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Ethnobotany and ethnopharmacology of medicinal plants used in communities of the Soure Marine Extractive Reserve, Pará State, Brazil

[Etnobotánica y etnofarmacología de plantas medicinales utilizadas en las comunidades de la Reserva Extractiva Marina de Soure-Pará, Brasil]

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Abstract: The study of the relationship between man and nature can reveal the potential of plant resources. In the present study we used non-probabilistic sampling and snowball technique in communities of the Soure Marine Extractive Reserve-Pará, namely, Caju-Úna Community, Céu Settlement, and Pesqueiro Village, in order to analyze the medicinal plants used by these peoples, focusing on the diversity, consensual use and cultural importance of species, and providing ethnopharmacological information available in the scientific literature. To this end, participant observation, semi-structured interviews and free lists were used, as well as ethnobotanical indices and scientific studies retrieved from databases. We identified 90 species, among which *Ruta graveolens*, *Maytenus obtusifolia* and *Libidibia ferrea* stood out. The species were distributed in 50 families, mainly Lamiaceae, Asteraceae and Fabaceae. The most frequent diseases treated with these plants, mainly with preparations in the form of teas, were flu, inflammations and stomach problems. The Caju-Úna Community had the highest indices of total species diversity and evenness. Nine species stood out in the consensus factor and importance value and pharmacological studies corroborated 35% of the popular indications.

Keywords: Traditional knowledge; Marajó Island; Popular medicine; Ethnobotany; Ethnopharmacology

Resumen: El estudio de la relación entre el hombre y la naturaleza puede revelar el potencial de los recursos vegetales. En el presente estudio utilizamos técnicas de muestreo no probabilístico y de bola de nieve en las comunidades de la Reserva Extractiva Marina de Soure-Pará, que incluyeron a la Comunidad Caju-Úna, el Establecimiento de Céu y el Pueblo de Pesqueiro, ello con el propósito de analizar las plantas medicinales utilizadas por estos pueblos. El estudio se centró en la diversidad, el uso consensual y la importancia cultural de las especies, sobre la base de información etnofarmacológica disponible en la literatura científica. Con este fin, se utilizaron observaciones de los participantes, entrevistas semiestructuradas y información de acceso libre, así como índices etnobotánicos y estudios científicos obtenidos de bases de datos. Se identificaron 90 especies, entre las que destacan *Ruta graveolens*, *Maytenus obtusifolia* y *Libidibia ferrea*. Las especies se distribuyeron en 50 familias, principalmente Lamiaceae, Asteraceae y Fabaceae. Las enfermedades más frecuentes tratadas con estas plantas, principalmente mediante infusiones fueron gripe, inflamaciones y problemas estomacales. La comunidad de Caju-Úna tuvo los índices más altos de diversidad y uniformidad total de especies. Se destacaron 9 en el factor consenso y valor de importancia, y los estudios farmacológicos corroboraron el 35% de las indicaciones populares.

Palabras clave: Conocimiento tradicional; Isla Marajó; Medicina popular; Etnobotánica; Etnofarmacología

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INTRODUCTION

The survival of human societies has always been closely related to the consumption of plant products, considering that since the beginning of civilization, the flora has been manipulated by men to satisfy their nutritional, cultural and therapeutic needs (Franco *et al.*, 2011).

Medicinal plants are used by approximately 82% of the Brazilian population and this is related to a poor health care system, easy access to plant resources and the strong traditional use of these resources in popular medicine (Veiga & Pinto, 2005; Brasil, 2012). In the Amazon region, communities have adapted to use the available resources to treat diseases, seeking new techniques to use plants in their daily lives and consolidating the use of "bush medicines" as a striking feature of their cultural identity (Santos, 2000).

Phytotherapy consists in the practice of using plant attributes to treat diseases (Santos *et al.*, 2013), and it is considered a means of valuing popular knowledge and traditions. It is, therefore, important to document the interactions resulting from such habits of use of plant diversity (Martins *et al.*, 2013).

The exchange of traditional and scientific knowledge on medicinal plants can contribute to a rational use of popular phytotherapy (Rossato *et al.*, 2012) and also subsidize the industrial innovation process, pre-selecting information on where to find species and which are their applications (Rezende & Ribeiro, 2005). Thus, plants with traditional uses have a crucial role in drug industry (Lopez, 2011). Investigations of plant-based preparations, their compositions and effects on the human body are needed in this field (Alves *et al.*, 2014).

The contrast between the variety of medicinal plants and the small amount of specific pharmacological data on them directly implies the mode of use of the plant drugs, making it a risk factor rather than a welfare benefit (Argenta *et al.*, 2011). It is fundamental investments and public policies that foster research in order to clarify the appropriate use of the population, as well as to explore Brazilian species as promising sources of new drugs, finally meeting the real needs of health (Vidotti & Castro, 2009).

In this context, sciences such as Ethnobotany and Ethnopharmacology have been strategically important to guide the discovery of new therapeutic substances in plants, through the appreciation of popular medicine practices (Maciel *et al.*, 2002; Albuquerque & Hanazaki, 2006).

Carneiro *et al.* (2014) listed studies on medicinal plants carried out in different regions of Brazil and observed that research has been concentrated in areas related to pharmacology, agriculture, ecology and botany. Among the various relevant works found in the northern region are those developed in the coastal belt of the state of Pará, in municipalities such as Marapanim, Maracanã, Bragança and Curuçá, exploring the therapeutic use of plants by caboclo populations (Furtado *et al.*, 1978); popular herbal medicine and secondary plant metabolites (Jardim *et al.*, 2005); the use of plants and the phytopharmacopeia of fishing communities (Coelho-Ferreira & Silva, 2005; Coelho-Ferreira, 2009); the importance of medicinal species for fishing communities (Roman & Santos, 2006; Freitas & Fernandes, 2006); and the diversity of healing plants and their use by rural (Silva *et al.*, 2013) and urban (Flor & Barboza, 2015) populations.

This type of study in coastal areas is particularly important because of the accelerated loss of biodiversity in ecosystems such as mangroves, sandbanks and estuaries (Fonseca-Kruel & Peixoto, 2004). In the case of the Amazon coast, the creation of several Marine Extractive Reserves (RESEXs) along the coast of the state of Pará is also worthy of note (Carneiro *et al.*, 2010), considering they represent a type of Conservation Unit (CU) whose land use is allowed for traditional extractive populations, based on their specific traditional knowledge, who have the right to stay there (SNUC, 2000).

The need for such studies is further stressed by the growing dependence of extractive populations on urban centers, a fact that may threaten the preservation of ethnological knowledgein the coming generations (Ribas & Zuculoto, 2012). As a result, the use of natural resources and the way of life of populations in extractive reserves have been the focus of studies in Pará (Carneiro *et al.*, 2010; Souza, 2010; Alves *et al.*, 2014; Lobato *et al.*, 2014). One of these reserves is the Soure Marine Extractive Reserve (Soure RESEX-Mar). This is an interesting area to be studied for it is a CU that encompasses mangrove, sandbank and beach ecosystems within its territory as well as populationswho make use of local products through artisanal fishing, crab fishery, and resort to plant extraction in a complementary way (SNUC,

2000; Santos-Júnior, 2006; Oliveira, 2012; Lobato *et al*., 2014).

Despite these characteristics, the only study that lists the plants used by these populations was carried out by Rocha *et al.* (2017), revealing general aspects of the link between these communities and the flora in various categories of use, including the medicinal one. Further in-depth investigations on the uses of plants that make up the framework of the knowledge on medicinal practices can be important when supported by scientific evidence.

The present study aimed to survey the medicinal plants used by the communities of the Soure Marine Extractive Reserve in Pará in order to identify the most used species and provide etnopharmacological data present in the scientific literature.

MATERIAL AND METHODS

Study area

The municipality of Soure is located in the Mesoregion of Marajó and in the Microregion of Arari, at the mouth of the Amazon River, in the easternmost part of the Marajó Island, and houses a population of approximately 24.286 people within an area of 3,517,318 km^2 (IBGE, 2010). The coastal plain of Soure belongs to the northern region of Brazil and has morphological features of tidal plains, mangroves and estuaries, surrounded by strands of beaches/barriers, following a regime of meso- to macro-tides under the dynamics of the Marajó Bay (França *et al.*, 2007).

The Marajó archipelago in northeastern Pará is a 49,606 km^2 fluvial-marine complex with a unique environmental heterogeneity in the Amazon region, delimited by the Amazon river (west), Pará River (south), Tocantins - Marajó Bay (east), and the Atlantic Ocean (north). Natural fields and flooded and dryland forests are common in this area and are influenced by the seasonal variation of rainfall, the river drainage network and the topography. The climate is tropical with annual temperature of 28ºC and rainfall of 2500 to 3000 mm per year mainly concentrated in the months between January and July (Amaral *et al.*, 2007; Souza *et al.*, 2013).

There are six federal sustainable use conservation units in the Marajó Island. This type of protected areahas the purpose of combining the conservation of nature with a coherent exploitation of natural resources. The six units cover 726.653 hectares, equivalent to 7% of the total area of the Archipelago (Brasil, 2007). The Soure Marine Extractive Reserve (Soure RESEX-Mar) is one of these units and was created as a result of the political mobilization of local extractive peoples against predatory forms of natural resource expliotation in the communities that threaten the survival of traditional populations. The management of the CU is under the responsibility of the Chico Mendes Institute for Conservation of Biodiversity - ICMBIO, in partnership with the Association of Users of the Soure Marine Extractive Reserve - ASSUREMAS (Guedes, 2012).

The Soure RESEX-Mar comprises a total area of 27.463,58 ha, limited to the north by the Atlantic Ocean, to the south by the municipality of Salvaterra, to the east by the Marajó Bay and to the west by the municipalities of Cachoeira do Arari and Chaves. The area is subdivided into the Soure mangrove where the Malvinas Islands are located, the Caju-Úna River, the Pesqueiro Stream (Igarapé), the Mirinduba Creek and the Malvinas Stream (Igarapé). It has also a continental portion where the Saco River is located (Rodrigues & Szlafsztein, 2011; Oliveira 2012). The environment has typical vegetation of sandbanks, wetlands, mangroves, fields, solid ground and mound areas with predominance of species such as red mangrove (*Rhizophora mangle* L.), "siriúba" [*Avicennia germinans* (L.) L.] and "tinteiro" [*Laguncularia racemosa* (L.) C.F.Gaertn.] (Brasil 2007).

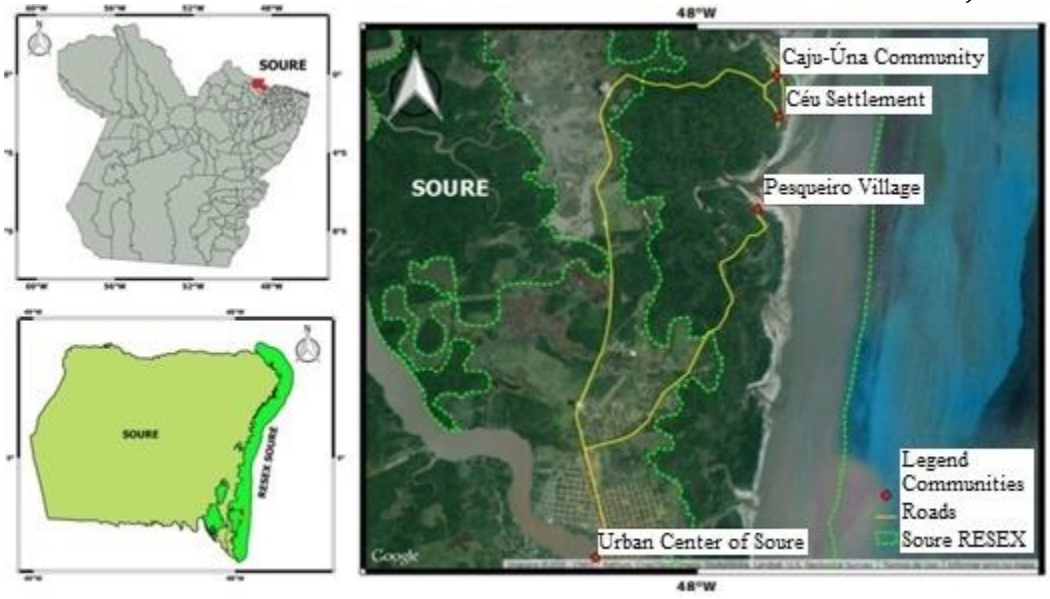
The study was carried out in three coastal communities of the Soure RESEX-Mar (0º40' 29.2" S, 40º30'29.7" W), namely: Caju-Úna Community (00°37'56.1" S; 048°29'10.1" W), 18 km far from the urban center of the municipality of Soure; Céu Settlement (S00° 37'57.1"W048°29'10.0"), 23 km far from the urban center and very close to the Caju-Úna Community; and Pesqueiro Village (00°39'42.2" S, 048°29'08.7" W), the closest to the urban center (7 km) and consequently with a greater infrastructure and potential for tourism activities (Figure No. 1).

As for the economy, the three communities share basically the same activities, mainly involving fishery (fish, shrimps and crabs), plant extractivism. Income also comes from pensions and salaries of public employees, and in the case of Pesqueiro Village, tourism activities (Lobato *et al.*, 2014; Pinheiro *et al*., 2014).

Houses are mostly made of wood and

financed by federal projects in partnership with the ICMBio, with a regular supply of electric power. Piped water is available in Pesqueiro Village, and in the case of Caju-Úna Community and Céu Settlement, water is supplied by community wells and kite trucks two to three times a week.

Figure No. 1
Location of traditional communities in the SoureMarine Extractive Reserve, Pará



Each community has a community center that usually hosts religious events and association meetings arranged through community leaderships in Caju-Úna Community, Céu Settlement and Pesqueiro Village. There are public primary schools in these communities and high school education for young people and adults has been recently implemented in Caju-Úna Community.

With regard to medical care, Family Health Units provide care in each community through weekly consultations by professionals of the *More Doctors* program. Treatments commonly aimed at common diseases such as viral diseases, diarrhea, headaches, stomach problems and injuries are followed up by health workers and nurses.

Sampling and selection of informants

The criterion to choose the above-mentioned communities was their time of occupation of the land. According to Santos-Júnior (2006), the people of Caju-Úna Community arrived in the Soure RESEX-Mar in 1948, and of Céu Settlement (former Areião) in 1964, while people of Pesqueiro Village have been there since 1966 (Oliveira, 2012). These communities were the first to settle in the Soure RESEX-Mar and have therefore accumulated a considerable amount of knowledge about the study area.

The research focused only on individuals who declared to be users of medicinal plants in Caju-Úna Community, Céu Settlement and Pesqueiro Village. We adopted the non-probabilistic sampling method, where the sample is obtained through rational selection (Albuquerque *et al*., 2010) using the snowball technique, in which one informant indicates the next individual to be interviewed (Baldin & Munhoz, 2011). This made it possible to reach a total of 76 informants, distributed among 33 people in Caju-Úna Community, 21 in Céu Settlement, and 22 in Pesqueiro Village.

Data collection

Before the field activities, the project "Ethnobotanical survey in the communities of the Soure Marine Extractive Reserve-PA" was presented to the Advisory Boardof the Soure RESEX-Mar. Later, we visited each community to request the authorization to collect botanical data and material through the signing of a Prior Informed Consent (PIC) statement. We also requested authorization from the SISBIO (System of Authorization and Information on Biodiversity) for collection of biological material.

For access to the traditional knowledge of the

residents, the present research was registered in the National System of Genetic Heritage Management and Associated Traditional Knowledge of the Brazilian Ministry of the Environment under number A593B64.

Data collection took place in the course of two years, specifically in January, May and September of 2014, and February, March and October of 2015. Each visit lasted from two to four weeks. In order to grasp a thorough understanding of the reality of the communities, the technique of participant observation was used for recording of qualitative data through field notes, photographs and dialogue logs.

Within this approach, we prepared and applied questionnaires to link the semi-structured interview to the free list, aiming to obtain data about the informants' profile (sex, age, origin, education, occupation, housing, source of knowledge) and the list of plants used for therapeutic purposes, the plant parts used in preparations, the composition of home recipes and details of the treatments (Albuquerque *et al*., 2010).

We also used audio recording in data collection. To avoid interruptions in the conversation, we used techniques such as *non-specific prompting* and *reading back* suggested by Brewer (2002), to aid the interviewee to remember species not previously mentioned and to recall more information.

Identification of botanical material

In order to collect botanical material, a guided tour was undertaken to search and collect the plants indicated by the informants, in order to authenticate the vernacular names, especially because there may be variability from one region to the other and among individuals within the same community (Albuquerque *et al.,* 2010)

Botanical samples were collected according to the methods of Mentz & Bordignon (2007), identified and incorporated into the João Murça Pires Herbarium (MG) of the EmílioGoeldi Museum of Pará, and the Prof. Dr. Marlene Freitas da Silva Herbarium (MFS) of the State University of Pará. The APGIII classification system was used for classification species and confirmation of scientific names and authorship. The online databases Flora of Brazil 2020 (Forzza *et al*., 2015) and Tropicos of the Missouri Botanical Garden (Tropicos, 2015) were consulted.

Data analysis

The relationship established among informants about the medicinal plants was analyzed under a qualitative approach, emphasizing the knowledge, the use of the species, and the way to prepare home remedies (Amorozo & Viertler, 2010).

Categories of the International Statistical Classification of Diseases and Related Health Problems - ICD10 (Brasil, 2008) were considered for grouping the diseases mentioned by informants. The ICD10 does not include the category Cultural Diseases, but this category was included in this study because it encompasses manifestations interpreted as diseases despite lack of scientifically proven etiology (Pinto *et al*., 2006) as cases of "frightened child", "bad spirit", "evil eye", "sorrow" and "fallen wind".

In the quantitative perspective, the medicinal plants used by the communities of the Soure Marine Extractive Reserve were analyzed in terms of consensual use and cultural importance of plants through ethnobotanical indices (Table No. 1).

The correlation between popular indications and scientific literature data about the species that stood out in the analyses of the quantitative indices Importance Value (IV) and Use Value (UV) was established through a bibliographic survey of pharmacological studies in the ScienceDirect ®, Scielo® and Google®academic databases.

RESULTS AND DISCUSSION

Data collected from the total of 76 users of medicinal plants revealed a concentration of interviewees in the age group of 40-84 years (61%), with a mode of 62 and a mean of 49, and predominance of the female sex (89%). In this scenario, the elderly and particularly women are the main persons who attain the knowledge, passing it on to the next generations, being therefore the main responsible for the use and management of medicinal plants in the communities.

On such profile, Feijó *et al*. (2012) and Balbinot *et al.* (2013) reiterate that the therapeutic recommendations and the cultivation of plants are generally attributed to older people in the population, as seen in the municipalities of Marmeleiro-PR and Pelotas-RS, respectively. Viu *et al*. (2010) also reinforce the role of women in ethnobotanical surveys, who are often the responsible for the care of the household and family health.

Table No. 1
Indices used to estimate the importance of medicinal species and the consensus of use among informants.

Index	Formula	Description	Authors
Total Species Diversity (SDtot)	$SD_{tot} = 1/\Sigma P^2$, where P = number of times the species s was mentioned divided by the total number of uses of all species mentioned.	It measures how many species are used and how they contribute to total use	Byg & Balslev (2001)
Total Species Evenness (SEtot)	$SE_{tot} = SD_{tot}/n$, where n = number of species cited	It measures how different species contribute to total use, regardless of the number of species used	Byg & Balslev (2001)
Informant Consensus Factor (ICF)	$ICF = (n_{ur}-nt) / (n_{ur}-1)$, where n_{ur} = number of citations of use in each subcategory, n_t = number of species used in this subcategory	It measures the local relative importance of different categories of body systems	Troter & Logan (1986)
Importance Value (IV)	$IV = n_{is}/n$, where n_{is} = number of informants who consider the species s most important; n = total number of informants.	It measures the proportion of informants who cited one species as more important	Byg & Balslev (2001)
Use Value (UV)	$UV = 2n_s/n-1$, where n_s = number of people using species s.	It measures the degree of agreement among informants as to whether a species is useful or not	Byg & Balslev (2001)

Regarding the origin of the informants, more than half (79%) came from the municipality of Soure, 59% of which had been born and continued to reside in the communities studied; 20% of the total number of respondents came from other cities (Belém, Cachoeira do Arari, Icoaraci, Marapanim, Salvaterra and São Caetano de Odivelas) and other states (1%).

The fact that most of the interviewees had been born and remained in their communities of origin facilitates the oral transmission of ethnomedicinal knowledge that according to Badke *et al.* (2011) is based on practices of everyday life. The accumulation of experiences stems from a predominantly rural way of life and a distance from urbanization. Shanley & Rosa (2005) explain that such accumulation is vulnerable to changes that may occur in the communities, threatening the essential knowledge about plants.

Regarding the educational level, 70% of the interviewees had incomplete primary education and only 5% had superior education, since the community schools offer only kindergarten and primary education; the implementation of secondary education through a program for education of young people and adults is recent.

Occupations and professions of the respondents include housewives (44%), civil servants (17%), retirees (10%) and artisans (4%). According to mentions, 28% of the informants in these four occupation categories have the habit of fishing sporadically. There were also people who reported fishing activities only (22%), and men typically fish on the open sea while women help in offloading the catch from the nets, and also in fishing with cast nets and matapi (artisanal trap for shrimp fishing).

The composition of family units ranges from one to three (38%), four to six (58%) and seven to nine (4%) members, in which half (51%) of the cases had at least one child. Many families benefit from government financial programs (35%), family grants (27%), green grants (18%) and scholarships (2%). The low schooling restricts the options of paid activities. Thus, most families rely mainly on fisheries and financial benefits granted by

government programs. Harvesting of non-timber forest productsis common in the Soure RESEX-Mar to complement the local family income, and also consolidate the tradition and cultural identity of these populations, as pointed by Campos *et al.* (2015) in the RESEX *Verde para Sempre*.

We also noted that the medical care provided to the communities is completely different from the popular herbal medicine practiced by them, where the use of some homemade teas considered safe by doctors is only rarely prescribed. On the contrary, the advice is rather to suspend the use of plants, when reported by the patients. Lima *et al*. (2014) warn of the importance of medical professionals to recognize all resources used in health treatments, including the non-conventional ones, in order to increase their knowledge and develop care actions to meet the real needs of the populations.

In a study of a population of elderly people assisted by Family Health Strategy teams in Dourados-MS, Lima *et al.* (2012) evidenced that the uses of medicinal plants are mostly unknown by health professionals because patients omit such information. This may be a hypothesis to be considered in the cases of the Soure RESEX-Mar. However, in general, plants are not used in public health systems due to lack of scientific support for the effectiveness of the use of native species according to popular knowledge, or because the available data are not explored (Santos *et al*., 2011; Pinto *et al.,* 2014).

Ethnological knowledge of medicinal plants

Etnological knowledge about the medicinal plants used by the interlocutors comes mainly from female members of the families, such as mothers and grandmothers (81.7%), among whom 14% were midwives or healers. This trend was also observed by Costa & Mitja (2010) among family farmers in Manacapurú, which was linked to the traditional family inheritance passed on through maternal teachings. Oliveira *et al.* (2014) reinforced this fact affirming that besides being users of popular practices, women are important agents of their propagation.

The knowledge of plants in the context of the Soure RESEX-Mar generated a list of 167 ethnospecies used for medicinal purposes (Table No. 2), of which 90 were identified and distributed in 50 families, the main ones being Lamiaceae (*n* = 8 spp.), Asteraceae (*n* = 6 spp.) and Fabaceae (*n* = 5 spp.).

Considering the individual contribution of the communities to the whole set of knowledge, Caju-Úna Community mentioned a total of 78 species, 10 of which were cited only in this place. A lower number of species was cited in Pesqueiro Village (*n* = 71 species, six of which were exclusive) and in Céu Settlement (*n* = 66 species, three of which were exclusive). There were 54 species common to the three communities, corresponding to 60% of the total number of plants mentioned. Among the most frequently cited species were *Ruta graveolens* L. Rutaceae (*n* = 90), *Maytenus obtusifolia* Mart. Celastraceae (*n* = 87) and *Libidibia ferrea* (Mart. ExTul.) L. P. Queiroz. Fabaceae (*n* = 76) (Table No. 2).

Lamiaceae, Asteraceae and Fabaceae usually have a high representativeness in ethnobotanical studies, especially in studies of medicinal nature of the flora conducted in different Brazilian biomes as in the Amazon (Martins *et al.,* 2013; Vásquez *et al*., 2014), Cerrado (Zucchi *et al.,* 2013; Ferrão *et al.,* 2014), Caatinga (Ribeiro *et al*., 2014) and the Atlantic Forest (Pinto *et al.,* 2006). The occurrence of these families is not restricted to Brazilian popular therapy; human populations in other tropical and temperate regions also recognize the medicinal value of these groups of plants (Di Stasi & Hiruma-Lima, 2002).

In Latin America, the importance of Lamiaceae and Asteraceae as suppliers of medicinal raw material comes from the presence of bioactive compounds such as essential or volatile oils widely useful for problems of the digestive and respiratory systems (Almassy-Junior, 2004), which were also the main systems treated by the residents of Caju-Úna Community, Céu Settlement and Pesqueiro Village. Medeiros *et al.* (2010) further reinforced the healing properties of Fabaceae as the result of the presence of pharmacological constituents such as heterosides.

Among the most cited species in the analyzed communities, *Ruta graveolens* L. Rutaceae (rue) was cited 90 times and was indicated mainly for stroke, headache and "sorrow". In other municipalities, the species is mentioned in recipes for pains, inflammation, ear pain, recovery from stroke, massages, sinusitis, head lice, flu, as well as spiritual ailmentsthrough attractive baths or rituals from breaking free from spells caused by envy, "evil eye" and "bad-desire" (Leão *et al*., 2007; Almeida *et al*.,

2013; Carmo *et al*., 2015). In the region of Matinhos-PR, Silva *et al.* (2015) also recorded the usefulness of this species for pain and cough.

Rue herb was also mentioned for cases of fractures, shock or muscle strains with external frictions in Ecuadorian indigenous communities (Armijos *et al.,* 2014); for diseases such as arthritis, ear infections, throat problems by residents of San Jose in Costa Rica (Madaleno, 2010); and for diseases of the nervous system; diseases of the ear and mastoid process; diseases of the respiratory system; diseases of the digestive system; and symptoms, signs and abnormal findings in a study with Afro-Caribbeans, Amerindians and mestizos (Torres-Avilez *et al.,* 2015). These data are in line with most of the indications given in the Soure RESEX-Mar (Table No. 2).

Maytenus obtusifolia Mart. Celastraceae ("barbatimão"), cited 87 times in the communities studied in Soure, was indicated mainly for vaginal cleanliness, general and uterine inflammation, gastritis and wounds. The predominating form of use of its bark was decoction. The use of leaves in the fight against diarrhea, also through decoction, has been cited in sandbanks of Rio de Janeiro (Santos *et al.,* 2010), and for inflammations and cancer in the Brazilian northeast (Agra *et al.,* 2007). Another species of the same genus, *Maytenus myrsinoides* Reissek Celastraceae, also known as "barbatimão", was registered in Marudá-Pa by Coelho-Ferreira (2009); in this community the bark of this plant was used for the same problems mentioned in the present study.

One of the possible aspects of *M.obtusifolia* in the Soure RESEX-Mar to be analyzed in future research is the influence of seasonality on the use of this species in view of the report of this phenomenon:

"*You cannot use barbatimão bark in June and July because the plant is poisoned"* (M.L.G. Favacho, 37 years old).

Among the most cited species in the studied communities, *Libidibia ferrea* (Mart. Ex Tul.) L. P. Queiroz. Fabaceae ("jucá"), mentioned 76 times, received indications for stomach problems, anemia, asthma, cough, intimate cleanliness, cicatrization, and inflammation. Preparations were based solely on the use of the fruit (pods), and interviewees place great trust in this preparation, as emphasized in the following comments:

"*I have a huge faith in jucá thick syrup"* (I.S. Avelar, 45 years).

"The juca's recipe in alcohol is better than iodized alcohol for wounds" (A. F. Silva, 74).

The medicinal applicability of *Libidibia ferrea* (Mart. Ex Tul.) L. P. Queiroz. Fabaceae ("jucá") was also reported in the Amazon region by Di Stasi & Hiruma-Lima (2002), who highlighted other indications such as treatment of amoebiasis and liver problems. Bitencourt *et al.* (2014) described similar applications of "jucá" among populations of Pará for cough, anemia, inflammation, cicatrization, cleanliness, low resistance, flu, cold, dandruff and diabetes (Table No. 2). In the community of Marudá-Pa studied by Coelho-Ferreira (2009), this species was also used similarly to the reported in the present study, and one of its main preparations was known as merthiolate, because it was applied in wounds.

The plants surveyed in the present study have a wide application in the treatment of respiratory diseases (17%), symptoms, signs and abnormal findings (15%) and diseases of the digestive system (14%), especially flu, inflammation and stomach problems. The high incidence of diseases affecting these systems may be associated with the health risks to which the communities are exposed, including factors such as poor water quality resulting from scarce supply (mainly in Caju-Úna Community and Céu Settlement) which leads the inhabitants to use water sources probably unfit for human consumption, such as wells that are precariously installed and vulnerable to pollution (Lobato *et al*., 2014).

Furthermore, fish and crab fisheryactivities bring dangers related to intense physical effort, climatic variations, accidents with instruments and fish/crustaceans, and contact with pathological agents in areas without basic sanitation (Rosa & Mattos, 2010).

The relevance of the main diseases treated through popular phytotherapy in the Soure RESEX-Mar is common to the northern region of Brazil. There are many reports of respiratory and digestive problems besides inflammatory processes in ethnobotanical studies, such as those in Jalapão-TO (Coelho *et al.,* 2005); Jaú-AM (Rodrigues *et al.,* 2010); Vale do Juruá-AC (Martins *et al.,* 2013); Igarapé-Miri-PA (Pinto *et al.,* 2014) and Rondônia (Santos *et al.,* 2014).

Table No. 2

Medicinal plants used by communities in the Soure Marine Extractive Reserve, Pará, Brazil. Legends: Form of preparation = Al - alcohol, B - Bath, Cb - cleanliness bath, Hb - Head bath, Bl - Blessing ritual, T - Tea, Ed - Eye drops, Cr - Cream, Ct - Cataplasm, Dc - Decoction, Sk - Smoking, Pl - Plaster, Fbl – Feet blanching, Gg - gargle, Btl – bottled recipe, If -Infusion, In - Natural, Oi - Oil infusion, Ts - Thick syrup, Ws - Washing, Uw – Soaking underwater, Mc - Maceration, Mt - Mixture, O - Oil, Ot - Ointment, Sp - Soap, Jc - Juice, Tj - Thick juice, In - Ink, Un - Unguent; Source of the species = B - Belém; Pc - Purchase in the community, Pd - Buy in drugstores, Co - Cocal, Rd - Roads to Soure, F - Farm, I – Igarapé (streams), Oy - Own yards, or neighbors' and relatives' yards, Bf - Bushfires, Stc - Streets in the community, Mg - Mangrove, Mi - Mirizal, Wc - Woods of the community, Pe - Pedral, Be - Beach, Pt - Partasana, S - Soure, Sa - Salvaterra, Te - Teso, Tu - Tucumanduba. (*: Species cited in the three communities).

Family/Species	Popular name	Indications	Used part	Form of preparation	Source	Voucher
Acanthaceae						
Justicia secunda Vahl	Forsangue	Anemia, Stomach, Urinary Tract Infection	Leaf	C	Oy, Stc, S	270
Avicennia germinans (L.) L.	Siriubeira	Toothache	Sap	In	Mg	048
Adoxaceae						
Sambucus nigra L.*	Sabugueiro	Asthma, Chickenpox, Catarrh, Itching, Fever, Flu, Measles, Cough	Leaf, Flower, Sprout, Branches	B, C, Jc, Tj	Oy, Stc	269
Amaranthaceae						
Alternanthera brasiliana (L.) Kuntze*	Ampicillin, Miraceline, Rifocin	Catarrh, Pain, Headache, Urinary pain, Fever, Injury, Stomach, Throat, Flu, Urinary Tract Infection, Inflammation, Uterine Inflammation, Intestines	Leaf, Branches	Bc, C, Gg, Btl, Ws, Tj	Wc, Oy, S	205
Pfaffia glomerata (Spreng.) Pedersen.*	Corrente	Flu, Diarrhea, Belly ache, Gastritis, Intestines, Constipation	Leaf	Bc, C, Ws	Oy	172
Dysphania ambrosioides (L.) Mosyakin & Clemants*	Mastruz	Asthma, Blow, Bronchitis, Catarrh, Stomach ache, Gastritis, Flu, *H. pylori*, Inflammation, Lice, Lung, Purging, Cough, Tuberculosis, Toxin, Worm	Leaf, Branches	Ct, C, Pl, Ts, Sp, Jc, Tj	B, Oy, S	---

Anacardiaceae						
Anacardium occidentale L.*	Cajueiro	Teeth abscess, Vaginal cleanliness, Teeth inflammation, Teeth eruption, Diarrhea, Pain, Belly pain, Injury, Throat, Inflammation, Belly inflammation, Uterine inflammation, Intestine, Cough	Bark, Bark seams, Flower, Sprout	Ba, C, Dc, If, Ts, Ws, Uw	Wc, Be, Oy	005
Mangifera indica L.*	Mangueira	Swelling problems during pregnancy, Injury, Flu, Cough	Bark, Bark seams, leaf	B, Ts, Um	Wc, Oy	---
Annonaceae						
Annona glabra L.*	Araticum, Jaquinha	Dandruff, Erysipelas, Lice	Leaf	Bc, Ct, Sp, Tj	Wc, Oy	086
Araceae						
Dieffenbachia parvifolia Engl.	Comigo Ninguém Pode	Evil eye	Leaf	B	Oy	323
Philodendron quinquenervium Miq.	Tracuá	Mouth ulcers	Sap	Wc	Oy	185
Arecaceae						
Cocos nucifera L.*	Coconut tree	Albumin, Vaginal cleanliness, Strong hair, Itching, Diarrhea, Headache, Weight loss, Rheumatism	Endosperm, Fruit, Sprout	Ba, C, Cr, In, Wc, O	Co, Be, Oy	349
Astrocaryum vulgare Mart.*	Tucumã	Blow, Swollen belly, Urinary incontinence, Cramps, Cancer, Headache, Toothache, Sore throat, Earache, Muscle pain, Weight loss, Erysipelas, Stomach, Injury, Brain weakness, Furuncle, Throat, Flu, Inflammation, Uterine inflammation, Insomnia, Intestine, Hemorrhoid, Rip, Cough	Seed (Maggot)	Ct, Pl, Gg, Oi, Ts, Ws, Wc, O, Um	Pc, F, Wc, Pt, Be, Oy	134
Asparagaceae						

Sansevieria trifasciata Prain	Espada de São Jorge	Evil eye	Whole plant	Bz	Oy	300
Asteraceae						
Gymnanthemum amygdalinum (Delile) Sch.Bip. ex Walp.*	Boldo, Boldo in plant	Heartburn, Diarrhea, Pain, Belly pain, Headache, Stomach ache, Pain in the liver, Nausea, Gastritis, Uterine inflammation, Bad digestion, Constipation, Ulcer, Viruses	Leaf	C, Ts	Pd, Wc, Oy	033
Ayapana triplinervis (M.Vahl) R.M.King & H.Rob.*	Japana, Japana Branca, Japana Roxa	Headache, Muscle Pain, Inflamed Throat, Influenza, Inflammation, Bug bite, Cough	Leaf, Branches	Al, B, Bc, C, Ts, Tj, Un	B, Oy, S	186, 352
Elephantopus mollis Kunth.	Língua de Vaca	Inflammation	Leaf	C	Mi	053
Pluchea sagittalis Less*	Lósnia, Lórnia	Menstrual cramps, Pain, Stomach ache, Bloated stomach, Liver	Leaf	C, Jc	Oy	178
Rolandra fruticosa (L.) Kuntze*	Pai Joaquim	Back pain, Urinary tract infection, Rheumatism, Kidneys	Leaf, Roots	C	Co, Wc, Rd, Bf, S	309
Bignoniaceae						
Crescentia cujete L.	Cuieira	Menstrual cramps, Regulation of menstrual cycle	Leaf	C	Oy	181
Fridericia chica (Bonpl.) L.G.Lohmann*	Pariri	Anemia, Stomach, Urinary tract infection, Inflammation	Leaf	C, Uw	Oy, S	109
Bixaceae						
Bixa orellana L.	Urucum	Albumin, Anemia, Eclampsia, High blood pressure	Roots, Seed	Al, C	Oy	101
Boraginaceae						
Heliotropium indicum L.	Fedegoso	Blow, Urinary tract infection, Inflammation, Cough	Leaf, Roots	Ct, C, Jc	Wc, Oy	302
Burseraceae						
Protium heptaphyllum (Aubl.) Marchand	Breu Branco	Bad spirit	Bark	Sk	Wc	136
Cactaceae						
Pereskia grandifolia Haw.	Rosa Madeira	Stomach cancer, Erysipelas, Injury,	Flower, Leaf	Ct, C, Dc, Tj	Oy	277

		Inflammation				
Celastraceae						
Maytenus obtusifolia Mart.*	Barbatimão	Anemia, Postpartum cleanliness, Vaginal cleanliness, Diarrhea, Headache, Pain in uterus, Stomach, Injury, Internal wound, Gastritis, Flu, Urinary tract infection, Inflammation, Uterine inflammation, Cough	Bark, Bark seams	Ba, C, Dc, Btl, Ts, Uw, Sp, Tintura	Pc, Co, Rd, Mg, Wc, Pt, Pe, Bf	237
Chrysobalanaceae						
Chrysobalanus icaco L.*	Agiru (Preto, Vermelho)	High cholesterol, Diabetes, Weight Loss, Gastritis, Inflammation, High blood pressure	Bark, Bark seams, Leaf, Branches	C, Uw	Mg, Mi, Wc, Be, Oy	121
Commelinaceae						
Commelina virginica L.*	Maria Mole	Flu, Intestine, Sorrow	Leaf, Branches	Bc, Bz, Ws	Wc, Oy	338
Convolvulaceae						
Evolvulus sericeus Sw.	Melhoral	Flu, Headache	Leaf	Bc, C	Oy	258
Costaceae						
Costus spicatus (Jacq.)Sw.*	Canarana	Urinary tract pain, Urinary tract infection, Inflammation, Gallbladder stones, Kidneys	Leaf, Branches, Root	C	Oy	016
Crassulaceae						
Bryophyllum pinnatum (Lam.) Oken *	Pirarucu	Blow, Pain, Stomach ache, Erysipelas, Wound, Gastritis, Flu, Urinary tract infection, Inflammation, Uterine inflammation, Ovaries inflammation, Cough, Ulcer	Leaf	Bc, Ct, C, Dc, Btl, In, Ts, Jc, Tj	Oy, S	017
Kalanchoe sp.*	Desinflama	Blow, Menstrual cramps, Heart, Stroke, Urinary Pain, Stomach ache, Earache, Erysipelas, Thorn, Injury, Furuncle, Gastritis,	Leaf, Branches	Al, Ct, C, Btl, Jc, Tj	Pc, Oy	040

Tabela 2. Continuação

		Urinary tract infection, Inflammation, Inflammation in the liver, Uterine inflammation, Lung, Cough				
Cucurbitaceae						
Luffa operculata (L.) Cogn.*	Cabacinha	Blow, Stroke, Muscle pain, Rheumatic pain, Flu, Rheumatism, Sinusitis	Fruit	Al, B, Bc, Dc, Oi, Uw, Um	Wc, Be, Oy	325
Momordica charantia L.	Melão de São Caetano	Itching, Lice, Cough	Leaf, Fruit	B, Ts, Sp	Oy	324
Cyperaceae						
Cyperus articulatus L.	Pripioca	Flu, Headache	Root	Bc, In	Oy	077
Dilleniaceae						
Curatella americana L.*	Caimbé, Cajueiro Bravo	Vaginal cleanliness, Stomach cancer, Cirrhosis, Diabetes, Stomach ache, Injury, Gastritis, Inflammation, Uterine inflammation, High blood pressure, Cough, Ulcer	Bark, Bark seams, Leaf, Sprout	Ba, C, Dc, Btl, Ts, Uw	Pc, Rd, Mi, Wc, Pt, Oy, S	104
Euphorbiaceae						
Euphorbia tirucalli L.	Caranguejinho, Pau de São Sebastião, Pau Sirí	Anemia, Toothache, Injury, Nail inflammation	Bark, Sap, Seed	Pl, Btl, In	Pe, Oy, S	204
Euphorbia tithymaloides L. *	Coramina	Calming, Heart, Headache, Inflammation, High blood pressure	Leaf	C	Oy, S	144
Jatropha curcas L.*	Pião Branco	Skin rash, Itching, Skin cut, Toothache, Injury, Throat, Flu, Intestines, Mouth ulcers, Cough	Bark, Leaf, Sap	Bc, C, Gg, In, Ws, Wc	Wc, Oy	190
Jatropha gossypifolia L.*	Pião Roxo	Thrush, Toothache, Headache, Injury, Sore Throat, Flu, Evil eye, Sorrow, Mouth ulcers, Worms	Leaf, Branches, Sap, Seed	B, Bc, Bz, Ct, C, In, Wc, Uw	Stc, Oy	010
Fabaceae						
Copaifera martii Hayne*	Copaíba	Anemia, Contraceptive,	Bark, Sap	Ba, C, Dc, Gg, Btl,	Pc, Pd, Co, F,	342

		Asthma, Postpartum cleanliness, Vaginal cleanliness, Blow, Cancer, Teeth inflammation, Sore throat, Gastritis, Hemorrhoids, Inflammation, Uterine inflammation		In, Oi, Ts, Wc, Uw, O, Sp	Mg. Wc, Pe, Pt, S, Sa	
Libidibia ferrea (Mart. ex Tul.) L.P.Queiroz*	Jucá	Anemia, Asthma, Vaginal cleanliness, Blow, Cuts, Stroke, Diarrhea, Stomach, Injury, Internal wound, Insect sting, Throat, Gastritis, Flu, Inflammation Uterine Inflammation, Cracked foot, Cough, Ulcer	Fruit	Al, Ba, C, Esp, Btl, If, Ts, Uw, Sp, In	F, Wc, Pe, Oy, S	009
Senna reticulata (Willd.) H.S.Irwin & Barneby	Mata Pasto	Itchy, Frightened child, Bad spirit, Evil eye, Sorrow	Leaf, Branches	B, Bz, Tj	Wc, Stc, Oy	106
Canavalia rosea (Sw.) DC.	Salsa	Itching	Leaf	B, Tj	Wc, Be, Stc	200
Dalbergia monetaria L. f.*	Verônica	Anemia, Postpartum cleanliness, Vaginal cleanliness, Diarrhea, Pain, Weigh gain, Injury, Internal injury, Gastritis, Flu, Inflammation, Uterine inflammation, Intestines, Lung, Cough	Bark, Bark seams	Ba, C, Dc, Btl, Ts, Uw	Pc, Co, Rd, I, Mg, Wc, Pt	123
Hypericaceae						
Vismia guianensis (Aubl.) Pers.*	Lacre	Itchy, Dermatitis, Nail inflammation	Leaf, Root, Sap	B, In	Rd, Mi, Pt, Oy	187
Iridaceae						
Eleutherine bulbosa (Mill.) Urb.*	Marupazinho	Amoeba, Diarrhea, Stomach ache, Hemorrhoids, Intestines	Root	C, Uw	Oy, S	163
Lamiaceae						
Vitex agnus-castus L.*	Alecrim, Alecrim da Angola	Asthma, Calming, Children's Colic, Menstrual Cramps,	Leaf, Branches, Seed	Al, B, Bc, Bz, C, Sk	Pd, Oy, S	173

		Catarrh, Headache, Flu, Bad spirit, Evil eye, Sorrow, Fallen wind				
Aegiphila sp.	Anum	Asthma	Leaf	C	Oy	305
Aeollanthus suaveolens Mart. ex Spreng.*	Catinga de Mulata	Pain reliever, Stroke, Pain, Headache, Muscle pain Earache, Leg pain, Rheumatic pain, Epilepsy, Bad spirit, Flu, Laxative, Evil eye, Low pressure, Sorrow, Cough, Thrombosis, Fallen wind	Leaf, Branches	Al, B, Bc, Bz, C, Ts, Wc, Uw, Tj, Um	Pe, Oy, S	082
Mentha x piperita L.*	Chama	Flu, Uterine inflammation	Leaf	Bc, C	Oy	148
Ocimum campechianum Mill.*	Favaca, Favacão	Menstrual cramps, Catarrh, Headache, Flu, Urinary tract infection, Cough	Leaf, Branches, Root	Bc, C, Ts	Oy, S	337
Plectranthus amboinicus (Lour.) Spreng.*	Hortelã, Hortelã Grande, Hortelã da Índia, Hortelã do Maranhão	Asthma, Catarrh, Menstrual cramps, Vaginal cleanliness, Earache, Erysipelas, Stomach, Liver, Throat, Flu, Inflammation, Uterine Inflammation, Ovaries, Kidneys, Cough	Leaf	Ba, Bc, Ct, C, Btl, Ts, Jc, Tj	B, Oy, S	---
Mentha spicata L.*	Hortelãzinho	Calming, Children's colic, Diarrhea, Pain, Belly pain, Headache, Earache, Stomach, Fever, Flatulence, Insomnia, Bad digestion, Constipation, Sorrow, Cough	Leaf, Branches	Bz, C, Ts, Ws, Tj	Pe, Oy, S	067
Ocimum minimum L.*	Manjericão	Catarrh, Headache, Fever, Flu, Evil eye, Sorrow	Leaf, Branches	Al, B, Bc, Bz, C	Pe, Oy, S	202
Lauraceae						
Cinnamomum verum J.Presl.*	Canela	Calming, Anemia, Strong hair, Catarrh, Headache, Hip pain, Fever, Weakness, Flu, Swelling in the legs,	Leaf, Branches	Bc, C, Dc, Esp, Btl, Ts	Oy, S	209

		Poor circulation, Low pressure, Head lice, Cough, Vomiting				
Malpighiaceae						
Malpighia glabra L.	Acerola	Cough, Anemia	Fruit	Tj, Jc	Oy	279
Byrsonima crassifolia L.(Kunth)	Muruci	Teeth eruption, Diarrhea	Bark, Flower	C	Wc, Oy	054
Malvaceae						
Gossypium barbadense L.	Cotton Algodão	Asthma, Catarrh, Internal wound, Lung, Cough, Tuberculosis	Leaf	Ts, Jc, Tj	Oy, S	318
Meliaceae						
Carapa guianensis Aubl.	Andiroba	Asthma, Blow, Strong hair, Catarrh, Cancer, Stroke, Rheumatic Pain, Injury, Inflamed throat, Flu, Hemorrhoids, Inflammation, Uterine Inflammation, Labyrinthitis, Insect stinging, Lice, Rip, Rheumatism, Sinusitis, Cough	Bark, Seed	B, Ba, C, Cr, Dc, Pl, Gg. Btl, Oi, Ts, Wc, O, Sp, Um	Pc, Co, I, Wc, Be	---
Azadirachta indica A. Juss.	Nim	Vaginal cleanliness, Blow, Cancer, Pain, Leg pain, Gastritis, Inflammation, Uterine inflammation, Lice, High blood pressure, Ulcer, Worms	Leaf, Flower	Al, Ba, Bc, C, Pl, In	Oy	013
Moraceae						
Ficus catappifolia Kunth. & Bouché	Apuí, Apii	Inflammation, Cough, Rip	Bark, Leaf, Sap	C, Pl, Ts	Oy, S	100
Myrtaceae						
Syzygium cumini (L.) Skeels.	Ameixeira	High cholesterol, Diarrhea, Belly pain, Stomach	Bark, Bark seams, Fruit skin, Sprout	C, Uw	Wc, Oy	280
Psidium guajava L.*	Goiabeira	Diarrhea, Belly pain, intestines	Bark, Sprout	C, Ws	Be, Oy	022
Oxalidaceae						
Averrhoa	Caramba	Diabetes	Leaf	C	-	340

carambola L.						
Passifloraceae						
Passiflora edulis Sims	Maracujazeiro	Hearth, Erysipelas	Flower, Leaf	Ct, C	Oy, S	313
Phyllanthaceae						
Phyllanthus niruri L.*	Quebra Pedra	Urinary tract infection, Kidney stones, Kidneys	Whole plant, Branches, Root	C	Wc, Oy, Stc	169
Phytolaccaceae						
Petiveria alliacea L.	Mucuracaá	Stroke, Headache, Toothache, Swelling problems during pregnancy, Evil eye, Sorrow, Rheumatism, Thrombosis	Leaf, Branches, Root	Al, B, Bc, Bz, Btl, Mc, Uw, Un	Oy, Stc, S	315
Plantaginacecae						
Scoparia dulcis L.*	Vassourinha	Itching, Erysipelas, Fungi in feet, Flu, Inflammation, Evil eye, Sorrow, Fallen wind	Leaf, Branches, Root	B, Bc, Bz, C, Mc, Wc, Tj	Wc, Oy, Stc	---
Piperaceae						
Piper callosum Ruiz & Pavon*	Elixir Paregórico	Diarrhea, Pain, Liver pain, Stomach, Fever, Intestinal infection, Virus disease, Vomiting	Leaf	C	Oy, S, Tu	328
Peperomia pellucida (L.) Kunth	Erva de Jabuti, Comida de Jabuti	Albumin, Weight loss, Fungi in feet, Urinary tract infection, High blood pressure, Kidneys	Leaf, Root	C, Mc	Wc, Oy	---
Poaceae						
Cymbopogon citratus (DC.) Stapf.*	Capim Marinho, Capim Santo	Strong hair, Calming, Heart, Belly pain, Stomach, Fever, Flu, Intestines, Insomnia, Head lice, High blood pressure, Hair loss	Bark seams, Leaf, Branches, Root	Bc, C, Ws, Sp	Oy, Stc	105
Coix lacryma-jobi L.	Lágrima de Nossa Senhora	Urinary tract infection, Gallbladder stones	Seed	C	Oy, S	287
Portulacaceae						
Portulaca pilosa L.*	Amor Crescido	Strong hair, Blow, Cuts, Diabetes, Stomach, Injury,	Leaf, Branches,	Bc, Bz, Ct, C, Mc, Sp, Jc, Tj, Un	Oy, S	119

		Liver, Gastritis, Hit, Flu, Inflammation, Intestines, Kidney stones, Lice, Evil eye				
Talinum fruticosum (L.) Juss.	Cariru	Anemia, Urinary tract infection	Branches, Root	C	Oy, S	---
Rhizophoraceae						
Rhizophora racemosa G.Mey.*	Mangueiro	Diabetes, Diarrhea, Gastritis	Bark seams, Sprout, Root	C, Uw	Mg	129
Rubiaceae						
Genipa americana L.	Genipapo	Anemia, Menstrual cramps, Back pain, Urinary tract infection, Uterine inflammation, Kidney stones, Kidneys	Leaf, Fruit	C, Btl, Ts	Co, Wc, Oy	127
Morinda citrifolia L.*	Noni	Heartburn, Cancer, Dandruff, High cholesterol, Weight loss, Stomach, Gastritis, Lice	Leaf, Fruit	Bc, C, Btl, Uw, Jc	Oy, S	015
Spermacoce verticillata L. *	Vassourinha de Botão	Albumin, Belly pain, Hemorrhoids	Flower, Whole plant, Root	C, Bz	Wc, Oy	008
Rutaceae						
Ruta graveolens L.*	Arruda	Blow, Grown flesh, Menstrual cramps, Stroke, Pain, Headache, Toothache, Muscle pain, Rheumatic pain, Epilepsy, Erysipelas, Bad spirit, Stomach, Flu, Throat, Inflammation, Laxative, Evil eye, Lice, Sorrow, Thrombosis, Ulcer, Fallen wind	Leaf, Branches	Al, B, Bc, Bz, C, Cl, Ot, Sp, Tj, Um	Pe, Oy, S	043
Citrus limon (L.) Osbeck	Limão Galego	Catarrh, Headache	Leaf	Bc	Oy	350

Citrus limon (L.) Osbeck *	Limão, Limãozinho	Amoeba, Blow, High cholesterol, Catarrh, Pain, Headache, Throat, Flu, Inflammation, Intestines, Hoarseness, Sinusitis, Cough	Fruit skin, Leaf, Fruit	B, Bc, C, Pc, Ts, Uw, Jc	Wc, Oy, S	180
Citrus reticulata Blanco	Limão Tangerina	Albumin, Anemia, Flatulence, Flu	Fruit skin, Leaf, Fruit	Bc, C, In, Jc	Oy, Te	351
Solanaceae						
Capsicum annuum L.	Pimenta Malagueta	Evil eye	Leaf, Fruit	B, Bz	Oy	272, 291, 293
Verbenaceae						
Lippia alba (Mill.) N.E.Br. ex Britton & P. Wilson*	Erva Cidreira	Cardiac arrhythmia, Calming, Catarrh, Heart, Stroke, Headache, Stomach ache, Stomach, Fever, Liver, Flu, Uterine inflammation, Insomnia, high pressure, Fallen wind	Leaf, Branches, Sprout	Al, Bc, Bz, C, Btl	Be, Oy, Stc	141
Lippia thymoides Mart. & Schauer	Manjerona	Heart, Stroke, Pain, Headache, Flu, Cough	Leaf	Al, Bc, C, Ts, Um	B, Oy, S	257
Vitaceae						
Cissus sp.*	Anador	Catarrh, Menstrual cramps, Stroke, Pain, Stomach ache, Headache, Body pain, Fever, Stroke, Urinary tract infection, Uterine Inflammation	Leaf, Root	Bc, C, Al, Ts	Pe, Oy, S	039
Cissus verticillata (L.) Nicolson & C.E.Jarvis*	Cipó Pucá	Stroke, Headache, Thrombosis	Leaf, Branches	Al, C, Ot, Tj, Um	Oy, S	230
Xanthorrhoeaceae						
Aloe vera (L.) Burm. F.*	Babosa	Blow, Strong hair, Stomach cancer, Dandruff, Erysipelas, Stomach, Wound, Stingray sting, Liver, Weak chest, Gastritis, Inflammation, Uterine inflammation, Lice,	Leaf	Al, C, Cr, Pl, Btl, In, Sp, Jc	Oy, S, Tu	038

		Burn, Rip, Cough, Ulcer				
Zingiberaceae						
Zingiber officinale Roscoe*	Gengibre	Cramps, Menstrual cramps, Stroke, Headache, Muscle pain, Rheumatic pain, Stomach, Throat, Flu, Cough	Leaf, Root	Al, C, In, Ts, Um	Oy, S	059

The techniques used by the interviewees in the preparation of therapeutic recipes mostly involved leaves (62%), followed by bark and bark seams (16%), which were manipulated in simple preparations, that is, using only one species (78%). The conjugate use of various species was less frequent (22%), with up to 11 species used in a preparation.

The prominent use of leaves in the preparation of these recipes may be related to the high concentration of bioactive substances in these organs (Ming & Amaral-Júnior, 2005), as well as to the habit of the most frequent botanical families, since they include many herbaceous, sub-shrubby and shrubby species (Barboza da Silva *et al.*, 2012). Besides, leaves are easier to collect and are available practically throughout the year (Alves *et al.*, 2008). However, excessive removal of leaves is non-recommendable, because of the need to protect the development and reproduction of the species and contribute to the conservation of the plant resources used (Meyer *et al.*, 2012).

Although most home remedies have a simple composition, combinations of several species in a single recipe are noteworthy. Similar practices were described by Rodrigues & Carlini (2003) in a group of *quilombola* people (community of descendants of runaway slaves) in Mato Grosso, where some recipes included from two to up to 10 plants.

Medicinal preparations were very diversified, but the most used forms were teas (39%), especially decocts, as well as baths (17%), mainly head and cleanliness baths, and thick syrups (6.3%) generally applied in the treatment of respiratory diseases.

The application of leaves in the form of tea decoction is commonly described in ethnobotanical studies (Silva *et al*., 2012; Botelho *et al*., 2014; Cavalcante & Silva, 2014; Leite & Marinho, 2014). Decoction of plant parts extracts secondary metabolites with greater ease through dilution in boiling water, and these metabolites have active principles with positive effects on human health (Fuck *et al*., 2005). It should be noted that teas can be obtained through different ways of preparation, depending on the part of the plant used; infusion is indicated for tender parts and decoction for the more rigid ones (Silva *et al.*, 2015).

In the communities studied at the Soure RESEX-Mar, although decoctions were preferred, many residents emphasized the use of infusions, saying that this is a recent trend in preparations observed in training courses on medicinal plants they attended, as well as observed in the televisionand the Internet, which access has increased, and also based in the information passed from health professionals, as observed in the following statements:

"I learned to boil water separately from the plant on television" J. N. Campos, 54 years old.

"The doctor taught me that it is better to infuse it" V. M. Almeida, 46 years old.

This makes it evident how traditional knowledge can be reformulated under influence of novel information, as long as its essence is preserved.

The predominant route of administration of these home remedies is the oral one (59%) and in some cases intake be made under fasting conditions was recommended (7%). It is important to mention that a good part of these oral treatments were not well defined, since 50% of the users said they consume the preparations "as water", drinking it every time they feel thirsty. In only 14% of the cases, the dose to be ingested and the number of times a day were accurately recommended, with five occurrences of the associated use of home preparations and medications such as Paracetamol, Buscopan (Scopolamine Butylbromide) and Anador (Dipyrone Sodium). This fact may pose a risk to users, because the population generally believes that plants are natural remedies free from adverse effects (Veiga-Júnior & Pinto, 2005; Rossato *et al.*, 2012), as said

the informant in the comment below:

"The home remedies never cause harm; it's just to avoid a strong dose" M. I. S. Palheta, 71 years old.

This risk can be considered high because of the action of plant products characterized as a xenobiotic, i.e. a product that despite having curative properties is foreign to the human body. When ingested, these products go through bio-transformations that may or may not trigger toxic reactions (Nicolleti *et al.*, 2007).

The synergistic action of plants and synthesized drugs can cause side effects, such as in the interaction of certain phytopharmaceuticals with other drugs. This indicates the need for guidance on the use of these drugs and home-based herbal preparations (Miranda *et al.*, 2013). Phytochemical, pharmacological and toxicological investigations are fundamental to validate the substances present in the plant species and their respective therapeutic effects (Maciel *et al.*, 2002).

Sources of floristic material used in medicinal preparations

Regarding the source of the species, backyards (87%), forest areas (44%) and the urban center of Soure (41%) stood out as the places where the highest number of species used by the inhabitants can be collected (Table No. 2). It is evident that plant users explore a range of environments to obtain these plant resources, but there is a consensus among the three communities about the importance of backyards (in own houses or in the neighbors' and relatives' houses) and forest areas as sources of access to medicinal flora and promoters of interaction and exchange of knowledge among people in the community, especially among family members. This was also found by Vásquez *et al.* (2014) in the study of healing plants in Manacupuru-AM.

According to Eichemberg *et al.* (2009), backyards are critical for the selection, cultivation and protection of medicinal plants. The study by Ferreira & Pires Sablayrolles (2009) in a rural community in the Tapajós-Arapuins RESEX in Pará also stresses the role of backyards as spaces where a considerable diversity of medicinal plants is housed. They facilitate the access to products cultivated there and, consequently, play an important role in health promotion. Backyards meet the demands of the residents, promote the exchange and provision of plants for relatives, neighbors and friends, and aid to preserve the local biodiversity and the traditional knowledge associated with it.

It is noteworthy that the use of medicinal plants is directly related to their cultivation, and in this case, aspects such as water problems in Caju-Úna Community and Céu Settlement become relevant, as already exposed by Santos-Júnior (2006), Oliveira (2012) and Lobato *et al.* (2014). The residents of these communities, most of whom are elderly people, need to carry water in buckets, collected from wells away from their homes and whose storage is mainly intended for household cleaning and personal hygiene. Because of this, many species are lost during the dry season and only a few reappear naturally in the rainy season.

Cultivation strategies also serve to avoid unfavorable conditions such as floods in some areas in the community, where it is not possible to grow plants directly on the ground due to recurrent invasions of brackish water, and also structural problems in the soil reported by people who have the habit to cultivate plants:

"We do not have much soil suitable for planting" R. E. Pereira, 44 years old.

There is yet livestock farming (buffaloes, pigs, chickens, among others) that trample and feed on the herbs and seedlings in open yards. For this reason, planting is done in fenced areas or in the balconies/back gardens of houses and in "jiraus", i.e. suspended pans, buckets, cans and flowerpots (Figure No. 2). Carniello *et al.* (2010) explains that this planting is ruled by the usefulness of the plants and the amount of area necessary and available to cultivate them.

Another factor that implies the use and cultivation of plants is the presence of children in the homes. Some species are mainly destined to the care of the health of infants. These include *Mentha spicata* L. Lamiaceae (little mint), *Lippia alba* (Mill.) N.E. Br. ex Britton & P. Wilson Verbenaceae (Brazilian lemon balm) and *Vitex agnus-castus* L. Lamiaceae (Angolan rosemary). When children grow up, these species are no longer cultivated except when another child, grandchild or nephew is born. According to Palheta *et al.* (2017), medicinal plants are typically sought to meet the therapeutic needs of the family.

Suppliers of raw material for medicinal recipes were mentioned in the three communities. In Caju-Úna Community, there is a person who goes

regularly to the forests and bush areas of the community to collect plants requested by people in the community, including bark of *Maytenus obtusifolia* Mart. Celastraceae ("Barbatimão"), *Curatella americana* L. Dilleniaceae ("Caimbé"), *Dalbergia monetaria* L. Fabaceae ("Verônica"), among other species. This person also receives requests from Céu Settlement. Other two residents in Céu Settlement receive this type of requests from people of the community, as well as from Pesqueiro Village, where two bark collectors were mentioned. These collectors do not stipulate prices for their services, but buyers collaborate with amounts from R$ 2.00 to R$ 5.00 per delivery, depending on the amount of material collected.

Figure No. 2
Plants cultivated in the studied communities. A - Jirau on flooded area. B - Jirau in backyard

Suppliers of plant raw materials (mainly barks) increase their income by acting as facilitators of access to the species because the requesters are usually not willing to risk entering the forest because they do not know the exact location of the species they need, besides the difficulties that the search involves, such as the correct removal of the material and the risks of bites stings from venomous animals or insects.

The use of plants aims mainly to meet the therapeutic needs of the families, but sporadic commercialization of products obtained for medicinal purposes was reported. For example, the oil obtained from *Carapa guianensis* Aubl. Meliaceae ("andiroba"), commonly used for muscle pains and respiratory problems, is removed in the rainy season, when the tides carry out the seeds to the shore, and sold for R$ 20.00 to R$ 50.00/L.

Also, the "tucumã maggot" oil, often applied in inflammations and muscle pains, is extracted from May to July from *Speciomerus ruficornis* maggots, a beetle found in perforated seeds of *Astrocaryum vulgare* Mart. Arecaceae (Rocha *et al.*, 2014) and sold for R$ 80.00 to R$ 200.00/L. Coconut oil, extracted from coconut fruits (*Cocos nucifera* L., Arecaceae) and applied in capillary treatment and weight loss, is collected throughout the year and sold for around R$ 20.00 to R$ 50.00/L. Traditional bottled oil is sold for R$ 5.00 to R$ 20.00/L, depending on the purpose and ingredients.

Some plants or products derived from these plants are purchased from local sellers who receive orders from other cities, but production is focused primarily on the demands of their communities. This type of commercialization is carried out in an informal way by root providers, herb providers and extractive people practically throughout the country and without any certification or licensing (Ethur *et al.*, 2011). Floristic diversity has therefore a direct economic value, that is, in terms of consumption in the form of food, medicines, handicrafts, among others (Paes & Pasa, 2014). A concern with the overexploitation of resources by populations around communities was noticeable in the RESEX-Mar Soure area. The example of this reality stands out in the reports about the search of raw material for "tucumã maggot" oil:

"*People who live in Tucumanduba extract a lot of tucumã to sell the maggot oil out of season"* (V. M. Almeida, 46 years old).

When questioned about the occurrence of the species in the environments, the perception of the interviewees was different in the communities. In Caju-Úna Community, 25% of the informants

believed that most of the species have low availability in the community. However, informants in Céu Settlement (25%) and Pesqueiro Village (22%) found most of the species to be widely available. On the other hand, 15% of the people in Caju-Úna Community, 29% in Céu Settlement and 14% in Pesqueiro Village said not to know or not to be able to inform on the availability of the species.

In two of the three communities, the medicinal flora resources were considered abundant by the residents of the areas from which the plants are extracted, passing the idea that their use does not need to be pondered considering their abundant disposition in these spaces.

In the case of individuals who did not know or were not able to inform on the occurrence of certain species, there was an evident lack of concern with this issue. It is worth noting that some people are unaware of the existence of the found in their environments although they use them, for they seek the material in external sources. This suggests the need for a greater exchange of knowledge among residents and communities, in order to make a better use of the available resources. In this sense, in-depth studies on the conservation status of medicinal species can more safely subsidize the sustainable use of the flora.

Ethnobotanical indices

Among the ethnobotanical indices, Total Species Diversity (SDtot) in Caju-Úna Community was equal to 42.77, in Céu Settlement was 39.20 and in Pesqueiro Village was 34.97. Despite the differences in SDtot, Total Species Eveness (SEtot) was equal between Caju-Úna Community and Pesqueiro Village, with a value of 0.55, while in Céu Settlement was 0.53.

Thus, Caju-Úna Community stood out among the other communities with higher SDtot and SEtot values, explained by the concentration of the largest number of plant uses reported by many informants, in addition to its greater distance from the urban center that somehow contributes to protect the traditional local knowledge about medicinal plants.

However, although Caju-Úna Community stood out in the above cited indices (SDtot and SEtot), it was evident that the diversified knowledge on medicinal plants was homogeneously distributed not only among knowledge holders in Caju-Úna Community, but also in Céu Settlement and Pesqueiro Village. Similar results were obtained by Rocha *et al.* (2017) in their study of useful plants in these three communities (Caju-Úna Community, Céu Settlement and Pesqueiro Village).

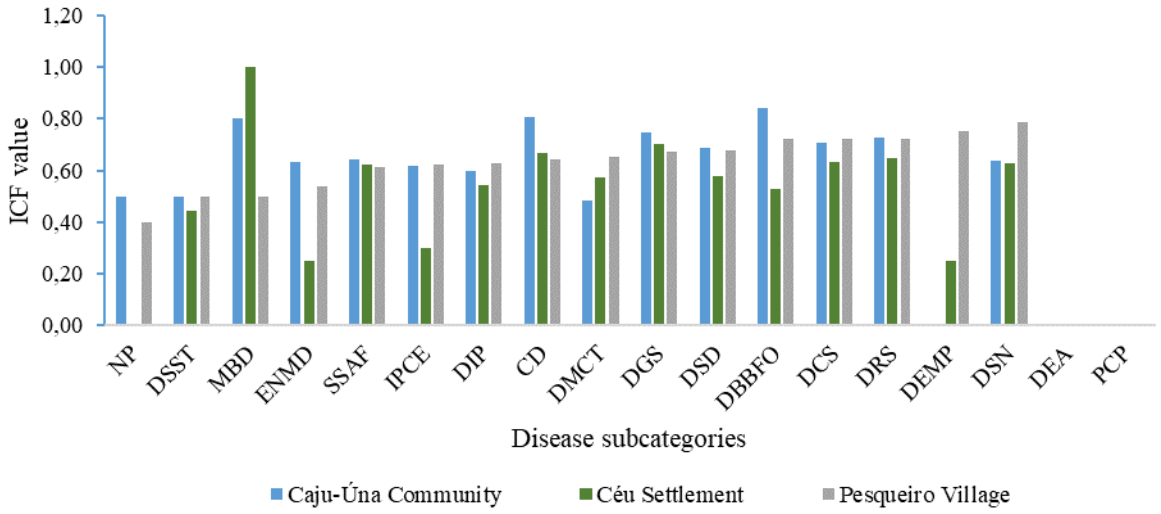
Thus, it was observed that, despite the different levels of diversity in the populations, there was a similar tendency of distribution of this ethnological knowledge on medicinal plants among all the evaluated communities. This analysis, as well as the origin and residence time of the respondents (62% were born and raised in the RESEX) confirmed that knowledge about plants is clearly linked to the traditionalism of the use and the dissemination of knowledge over time.

The Informant Consensus Factor (ICF) showed different values or the 18 subcategories of diseases or body systems (ICD-10). Diseases of the Blood and Blood-forming Organs (DBBFO) presented high values in Caju-Úna Community (ICF = 0.84), as well as Mental and Behavioral Disorders (MBD) in Céu Settlement (ICF = 1.0) and Diseases of the Nervous System (DNS) in Pesqueiro Village (ICF = 0.79) (Figure No. 3).

In the three communities, Diseases of the Eye and Adnexa (DEA) and Pregnancy, Childbirth and Puerperium (PCP) obtained indices equal to zero. This fact can be related to factors such as: low number of uses for diseases of these categories or high number of species applied to these purposes; an equivalent number of uses and species, as occurred in Céu Settlement for Neoplasms (NP); or non-use of plants for these purposes in the communities, as occurred in Caju-Úna Community for Diseases of the Ear and Mastoid Process (DEMP).

In this context, the following species can be highlighted: *Justicia secunda* Vahl Achantaceae ("Forsangue"), *Genipa americana* L. Rubiaceae ("Genipapo"), *Libidibia ferrea* (Mart. Ex Tul.) LP Queiroz Fabacecae ("Jucá"), *Fridericia chica* Lohmann Bignoniaceae ("Pariri") and *Dalbergia monetaria* L. f. Fabaceae ("Verônica") in the first category; and *Astrocaryum vulgare* Mart. Arecaceae ("Tucumã") in the second category. The later requires special attention because it was the only category in which the maximum FCI value (1) was detected. The species *Cinnamomum verum* J. Presl. Lauraceae (Cinnamon), *Cymbopogon citratus* (DC.) Stapf. Poaceae (Sea grass), *Lippia alba* (Mill.) N.E.Br. ex Britton & P. Wilson Verbenaceae (Mint herb) and *Mentha spicata* L. Lamiaceae (Mint) stood out in the third category.

Figure No. 3
Informant Consensus Factor (ICF) in Soure RESEX-Mar communities. Legends: NP: Neoplasms; DSST: Diseases of the Skin and Subcutaneous Tissue; MBD: Mental and Behavioral Disorders; ENMD: Endocrine, Nutritional and Metabolic Diseases; SSAF: Symptoms, Signs, and Abnormal Findings; IPCE: Injury, Poisoning and Other Consequences of External Causes; DIP: Infectious and Parasitic Diseases; CD: Cultural Diseases; DMCT: Diseases of the Musculoskeletal and Connective Tissue; DGS: Diseases of the Genitourinary System; DSD: Diseases of the Digestive System; DBBFO: Diseases of the Blood and Blood-forming Organs; DCS: Diseases of the Circulatory System; DRS: Diseases of the Respiratory System; DEMP: Diseases of the Ear and Mastoid Process; DNS: Diseases of the Nervous System; DEA: Diseases of the Eye and Adnexa; PCP: Pregnancy, Childbirth and Puerperium.



In synthesis, the categories of diseases identified by the ICF in the Soure RESEX-Mar differ from those with the highest number of citations in the free lists, considering that the calculations for this index are based not only on the uses, but also on the agreement of indications of species for the same therapeutic purpose.

The Informant Consensus Factor also shows that the species that stood out in these categories are culturally important and deserve further studies, as the index indicates important plants basically used for a single type of disease, and that for this reason could be replaced by those that have multiple applications in different healing purposes.

Other studies have also showed similar categories to those found in Soure RESEX-Mar, such as Maioli-Azevedo & Fonseca-Kruel (2007), who observed the same ICF value for the category Mental and Behavioral Disorders in Rio de Janeiro - RJ in their investigation of medicinal and ritualistic plants. The research by Oliveira *et al.* (2010) in rural communities of Oeiras - PI also highlighted Diseases of the Blood and Blood-forming Organs as the second most cited category, with ICF = 0.47, and Diseases of the Nervous System, with ICF = 0.6, which are lower than those calculated for the same categories in the Soure RESEX-Mar communities.

Nine species stood out with the highest Use Value and Importance Value (Table No. 3). *Copaifera martii* Hayne Fabacecae, *Maytenus obtusifolia* Mart. Celastraceae, *Ruta graveolens* L. Rutacaeae had high values in both indices, the latter two of which were outstanding in the same index (UCs) in different communities. It is noteworthy that some of the species here coincide with those that obtained the largest numbers of citations, considering the communities in general.

There was greater consensus of use for *M.obtusifolia* Mart. Celastraceae, *Copaifera martii* Hayne Fabaceae and *Mentha spicata* L. Lamiaceae, all with UV = 0.27 in Pesqueiro Village. Considering all the species, only 12 had values greater than or

equal to zero, thus positive values, but none reached the maximum value (UV = 1).

This implies that the species with the highest indices may even present a great multiplicity of medicinal uses, but in most cases they are applied by few people. These informants probably accumulate reports, experiences and recipes of a particular species, making such use well known and recurrent among a narrow group of respondents. Therefore, there is no consensus across all individuals in the communities.

Contrary to this reality, Silva *et al.* (2010) found high UV among plants cultivated by residents of the community of Igaraú in São Luis - Ma, where only 30% of the mentioned species obtained values lower than one. These values can be considered high in relation to those calculated in the Soure RESEX-Mar communities. This may be explained by the number of categories analyzed (food, medicinal, ornamental, spices and wood), for the number of species cited in the studies is very close (85 and 90) and the number of informants differs (30 and 76). Nevertheless, the indices in the Soure RESEX-Mar communities can serve as a guide for more specific studies on the validation of the therapeutic potential of these plants shared among traditional populations.

The greatest importance values were attributed to *Copaifera martii* Hayne Fabaceae, *Curatella americana* L. Dilleniaceae, *Gymnanthemum amygdalinum* (Delile) Sch.Bip. ex Walp. Asteraceae and *Kalanchoe* sp. Crassulaceae. These four species had IVs = 0.14 in Pesqueiro Village. It was noticed that these species were indicated as more important in Caju-Úna Community, Céu Settlement and Pesqueiro Village due to the their great versatility in the treatment of several diseases or because they are used for the treatment of specific diseases that the informants cope with, thus based on by their own experiences, as well as the experiences of relatives and acquaintances about the effectiveness of the species in the indicated treatments that are shared in the communities.

These species are generally readily accessible, found in many backyards, with the exception of *Copaifera martii* Hayne Fabaceae and *Curatella americana* L. Dilleniaceae, which are found in forest areas. This shows that the cultural relationship of users with plants found in different environments and the symbolic reasons are considered important. These plants are considered essential in the daily lives of these populations and are seen by many users as a resource that should not be exhausted. They are present around the houses and, in some cases, are constantly cared in order to avoid losing specimens.

Veiga & Scudeller (2011) recorded greater importance values in the medicinal category for *Bonamia ferruginea* (Choisy) Hallier f. Convolvulaceae (IV = 0.76) in the community of São João do Tupé – AM. This value is quite high when compared to the most important species in the Soure RESEX-Mar. This may be related to the nature of their study, which explored only backyards, where it is expected that the plants with which residents have more direct contact due to their cultivation receive greater importance. Moreover, the small number of informants (13 respondents) influences the values; this index is the result of the division of the number of informants who consider the species to be the most important by the total number of respondents.

Pharmacological properties

Based on the assumption that high agreement values for a species suggest its effectiveness in the treatment of a given disease and facilitate the selection of species for tests of efficacy of active principles (Friendman *et al.*, 1986), pharmacological information was collected only for the plants that stood out in terms of use value (UV) and importance value (IV).

The studies found in the literature on the pharmacological activity of these species (Table No. 3) corroborate 35% of the popular indications mentioned in Caju-Úna Community, Céu Settlement and Pesqueiro Village (Table No. 2). The literature sources were experimental pharmacological trials and were generally based on ethnopharmacological surveys that included these plants. The plant parts indicated by the populations or seen in the literature as most frequently used in preparations were those with a probable higher concentration of bioactive constituents.

Although ethnopharmacological investigations contribute to the production of herbal products, popular knowledge and use alone do not provide enough support for the use of these plants as medicinal products (Elisabetsky & Souza, 2004). In this sense, the correlation established between popular indications in the Soure RESEX-Mar and pharmacological studies is considered preliminary. It

is necessary to deepen the search for more studies with these plant parts used by people in Caju-Úna Community, Céu Settlement and Pesqueiro Village, and also studies grounded on the same principles of popular ways of preparation. Furthermore, it is interesting to gather phytochemical information already described for these species.

Table No. 3
Main species according to Use Values and Importance Values with respective pharmacological information. Legends: Nc = Number of citations; UV = Use Value NOS: Non-outstanding for this index in any community; IV: Importance Value; NS: Non-outstanding for this index in any community. ([a] Highlight for Caju-Úna Community; [b] Highlight forCéu Settlement; [c] Highlight forPesqueiro Village).

Species	Nc	UV	IV	Pharmacological studies (effects)
Astrocaryum vulgare Mart.	72	0.14[b]	NOS	Anti-inflammatory effect (Bony *et al.*, 2012);
Copaifera martii Hayne	55	0.27[c]	0.14[b]	Anti-inflammatory effect (Basile *et al.*, 1988); Cicatrization of cutaneous wounds (Brito *et al.*, 1998); Cicatrizant in ovaries (Brito *et al.*, 2000); Effects against gastric congestion (Brito *et al.*, 2001); Antimicrobial action (Bonan *et al.*, 2015)
Curatella americana L.	40	NOS	0.14[c]	Anti-inflammatory and analgesic effect (Alexandre-Moreira *et al.*, 1999); Antihypertensive effect (Guerrero *et al.*, 2002); Antiulcerogenic effect (Hiruma-Lima *et al.*, 2009); Antimicrobial activity (Toledo *et al.*, 2011)
Gymnanthemum amygdalinum (Delile) Sch. Bip. ex Walp.	42	NOS	0.14[c]	Anti-inflammatory and analgesic effect (Valverde *et al.*, 2001); Analgesic and antiulcerogenic effect (Frutuoso *et al.*, 1994); Antioxidant effect (Silva *et al.*, 2013)
Kalanchoe sp.	56	NOS	0.14[b]	Hepatoprotective activity (Yadav & Dixit, 2003); Analgesic effect (Nguelefack *et al.*, 2006); Antimicrobial activity (Fortes *et al.*, 2008); Anti-inflammatory, anti-oxidant, antiproliferative activity (Lai *et al.*, 2011)
Libidibia ferrea (Mart. exTul.) L. P. Queiroz	76	0.09[a]	NOS	Cardiovascular activity (Menezes *et al.*, 2007); Antimicrobial and antifungal activity (Sampaio *et al.*, 2009; Martins *et al.*, 2014); Antioxidant and hepatoprotective effect (Barros *et al.*, 2014); Antimicrobial, analgesic and anti-inflammatory effect (Araújo *et al.*, 2014); Cicatrizant action (Kobayashi *et al.*, 2015)
Maytenus obtusifolia Mart.	87	0.09[a] 0.27[c]	0.12[a]	Antiulcerogenic activity (Mota *et al.*, 2008)

Mentha spicata L.	39	0.27[c]	NOS	Increase of digestive enzymes (Sharathchadra *et al.,* 1995); Antioxidant effect (Elmastas *et al.,* 2006); Antibacterial activity (Padmini *et al.,* 2010)
Ruta graveolens L.	90	0.09[a] 0.05[b]	0.12[a]	Antimicrobialactivity (Ivanova *et al.,* 2005); Anti-inflammatory effect (Raghav *et al.*, 2006); Antiarrhythmic effect (Khori *et al.*, 2008); Arthritis (Ratheesh *et al.,* 2009); Antiulcerogenic (Zaidi *et al.,* 2012); Licerepellent (Moroni *et al.*, 2014); Antibacterialactivity (Orlanda & Nascimento, 2015)

Among the species with higher Values of Use and Importance Values, the occurrence of saturated and unsaturated fatty acids in the major components of the mixture, such as linoleic acid, oleic acid and palmisic acid, was observed in the chemical profile of the palm tree *Astrocaryum vulgare* (Rocha *et al*., 2014). For *Copaifera martii* oil, Leandro *et al*. (2012) and Veiga Junior and Pinto (2002) describe sesquiterpenes, α-copaene, β-589 caryophyllene, β-bisabolene, α and β-selinene, α-humulene and δ and γ-cadinene. In extracts ethanolics from *Curatella americana* leaves verified phenols and tannins, reducing sugars, saponins, steroids and triterpenoids, depsides and depsidones and alkaloids (Henriques & Almeida, 2013). In *Libidibia ferrea* are reported saponins, organic acids, reducing sugars, steroids and triterpenoids, phenols and tannins have been reported (Magalhães *et al*., 2015).

The planning of the pharmacological study with medicinal plants in the form of teas and extracts requires detailed investigations, due to numerous factors that make it difficult to prove in animal and human models, since they are complex and indefinite mixtures of active and other secondary principles that, besides varying consistently their composition, can be mutually reinforcing or antagonistic (Sixel & Pecinalli, 2005).

The chemical information about the same plant species may present divergences, considering factors such a altitude, temperature, rainfall indexes, seasonality, circadian rhythm, etc. (Gobbo-Neto & Lopes, 2007), which may produce variations in the content or concentration of compounds as the secondary metabolites in plants.

In this research, the species that had the highest number of citations and high values in the ethnobotanical indices were not always those on which the largest number of scientific studies is focused, suggesting the need to investigate these plants under new perspectives of popular indications, like those mentioned by the informants in this research.

CONCLUSIONS

Ethnobotanical knowledge is perpetuated in the daily practices of Céu Settlement and Pesqueiro Village communities in the Soure RESEX-Mar, considering that these people focus mainly on fish and crab fishery, but also maintain a close relationship with plant resources. In this scenario, the use of medicinal plants may be related to a poor health care system, difficult access to communities, and habits peculiar to the Amazonian culture that persist over time among the inhabitants.

The presence of professional medical care in these towns has not eliminated the traditional use of the flora in the treatment of diseases, being mainly employed in cases of common diseases such as flu, inflammations, stomach problems probably associated with risks typical of extractive activities related to fish and crab fishery, as well as diseases related to cultural beliefs.

The therapeutic potential of species indicated by the Informant Consensus Factor (ICF) to treat diseases of the blood and blood-forming organs, mental and behavioral disorders, and diseases of the

nervous system may represent interesting object for chemical and pharmacological research. The species *A. vulgare, C. martii, C. americana, G. amygdalinum, Kalanchoe* sp., *L. ferrea, M. obtusifolia, M. spicata* and *R. graveolens,* which stood out in the use values (UV) and importance values (IV) also deserve further studies.

Backyards and forest areas in the community are important sources of medicinal species and called attention to traditional practices of vegetation management that contribute to the maintenance of ethnobotanical knowledge and to the conservation of biological diversity. The fact of these peoples being inserted in a Conservation Unit favors the establishment of an apparently harmonious relationship between plant resources and the local society.

Knowledge of the local flora can also subsidize researches aimed at promoting the sustainability of plant resources and better living conditions of residents who directly depend on the environment in which they are inserted.

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