247
Melastomataceae	*Mouriri grandiflora* D.C.	Camutim	F	Fo	Sh	Fresh fruit		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	INPA 158520
	Guarea guidonia (L.) Sleumer	Jataúba	M	Fo	Tr	Cooked root with other foods	To clean the intestine	INPA 118374
Menispermaceae	*Abuta grandifolia* L.	Bôta	M	Rf	Cl	Ingestion of leaf tea with *P. angulata* root, *Q. amara* leaf and *L. operculata* fruit dried	Malaria	INPA 94362
Monimiaceae	*Siparuna guianensis* L.	Capitiú	M	Vg	He	ingestion of tree bark tea; bath with bark of *nazarana* tree and *C. deodara* with *C. cujete* leaf	Flu and headache; fever and “evil eye”	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	INPA 7638
	Ficus insipida Willd.	Apuí (caxinguba)	M	Fo	Tr	Use milk to clog the area of	Muscle strain	INPA 39967

						the strain		
	Artocarpus camansi Blanco	Fruta pão	Mf	Fo	Tr	M: Use milk to clog the area of the strain / F: cooked fruit	Muscle strain	INPA 280857
	Artocarpus heterophyllus Lam.	Jaca	F	O	Tr	Fresh fruit		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	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	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	INPA 57328
Myrtaceae	*Syzygium cumini* (L.) Skeels	Ameixa	Mf	O	Tr	M: ingestion of tree bark tea / F: fresh fruit	Diarrhea	INPA 268285
	Psidium cattleianum Sabine	Araçá	F	O	Sh	Fresh fruit		EAFM 12223
	Syzygium aromaticum (L.) Merr. & L.M. Perry	Cravo arvore	Mf	Fo	Tr	ingestion of tree bark tea (M/F)	Stomachache, intestinal constipation	IAC 5345
	Eugenia victoriana Cuatrec.	Ginja	F	Rf	Tr	Fresh fruit		HPL 6127
	Psidium guajava L.	Goiaba	Mf	O	Sh	M: ingestion of tree bark tea / F: fresh fruit	Diarrhea	INPA 237204
	Syzygium malaccense (L.) Merr. & L.M. Perry	Jambo	F	O	Tr	Fresh fruit		INPA 214039
Olacaceae	*Ptychopetalum uncinatum* Anselmino	Marapuama	M	Rf	Tr	Mixture of the tree bark with alcohol and massage	Crab and rheumatism	INPA 95874

Oxalidaceae	*Averrhoa carambola* L.	Carambola	F	O	Sh	Fresh fruit and juice		INPA 224146
	Averrhoa bilimbi L.	Limão caiana	F	O	Sh	Food flavoring		INPA 146883
Passifloraceae	*Passiflora micropetala* Mart. Ex Mast.	Maracujá de paca	F	O	Cl	Fresh fruit		EAFM 279
	Passiflora nitida Kunth	Maracujá do mato (de cheiro)	F	Fo	Cl	Fresh fruit		INPA 154814
	Passiflora quadrangularis L.	Maracujá peroba	F	Ff	Cl	Fresh fruit		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	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	INPA 206973
Phyllanthaceae	*Phyllanthus niruri* L.	Quebra pedra	M	Vg	He	Ingestion of leaf tea (or *G. arborescens* leaves), leaves from *A. tenella*, *C. spicatus* and *A. muricata*	Urinary tract infection, kidney stones	INPA 193468
	Petiveria alliacea L.	Mucuracaá	M	Vg	He	Ingestion of leaf tea with *J. gossypiifolia* and *B. caapi* leaves; beverage with leaves	"evil eye"; gastritis	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"	ICN 128901
Piperaceae	*Peperomia pellucida* (L.) Kunth	Comida de jabuti	Mf	Vg, O	He	M: leaf and stem tea / F: sautéed with	Infection	INPA 33834

						other foods		
	Piper callosum Ruiz & Pav.	Óleo elétrico	M	O	He	Ingestion of leaf tea	Migraine and sting of insects	INPA 243162
Plantaginaceae	*Scoparia dulcis* L.	Vassourinha	M	O	He	Squeeze the juice from the leaves on the affected area	Mycosis and skin irritation	INPA 58086
Poaceae	*Bambusa vulgaris* Schrad.	Bambu	M	Fo	Tr	Ingestion of leaf tea	Arterial hypertension	IAN 197468
	Saccharum spp. L.	Cana	Mf	Ff	Sh	Drink the juice from the stem (M/F)	Malaise and indisposition	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* root, and *C. nucifera* and *B. excelsa* peel / F: leaf tea	Bathe woman after childbirth; hepatitis	INPA 268065
	Cymbopogon winterianus Jowitt ex Bor	Eucalipto	M	Vg	He	Ingestion of leaf tea with raiz *C. citratus* and *E. oleracea* root, and *C. nucifera* and *B. excelsa* peel	Hepatitis	IAN 194324
	Guadua weberbaueri Pilg.	Tabuqui	M	Fo	Sh	Chew and swallow the apical bud of the plant	Sting of insects	INPA 26135
Portulacaceae	*Portulaca pilosa* L.	Amor crescido	M	Vg	He	leaf tea with *E. plicata* leaves	Diarrhea	INPA 177381
	Portulaca grandiflora L.	Onze-horas	M	Vg	He	Ingestion of leaf tea	Arterial hypertension	INPA 56716
Rhamnaceae	*Houvenia dulcis* Thunberg.	Pau doce	M	Fo	Tr	Bark tea	Headache	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	IAN 11348
Rubiaceae	*Genipa americana* L.	Jenipapo	Mf	Fo	Tr	Fresh fruit and juice (M/F)	Cholesterol	INPA 1871
	Morinda citrifolia L.	Noni	M	O	Sh	Ingestion of leaf tea	Aches over the body	INPA 237845
	Calycophyllum	Pau mulato	M	O	Tr	Bark tea	Stomachache	INPA

	spruceanum (Benth.) K.						and amoeba	253827
	Alibertia sorbilis Ducke	Puruí	F	Rf	Tr	Fresh fruit		INPA 16548
	Cinchona calisaya Weed.	Quinarana	M	Fo	Tr	Root tea	Fever	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	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	INPA 100963
	Citrus sinensis L. Osb.	Laranja	Mf	O	Tr	M: ingestion of leaf tea with *A. esperanzae* / F: fresh fruit and juice	Gases	INPA 161639
	Citrus aurantium L.	Laranja da terra	M	O	Tr	Eat the fresh fruit with bee honey	Anemia	INPA 40936
	Citrus limettioides Tan	Lima	Mf	O	Tr	M: ingestion of tree bark tea / F: fresh fruit	Arterial hypertension	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	MAR 3171
Sapindaceae	*Talisia esculenta* (A.St.-Hil.) Radlk	Pitomba	F	Fo	Sh	Fresh fruit		INPA 12607
Sapotaceae	*Pouteria caimito* (Ruiz & Pav.) Radlk.	Abiu	F	Fo	Tr	Fresh fruit		INPA 10714
	Pouteria pachyphylla Pires	Abiurana	F	Fo	Tr	Fresh fruit		INPA 45784
	Pouteria macrophylla (Lam.) Eyma	Cutite	F	Fo	Sh	Fresh fruit		INPA 130432
	Manilkara huberi (Ducke) Stand.	Maçaranduba	Mf	Fo	Tr	M: drink the tree milk / F: fresh fruit	Improves the sight	INPA 10320
Scrophulariaceae	*Dalbergia subcymosa*	Cipó verônica	M	Rf,	Sh	Beverage: bark	Gastritis and	INPA

	Ducke.			O		with and leaves of *P. americana*, *F. chica* and of *G. hirsutum*; or with bark of *espinheira santa*, *U. tomentosa* and *S. adstringens*	anemia	248892
Simaroubaceae	*Simarouba amara* Aubl.	Jaruba (aruba, marupá)	M	Fo	Tr	Bark tea	Worm	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	INPA 12499
	Quassia amara L.	Quina	M	Fo	Tr	Leaf and bark tea	Malaria	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	INPA 106301
	Solanum sessiliflorum Dunal	Cubiu	F	Fo	Sh	Fresh fruit		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	MIRR 5805
	Solanum americanum Mill.	Pretinha	F	Rf	He	Fresh fruit		INPA 109121
Talinaceae	*Talinum paniculatum* (Jacq.) Gaertn.	Cariru grande	F	Vg, Ff	He	Leaf cooked with other foods		INPA 163212
	Talinum triangulare (Jacq.) Willd.	Cariru pequeno	F	Vg, Ff	He	Leaf cooked with other foods		INPA 259147
Urticaceae	*Cecropia pachystachya* Trécul	Embaúba	M	Rf	Tr	Grind the leaf, put it in the water and drink it	Diabetes	INPA 109923
Verbenaceae	*Lippia alba* (Mill.) N.E. Br.	Carmelitana	Mf	Vg	He	M: leaf tea / F: leaf cooked with other foods	Headache	EAFM 12165
Vitaceae	*Cissus verticillata* (L.) Nicolson & C.E. Jarvis	Cipó pucá	M	Fo	Cl	Bark tea	Stomachache	INPA 167873
	Cissus sicyoides L.	Insulina	M	Vg	He	Ingestion of leaf tea	Diabetes	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	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	INPA 186157
Ñ identificada	Ñ identificado	Aririmba (ariramba)	F	Fo	Tr	Fresh fruit		--
Ñ identificada	Ñ identificado	Bolota	F	Fo	Sh	Fresh fruit		--
Ñ identificada	Ñ identificado	Copaíba de planta	M	Vg	He	Tea and syrup of the leaves	Headache and cough	--
Ñ identificada	Ñ identificado	Cumaru de planta	M	Vg	He	Syrup of the leaves	Pneumonia	--
Ñ identificada	Ñ identificado	Espinheira santa	M	Fo	Tr	Beverage of the bark tree with bark of *S. adstringens*, *U. tomentosa* and *D. subcymosa*	Gastritis	--
Ñ identificada	Ñ identificado	Japá	M	Fo	Tr	Drink the tree milk	Gastritis	--
Ñ identificada	Ñ identificado	Larém (aralém)	M	Vg	He	Ingestion of leaf tea	Malaria	--
Ñ identificada	Ñ identificado	Lua	F	Rf	Cl	Fresh fruit		--
Ñ identificada	Ñ identificado	Nazarana	M	Fo	Tr	Bath: tree bark, *C deodara* bark, *S. guianensis* and *C. cujete* leaves	Fever and “evil eye”	--
Ñ identificada	Ñ identificado	Papagainho	M	Vg	He	Ingestion of leaf tea	Worm	--
Ñ identificada	Ñ identificado	Pichona	F	Fo	Sh	Fresh fruit		--
Ñ identificada	Ñ identificado	Pracapeá	F	Rf	Tr	Fresh fruit		--
Ñ identificada	Ñ identificado	Pranari	F	Rf	Tr	Fresh fruit		--

(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.

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.

The Use Value Index of the species (Table No. 4) 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 daily.

Table No. 4
Relative frequency (Fr) and Value of Use Index (IVU) 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
T. triangulare	21	7.81	0.38
H. mariae; *F. insipida*	20	7.43	0.36

Q. amara; *C. zeylanicum*	19	7.06	0.34
Petiveria alliacea L.	18	6.69	0.32
B. rutilans; *D. odorata*; *M alliacea*	17	6.32	0.30
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*; Not identified; *E. ayapana*; *L. operculata*; *A. xanthorriza*	9	3.35	016
B. orellana; *J. pectoralis*; *P. nitida*; *M. indica*; Not identified; *D. dodecaneura*	8	2.97	0.14
S. australis; *T. esculenta*; *C. icaco*; *C. ferrea* var. *cearensis*; *S. indicum*; *T. minuta*; *O. diandra*; *C. nucifera*; *S. adstringens*; *Musa 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*; Not identified; *C. cujete*; *A. nitidum*; *B. caapi*; *O. coutinhoi*; *I. batatas var.* Rainha; *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*; Not identified (1); *C. aurantium*; *V. guianensis*; *C. brasiliense*; *M. maripa*; *V. faba*; *S. sessiliflorum*; *B. exoleta*; *T. nocturnum*; *A. carambola*; *C. americana*; *E. tirucalli*; *C. bicolor*; Not identified (2); *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.

DISCUSSION

Social-cultural characteristics

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 (Conde *et al.*, 2017). 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. The fact that the Tapereira and Santana communities had the highest number and average number of plant species (Table No. 1).

According to the informants, the ethnobotanical knowledge about PANC 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. 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 (Cheikhyoussef *et al.*, 2011; Barreira *et al.*, 2015; Campos *et al.*, 2015). It is worth mentioning that the average age in the state of Amapá is 73.9 years, 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 (Amapá, 2018).

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 (Pilla & Amorozo, 2009), denominated Cultural Erosion by some authors (Sujarwo *et al.*, 2014). 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.

Regarding the gender of the survey respondents, there is a predominance of women (Table No. 2).They 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 (Guimbo *et al.*, 2011; Souto & Ticktin, 2012).

As for the category of use, 25% 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 (Lucena *et al.*, 2012a), and in other countries in South America, Europe and Oceania (Mattalia *et al.*, 2013; Haselmair *et al.*, 2014). 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 (Bieski *et al.*, 2012; Quave & Pieroni, 2015).

Ethnobotanics data

Table No. 3 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 (Vásquez *et al.*, 2014). 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 (Costa & Mitja, 2010).

In relation to the propagation environment of the species, it was found in the forest, vegetable gardens, orchards, Family farms and riparian forests (Table No. 3), 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 *et al.* (2011). 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 (Costa & Mitja, 2010; Vásquez *et al*., 2014).

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) (Couly & Sist, 2013). The availability of these plant resources is associated with the social organization of families, since herbaceous species are required daily, and for this reason they are found in vegetable gardens and orchards, being easily accessible for women who deal with household activities (Murad *et al*., 2012). The species located in the forest are seasonal, which makes them to be obtained, making them less required (Murad *et al*., 2012).

According to the informants' 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 *E. uchi*, *C. villosum*, *B. excelsa*, *T. roseoalba*. 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 (Danikou *et al*., 2011). 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 (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 (Costa & Mitja, 2010; Couly & Sist, 2013), together with cassava flour (*M. esculenta*) and fish (Fraser, 2010; Isaac *et al.*, 2015). Also, the consumption of vegetables is low among this population group, as highlighted by Adams *et al*. (2005).

Among the species found in the study and available in Table No. 3, 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. pectoralisvar*. *stenophylla*), melhoral (*J. pectoralis*), 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 (Pilla *et al*.,

2006). 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 (Garlet & Irgang, 2001; Pilla *et al.*, 2006).

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*).

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 (Silva & Freire, 2010; Roque *et al.*, 2010).

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 (Moreira & Guarim-Neto, 2009).

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 (Moreira & Guarim-Neto, 2009; Roque *et al.*, 2010).

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 (Pilla *et al*., 2006).

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 (Pilla *et al*., 2006; Roque *et al.*, 2010).

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 (Vásquez *et al*., 2014).

Tree milk

It is extracted from the stem of forest species for food and medicinal purposes (Bezerra *et al.*, 2013). 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 (Pereira *et al*., 2009).

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 (Pasa, 2011).

Plant sap

It can be either the stem sap (*M. linifera*, Saccharum spp.), 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 (Pasa, 2011).

Ethnobotanical indices

The results found for the diversity and equitability indexes in this study are superior to those found by Silva *et al*. (2007), in work carried out with traditional populations in the Amazon (Silva *et al*., 2007). These authors found 425 plant species used for medicinal, food, construction, ritual and ornamental purposes, and obtained the *Shannon-Wiener* index equal to 4.71. Kainer and Duryea (1992), also in a study carried out on plant resources in a conservation unit like this study, but only with women, found 145 plant species used for medicinal, food, construction, ritual and ornamental purposes, and obtained the indices of *Shannon-Wiener* and *Pielou* equal to 4.8 and 0.97, respectively (Kainer & Duryea, 1992). In this last work analyzed, the *Shannon-Wiener* index was lower than that of the present study, and the Pielou index was higher due to the greater diversity of species. However, knowledge about the use of species was better distributed and less concentrated among informants.

There are works carried out in the Amazon and in other biomes in Brazil that show similar diversity and equitability indices, such as the one carried out by Amorozo, Gély who obtained *Shannon-Wiener* and *Pielou* indices equal to 5.07 and 0.94, respectively with 17 informants in an ethnobotanical survey carried out only on medicinal plants (Amorozo & Gély, 1988). In addition, works carried out in other biomes in Brazil registered *Shannon-Wiener* and *Pielou* indexes more expressive than those already found (Amorozo, 2002; Pinto *et al.*, 2006; Cunha & Bortolotto, 2011).

The species *E. foetidum* (Apiaceae) and *I. batatas* (Convolvulaceaea) were the most cited by the informants (Table No. 4) 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 (Barreira *et al*., 2015). By observing the most cited species (Table No. 4), 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 daily. These species occur significantly in

other studies on food and medicinal resources in the Amazon region (Leão *et* al., 2007; Vásquez *et al*., 2014) and other biomes in Brazil (Pasa *et al*., 2005).

It is worth noting that the higher the use value of these species, the greater the pressure of use upon them (Lucena *et al*., 2007; Lucena *et al*., 2012b). 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.

The implications of the present study are related to the fact that, possibly, there is a huge bank of germplasm, of genetic material to be studied in the forest areas of the Amazon that can result in research with new drugs and food potential. The present study was unable to explore this information, as it did not have them as an objective, and due to limited time and resources (human and financial). However, this reality may open possibilities for further research.

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. The main finding of the present study is the intensity with which these plants are used, So that these species directly contribute to the safety and food and medicinal sovereignty of the families that consume them daily.

These species are used for food and medicinal purposes, are available in forest environments, backyards, swiddens and close to homes. They are consumed in natura, cooked with other foods, and in the form of teas, beverage, tree bark sauce, mixture, bath (maceration), syrup, juice of the leaves and seeds, tree milk, oil and plant sap.

One of the assets observed in the present study 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.

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