Journal of Medicinal Plants Studies
www.PlantsJournal.com

ISSN 2320-3862
JMPS 2017; 5(1): 164-170

Received: 21-11-2016
Accepted: 22-12-2016

Patrícia Chaves de Oliveira
Biodiversity and Forest Institute, Universidade Federal do Oeste do Pará (UFOPA), Santarém, Pará, Brazil

Jacqueline Braga
Master's Program in Natural Resources of Amazon (PPGRNA)-UFOPA Santarém, Pará, Brazil

Correspondence
Patrícia Chaves de Oliveira
Biodiversity and Forest Institute, Universidade Federal do Oeste do Pará (UFOPA), Santarém, Pará, Brazil

Ethnobotany of Borari-Arapiuns indigenous people, Amazon, Brazil

Patrícia Chaves de Oliveira and Jacqueline Braga

Abstract
The indigenous people in the Amazon have a wealth of traditional knowledge about use and management of plant species. Considering these populations live on remote areas from health centers, the use of medicinal plants is many times is the unique alternative to survive in disturbed social environment. Whereas the reproduction of traditional knowledge for future generations should preserved, this project aimed to characterize the plants used by Borari indigenous people from Novo Lugar Village, Santarém City, Pará State, Brazil. The methodology characterized for been conducted semi-structured interviews in order to obtain the relative frequency of quotes (RFQ) and the use value (UV). To determine the main therapeutic indication was used fidelity level (FL) and Rank Order Priority (ROP). The results showed 90 species useful from indigenous community; among the plants with higher RFQ are arruda (*Ruta graveolens*), buriti (*Mauritia flexuosa*), cupuaçu (*Theobroma grandiflorum*) and goiaba (*Psidium guajava*). The species with the highest UV were *Inga heterophylla* and *Carapa guianenses*. Diseases like stomachache; coughs, influenza and diarrhea could treated with these species and therefore, should be as priority in management and conservation programs to protect the health and survival of indigenous people in the Arapiuns region, Amazon.

Keywords: Ethnobotany, Amazon, indigenous, Borari-Arapiuns

1. Introduction
The colonization of Amazon from 1960s marked by violent occupation process and environmental degradation, without taking into account the peculiarities of the various Amazonian ecological areas and the wishes of the regional population. This process resulted in almost 600,000 km2 of ecosystems modified by the year 2000 (Vieira *et al*. 2005) [30]. Currently the environmental degradation scenario continues with the opening of new roads, increasingly within the forest; timber and mineral exploitation, not to mention the population increase (Hubbell *et al*. 2008) [11]. Tropical forests been reduced to their areas through deforestation for timber harvesting, exploitation of mineral resources, implementation of agricultural projects and criminal fires (Silva and Andrade 2005) [26].
In this context, live indigenous communities in the Amazon, far from health centers and therefore vulnerable; has with the use of medicinal plants, the only alternative to survive from many diseases, as respiratory or skin problems. In accordance with Menale *et al* (2016) [15], studying an ethnobotanical investigation carried out with communities of Vesuvius National Park (VNP), the majority of plants used in the treatment of gastrointestinal, skin and respiratory problems. Therefore, the globalization of social exclusion models of traditional people is reality.
The forest plays a key role in the lives of indigenous families, contributing even to the health of them under various diseases contexts. Moreover, the forest is also a source of food, such as fish and products of shifting cultivation of cassava and regional crops. Families also enjoy a large number of species for many household products such as lianas, splints, resins, seeds, leaves and roots. There is almost no marketing production, with low circulation coins, the Indians have difficulties to ensure their own economy, but it has the sale of cassava flour as one of the sources of income, which is the main activity for them.
The development of the Amazon requires alternative solutions for sustainable use, considering codes and laws of environmental and forest nature, in view of the need to reconcile economic and social development with environmental preservation (Valois 2003) [23]. In this context, ethno biological studies can contribute, as they represent a key tool in the management strategies of development process by providing ecological information, social and economic that can

result in better development plans adapted to local conditions (Barroso *et al*. 2010) [5].

Ethnobotany is then shows an important tool for analyzing the sustainability of natural resources through research the relationship people/plants in order to register and know the strategies and knowledge of local people (Albuquerque 2010) [1]. Queiroz (2005) [19] mentions that the combination of scientific knowledge and traditional is extremely beneficial and contributes significantly to environmental preservation. It is visible the role that traditional peoples play in the exploitation of natural environments, providing information on the different ways of handling performed in their daily lives and enjoying the exploration as a way to support these people (Pasa *et al*. 2005) [17]. The ethnobotany been an actually, a science that make possible a valorization of traditional knowledge of natives communities, but more than this, a sophisticate way of survive. As showed Samoisy and Mahomoodally (2016) [21], a ninety-seven plants belonging to 49 families recorded to be in common use as monotherapy (80 plants) and/or as part of polyherbal preparation (23 plants) for the treatment and/or management of 16 different communicable diseases in Rodrigues Island.

Although understand the knowledge of local people can be an important element in discussions on the use of resources (Albuquerque 2010) [1]. For Diegues (2001) [8] the form of use natural resources related to the culture of each population so that the indigenous and riverine relationship has contributed to the preservation of much of tropical forests, as in many cases this relationship is true symbiosis. Thus, the objective of this work was to make an ethnobotanical survey of the species used in the Novo Lugar (New Place) indigenous community, west of Pará state, Brazil, in order to record the traditional knowledge of indigenous Borari and explicit the needs of plant medicinal conservation in Amazon region.

2. Material and Methods

The local of study was the New Place community (55.8º W, 2.9 ºS) located at the left bank of Maró River, a tributary of Arapiuns river in front of Tapajós- Arapiuns Extractive Reserve (RESEX Tapajos–Arapiuns), Santarém, West of Pará, Brazil. This community is part of Gleba Nova Olinda I a huge amount of area for nature conservation with unknown biodiversity, and refuge for endemic and endangered species, with hight importance in maintaining of environmental local services (Dhesca, 2011) [7]. Composed of 14 communities, among which three indigenous: 1. San Jose, 2.Maró Waterfall and 3. Novo Lugar (New Place) where live indigenous people, identified as groups of Arapiuns and Borari ethnicity. Currently, the indigenous areas are in process of legalization, approximately 42.373ha and unfortunately is a territory of social conflicts with death of indigenous leaders in the past 10 years.

The New Place community have a traditional way of life whose livelihood based on plant and animal extraction from Amazon forest with a little agricultural areas, called *roçados*, with 0, 5 hectare approximately where cassava and beans was cultivated.

Interviews conducted with application of semi-structured questionnaires (Albuquerque 2010) [1] in nine of the seventeen families of New Place community. The interviews made with the aid of second *cacique* (political leader). In each residence, usually the oldest people of the house interviewed. The plants from families, collected, identified and deposited in herbarium of National Institute for Research in the Amazon-INPA.

2.1 The ethnobotanical parameters studied was

1. Relative Frequency of Citation (RFC): RFC = FC / N, where FC is the number of respondents who mentioned the use of certain species and N is the total number of respondents (Tardío and Pardo- de- Santana, 2008) [26].
2. Use value (VU): was calculated according to the methodology described by Rossato *et al*. (1999) [20], VU = (Σ U) / N, where ΣU is the sum of the number of plant uses cited by informants divided by the total number of informants (N).
3. Level of fidelity (FL): in accordance with Friedman *et al*. (1986) [10], the FL based on the agreement between the responses of informants to main therapeutic indication. FL = (Ip/Iu) x 100%, where Ip is the number of respondents those cited the same plant use and Iu is the number of medicinal uses of given species.
4. Rank of Order Priority (ROP): this parameter combined with FL, calculates the relative popularity of medical plants which is given by ROP = FL x RP;
5. Relative Popularity (RP): given by the ratio of the number of respondents who cited a given species per the number of respondents who cited the most frequently cited species (Friedman *et al*. 1986) [10].

3. Results and Discussions

Ninety ethno species (Table 1) useful to the New Place community cited, which classified into three categories: medicinal, food and handcrafts. The result of the multivariate analysis, through the Friedman test (Table 2) showed significant differences ($p = 0.0128$) in the knowledge of families by category, especially when comparing the categories, medicinal and artisanal ($p > 0.05$). It can be seen (Figure 1), the number of mentioned medicinal plants is significantly higher than the other categories. Silva and Andrade (2005) [25] point out that in several papers this category is among the most representative. Other authors emphasize the importance of this category (Pasa 2011; Anderson and Posey 1985) [16, 4]. Junior and Pinto (2005) [29] argue that the use of medicinal plants in developing countries like Brazil, is due to easy to obtain and tradition in using them. However, the fact that despite the advances of allopathic medicines, even there are basic obstacles to their use by the poorest segments of the population, ranging from hospital care access. For Amoroso and Gély (1988) [3], in many cases, medicinal plants represent the only therapeutic option available to the population.

The food category, although it has registered a significant number of species did not differ significantly from the medicinal and handcraft categories, Table 2 and Figure 2 ($p > 0.05$). There was a predominance of fruit species, such as buriti (*Mauritia flexuosa* L.), cupuaçu (*Theobroma grandiflorum* Schum.) and guava (*Psidium guajava* L.). Among the craft species, the main species are palm trees, such as arumã, patauá and buriti, used to make utensils such as sieves, tipiti, flappy, balaio, panacú and jamanchim. Some species used to make bio-jewels, such as the Açai (*Euterpe oleracea* Mart), chuburana (*Cardiospermum halicacabum* L.) and puçá (*Canna indica* L.)

Analysis of Shannon-Wiener (Table 3) showed that in a universe of nine families studied, there is a greater diversity of medicinal plants (0.8259), followed by food (0.7476) and artisanal (0.6461). The index also showed that there is a greater evenness in the knowledge of families for medicinal plants, ie knowledge among families is homogeneous (0.8655) and there is a consensus in the responses. The

greatest diversity of medicinal plants is justifiable from the cultural point of view, since the use of plants to treat diseases is longstanding among the natives, but also due to the precariousness of the health system. They often report that when they use the basic health units do not have access to medicines, so the simplest diseases such as flu and stomachaches treated with home remedies. Similar results we found it. Residents said treated with home remedies, in some communities there are experts in traditional medicine as chanters, handles and deniers; in indigenous communities, *shamans* take on this role (IDEFLOR 2009) [12]. Corroborating the verified in this study, Freitas and Fernandes (2006) [9] argue that medicinal plants are the primary means of treating diseases for most people due to cultural influences and the prohibitive cost of pharmaceuticals.

The Figure 3 shows how each family contributed to the value of the full range of each parameter (food, medicines and craft), where it was observed that the first family was mentioned that most species. The diversity by category also measured using the Simpson Index. Table 4 shows that as the Shannon-Wiener noted greater diversity for medicinal plants, but in addition, exhibited the contributions for each family to total diversity of each category.

Statistical analysis using the Friedman Test identified that traditional knowledge in the use of parts of plants showed very significant differences (p = 0.0013) when analyzing overall. However, the comparison between the ranks, there was significant difference (p> 0.05) only when comparing the rank leaves with ranks 3, 4, 5, and 6 respectively, bark, seed, root and stem, the comparison between the other ranks was not significant as shown in Figure 4. Thus, the leaves representing the organ of the most widely used, they used mainly in the preparation of medicines, suggesting that the home remedies represent an alternative treatment in the community. For Zuchiwschi *et al*. (2010) [32], the use of one or another organ, directly related to daily needs and way of life and community.

The test of Shannon-Wiener (Table 5) for the analysis of diversity in the use of different plant organs, pointed out that the indigenous families of New Place community, make use of a great diversity of species whose leaves are the main parts used, with index diversity of 0.8692, followed by seeds (0.7264) and fruits (0.6460). The lowest rate was recorded to peel (0.4647) which was also the least homogeneous parameter (0.4869), so where there was less agreement on the answers, because although a number sample relatively high, only four families mentioned make use of bark, as seen in Figure 4. As already mentioned, the sheets mainly used in the preparation of medicines in the form of tea. Results similar to those, found by Amoroso and Gély (1988) [3] in Barcarena, Pará state, where the leaves account for 49% of the uses. Freitas and Fernandes (2006) [9] in Bragança, Pará, observed the follow distribution; bark (29%), leaves (28%) and root (17%). Ahmed *et al* (2014) studying indigenous medicinal knowledge of plants and herbal remedies used as folk medicines in Cholistan desert, Punjab Province, Pakistan. reported the same importance for leaves; were the dominant over others with 26.4% used in herbal preparations followed by the stem (25.2%), fruit (21.5%), flower (16.3%), seed (6.5%), bark and pod (02%).

The analysis of diversity for plant organs through the Simpson index (Table 6) greater diversity to sheets (0.8408), followed by seeds (0.7934) and fruit (0.7242), and lower diversity for shells (0.6094). Moreover, it showed the proportion of the contribution of each family for the full diversity.

The Table 7 shows the results of Relative Frequency of Citation (RFC) for intervals, showing Absolute Frequency of species used in New Place. Among the 90 species mentioned (Figure 4) by the indigenous people of New Place community, plants with higher RFC (Figure 5) are, rue (*Ruta graveolens* L.), Buriti (*Mauritia flexuosa L.*), cupuaçu (*Theobroma grandiflorum* Schum.) and guava (*Psidium guajava* L.). Table 8 shows the results of 11 species with the highest RFC and Valor Use (VU) therefore more useful and relevant among the 90 species cited. The species Inga (*Inga heterophylla* Willd.), Andiroba (*Carapa Guyanese* Aubl.), Banana (*Musa sp*.), Rue (*Ruta graveolens* L.), Buriti (*Mauritia flexuosa* L.) and guava (*Psidium guajava* L.) showed higher-value use. For each kind of traditional knowledge about medicinal plants, distinct use value (UV) for species are used. By this way, Ahmed *et al* (2014) studied that *Haloxylon recurvum* exhibited the highest use vale (UV) 0.83 while least UV exhibited by *Mollugo cerviana* that was 0.16. The analysis of FL (Fidelity level) on Table 9 for the medicinal species cited confirmed there is consensus in therapeutic indications conform observed in other studies. Arruda (FL = 100) was indicated in the treatment of stomach and stomach pain. Van Den Berg & Silva (1988) [28], studying the medicinal flora of Roraima, found that arruda, as well as New Place community is used to treat stomach aches, but also in combating liver problems and as an abortifacient. Andiroba (FL = 100), as healing, cough, flu and pneumonia. Guava and urubucaá (*Aristolachia trilobata* L.) with FL = 100 were indicated to combat intestinal problems such as stomachaches. The pharmacological properties of *P. guajava* are multiple: antimicrobial, antimutagenic, antioxidant, anti-inflammatory among other (Begum *et al* 2002; Sanchez *et al* 2005) [6, 22]. According Begum *et al*. 2002 [6] different parts of *P. guajava* been used in Indian system of medicine for the treatment of various diseases such as wounds, ulcers, intestinal problems, cholera, sheets are used primarily to combat digestive diseases. The main disease per region, determine the plant species to be use. If in the Amazon, diseases as pneumonia and intestinal problems are the critical points in order do South Nigeria, the malaria is a main problem. In accordance with *Fabaceae* was the most represented family having fourteen (14) plant species indicates to malaria. *Azadirachta indica* was the species of highest relative frequency of citation (RFC – 1.0). The Table 9 also shows through the Rank Order Priority (ROP), the most important medicinal plants for health of indigenous of New Place community. Arruda (*R. graveolens)* and Guava (*P. guajava*) was the highest ROP. However, other plants was found for Ali- Shtayeh *et al* (2000) [23] studied an ethnobotanical was carried out in the West Bank to evaluate the relative efficacy of the plants used to treat skin diseases and prostate cancer. The following plant species classified as popular (hight ROP) in this study: *Teucrium polium, Matricaria aurea, Urtica pilulifera, Paronychia argentea, Petroselinum sativum,* and *Salvia fruticosa*. The remaining 57 species classified as 'unpopular'. Considering the ROP is a local variable because the local culture associated with typical ecosystem determine the Rank Order Priority of medicinal plants, than this is a parameter that we cannot globalize it.

Table 1: List of species used by Borari-Arapiuns indigenous, Maró Territory, Santarém, Pará, Brazil.

	Popular name	Family	Specie
1	Abacate	*Lauraceae*	*Persea americana Mill.*
2	Abacaxi	*Bromeliaceae*	*Ananas comosus (L.) Merril*
3	Açai	*Arecaceae*	*Euterpe oleraceae Mart.*
4	Alfavaca	*Lamiaceae*	*Ocimum basilicum L.*
5	Algodão branco	*Malvaceae*	*Gossypium herbaceum L.*
6	Algodão roxo	*Malvaceae*	*Gossypium arboreum L.*
7	Ambé	*Araceae*	*Philodendron imbe hort. ex Engl.*
8	Amor crescido	*Portulacaceae*	*Portulaca pilosa L.*
9	Anador	*Amaranthaceae*	*Alternanthera ficoidea (L.)*
10	Anani	*Rapataceae*	*Rapatea paludosa Aubl.*
11	Andiroba	*Meliaceae*	*Carapa guianensis Aubl.*
12	Apui	*Moraceae*	*Ficus nymphaefolia Mill.*
13	Araçá	*Myrtaceae*	*Psidium guineense Sw.*
14	Araticum	*Annonaceae*	*Annona montana Macf.*
15	Arraiacaá	*Piperaceae*	*Peperomia rotundifolia (L.) Kunth*
16	Arruda	*Rutaceae*	*Ruta graveolens L.*
17	Arumã	*Marantaceae*	*Ischnosiphon obliquus (Rudge) Korn.*
18	Bacaba	*Arecaceae*	*Oenocarpus bacaba Mart*
19	Banana	*Musaceae*	*Musa sp.*
20	Breu branco	*Burseraceae*	*Protium altsonii Sandwith*
21	Buriti	*Arecaceae*	*Mauritia flexuosa L.*
22	Caatinga de mulata	*Scrophulariaceae*	*Aelanthus suaveolens L.*
23	Cajú	*Anacardiaceae*	*Anacardium occidentale L.*
24	Cama de menina	*Selaginellaceae*	*Selaginella sp.*
25	Cana de açucar	*Poaceae*	*Saccharum officinarum L.*
26	Cana mansa	*Zingiberaceae*	*Costus spiralis (Jacq.) Rosc.*
27	Capim laranja	*Poaceae*	*Hyparrhenia bracteata (Humb. & Bonpl. Ex Willd.) S*
28	Cará	*Dioscoreaceae*	*Dioscorea sp.*
29	Carcanfo	*Lamiaceae*	*Ocimum minimum L.*
30	Carmelitana	*Verbenaceae*	*Phyla scaberrima (Juss. Ex Pers.) Moldenke*
31	Castanha do pará	*Lecythidaceae*	*Bertholletia excelsa Bonpl.*
32	Chicoria	*Apiaceae*	*Eryngium foetidum L.*
33	Chumburana	*Sapindaceae*	*Cardiospermum halicacabum L.*
34	Cidreira	*Verbenaceae*	*Lippia alba (Mill.) N.E. Br. Ex Britton & P. Wilso*
35	Cipó Verônica	*Sapindaceae*	*Serjania paradoxa Radlk*
36	Cipó-alho	*Bignoniaceae*	*Adenocalymma sp*
37	Coco	*Arecaceae*	*Cocos nucifera L.*
38	Copaiba	*Caesalpinoideae*	*Copaifera sp.*
39	Couve	*Brassicaceae*	*Brassica oleraceae L.*
40	Crajirú	*Bignoneaceae*	*Friedericia chica (Bonpl.) L.G.Lohmann*
41	Cuju-açu	*Anacardiaceae*	*Anacardium spruceanum Benth. Ex Engl*
66	Mucuracaá	*Phytolaccaceae*	*Petiveria alliacea L.*
67	Murici	*Malpighiaceae*	*Byrsonima spicata (Cav.) DC*
68	Murici pequeno	*Malpighiaceae*	*Byrsonima crassifolia (L.) Kunth*
69	Muruí	*Moraceae*	*Brosimum obovata Ducke*
70	Patauá	*Arecaceae*	*Oenocarpus bataua Mart.*
71	Pau-de- angola	*Piperaceae*	*Piper sp*
72	Pavamacaa	*Clusiaceae*	*Symphonia globulifera L.f.*
73	Pinpoca	*Euphorbiaceae*	*Croton colanaceus (Müll.Arg.) Gl. Webster*
74	Pião branco	*Euphobiaceae*	*Jatropha curcas L.*
75	Piquiá	*Caryocaraceae*	*Caryocar villosum (Aubl.) Pers.*
76	Puerá	*Canna*	*Canna indica L.*
77	Pupunha	*Arecaceae*	*Bactris gasipaes Kunth*
78	Rosa cumaacá	*Cactaceae*	*Pereskia grandifolia Haw.*
79	Salvia de marajó	*Verbenaceae*	*Lantana grandis Schum*
80	Sara tudo	*Acanthaceae*	*Justicia brasiliana Roth*
81	Sucuba	*Apocynaceae*	*Himatanthus sucuuba (Spruce ex Müll.Arg.) Woodson*
82	Tajá branco	*Araceae*	*Caladium sp.*
83	Taperebá	*Anacardiaceae*	*Spondias mombim L.*
84	Tucumã	*Arecaceae*	*Astrocaryum vulgare Mart*
85	Ubi liso	*Smilacaceae*	*Smilax polyphylla (Kunth) Wilbur Thomas*
86	Ucuuba preta	*Myristicaceae*	*Virola sebifera Aubl.*
87	Unha de gato	*Rubiaceae*	*Uncaria tomentosa (Willd. Ex R & S) DC*
88	Urubucaá	*Aristolochiaceae*	*Aristolochia trilobata L.*
89	Vick	*Lamiaceae*	*Mentha arvensis L.*

Table 2: Results of Friedman Test (nonparametric) for analysis of variance about traditional knowledge of medicinal, food and handcrafts plants reported from nine indigenous families in New Place community, Maró Territory, Santarém-Amazon, Brazil. ***Ns** non-significative under 0.05 of ***p*** (probability).

Parameters	Medicinal plants	Food plants	Handcraft plants
Sum of Ranks	24.5000	17.5000	12.0000
Average Ranks	2.7222	1.9444	1.3333
Average value	8.7778	4.5556	2.2222
(p)	**0.0128**		
	Diference	(p)	
Ranks 1 e 2	7	Ns*	
Ranks 1 e 3	**12.5**	**< 0.05**	
Ranks 2 e 3	5.5	Ns	

Table 3: Results of Shannon-Wiener Test for analysis of medicinal plant diversity, food plant diversity and handcraft plant diversity in indigenous population (9 families) and the wealth and evenness aspects Maró Indigenous Territory.

Parameters	Medicinal plants	Food plants	Handcraft plants
Sample amount	79	41	20
Shannon-Wiener Index	**0.8259**	0.7476	0.6461
Maximum diversity	0.9542	0.9542	0.9542
Homogenity	**0.8655**	0.7835	0.6771
Heterogenity	0.1345	0.2165	0.3229

Table 4: Results of Simpson's Diversity Index as the medicinal, food and handcraft plants in an indigenous population (9 families) and their respective proportions (pi) in the Community of New Place Territory Maró, Amazon, Brazil.

Parameters	Medicinal plants	Food plants	Handcraft plants
Indigenous Families	9	9	9
Total of species	79	41	20
Simpson's Diversity Index	**0.8079**	0.7817	0.7450
p 1	**0.3544**	**0.3415**	**0.4000**
p 2	0.0253	0.0244	0.0000
p 3	0.0759	0.1951	0.1500
p 4	0.1519	0.0488	0.0000
p 5	0.0380	0.0976	0.1000
p 6	0.1139	0.0244	0.1500
p 7	0.1266	0.2195	0.0000
p 8	0.0633	0.0000	0.0000
p 9	0.0506	0.0488	0.2000

Table 5: Results of the Shannon-Wiener Test for diversity analysis regarding the use of different organs of medicinal, food and handicraft plants in indigenous population (9 families) with aspects of wealth and equitability, Maró Indigenous Territory.

Parameters	- 1 – Leaves	- 2 – Fruits	- 3 – Bark	- 4 – Seeds	- 5 – Roots	- 6 – Trunk
Size of Sample	70	31	16	11	8	5
Number of Families	9	9	9	9	9	9
Shannon-Wiener Index	**0.8692**	0.6460	0.4647	0.7264	0.5268	0.5786
Maximum diversity	0.9542	0.9542	0.9542	0.9542	0.9542	0.9542
Homogenity	**0.9108**	0.6769	**0.4869**	0.7612	0.5521	0.6063
Heterogenity	0.0892	0.3231	0.5131	0.2388	0.4479	0.3937

Table 6: Results of the Simpson Diversity Index regarding the use of different organs of medicinal, food and handicraft plants in an indigenous population (9 families) and their respective proportions (pi) in the New Place Community, Maró Indigenous Territory, Santarém, Pará, Brazil.

Parameters	- 1 – Leaves	- 2 – Fruits	- 3 – Bark	- 4 – Seeds	- 5 – Roots	- 6 – Trunk
Families (sample)	9	9	9	9	9	9
Total of species	70	31	16	11	8	5
Simpson Index	**0.8408**	0.7242	0.6094	0.7934	0.6563	0.7200
p 1 (family 1)	**0.2857**	0.3871	0.4375	0.2727	0.5000	0.4000
p 2 (family 2)	0.0286	0.0000	0.0625	0.0000	0.0000	0.0000
p 3 (family 3)	0.1286	0.1935	0.0000	0.0000	0.0000	0.2000
p 4 (family 4)	0.1571	0.0323	0.0000	0.0000	0.0000	0.2000
p 5 (family 5)	0.0429	0.0323	0.0000	0.0909	0.2500	0.0000
p 6 (family 6)	0.1000	0.0323	0.4375	0.1818	0.1250	0.0000
p 7 (family 7)	0.1143	0.2903	0.0625	0.0909	0.1250	0.0000
p 8 (family 8)	0.0571	0.0000	0.0000	0.0909	0.0000	0.2000
p 9 (family 9)	0.0857	0.0323	0.0000	0.2727	0.0000	0.0000

Table 7: Classes Distribution of Relative Frequency of Plant Species Citations (FRC = Number of informants who quoted the species / Total number of informants) by nine indigenous families, New Place Community, Maró Indigenous Territory.

Classes	Fi	Percentage
0.10 |— 0.18	56	61,54%
0.18 |— 0.26	24	26,37%
0.26 |— 0.34	7	7,69%
0.34 |— 0.42	4	4,40%
0.42 |— 0.50	0	0%
TOTAL	91	100%

Table 8: Eleven species with the highest Relative Frequency of Quotations (RFC) and Use Value (VU), for New Place Indigenous Community, Maró Territory, Pará, Brazil

Specie	RFC	VU
Arruda	0,4	1,25
Buriti	0,4	1,25
Cupuaçu	0,4	1
Goiaba	0,4	1,25
Urubucaá	0,3	1
Arumã	0,3	1
Andiroba	0,3	1,66
Ingá xixi	0,3	2
Murici	0,3	1
Banana	0,3	1,33
Algodão roxo	0,3	0,42

Table 9: Index of Main Indication Therapeutic (FL) and Priority of Ordination (ROP), for the most cited medicinal plants in indigenous settings, Maró Indigenous Territory, Santarém. Pará, Brazil

	FL	ROP
Arruda	100	100
Andiroba	100	75
Goiaba	100	100
Algodão roxo	66,6	50
Urubucaá	100	75

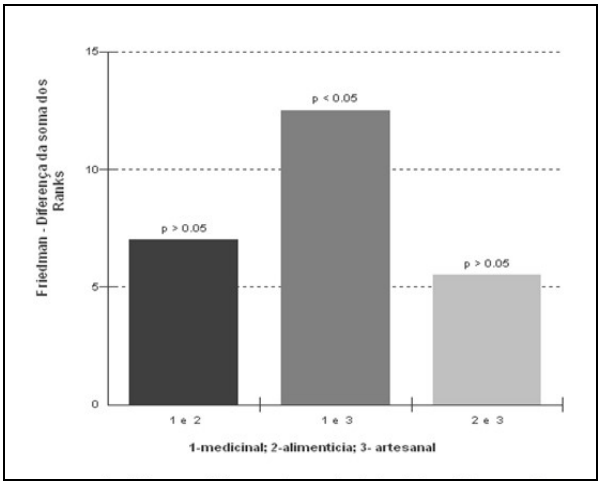

Fig 1: Number of plant species (axis Y) on medicinal category (Med), food category (Ali) and handcraft plants category (Art) reported from traditional knowledge from nine indigenous families (axis X) by application Shannon-Wiener test in Indigenous Territory Maró, Amazon, Brazil.

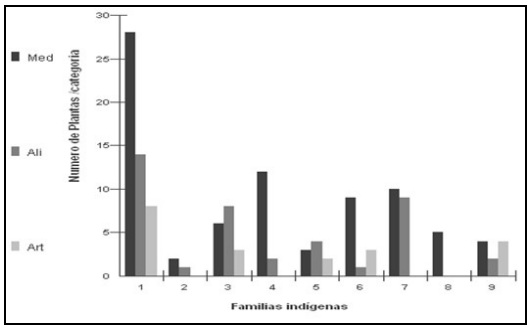

Fig 2: Friedman Test for analysis of variance (Ranks, axis Y) on traditional knowledge about organs (1. Leaves; 2. Fruits; 3. Bark; 4. Roots; 5. Seeds; 6. Trunk) that are used for medicinal, food and handicraft purposes; New Place Indigenous Community – Maró Territory, Santarém, Pará, Brazil.

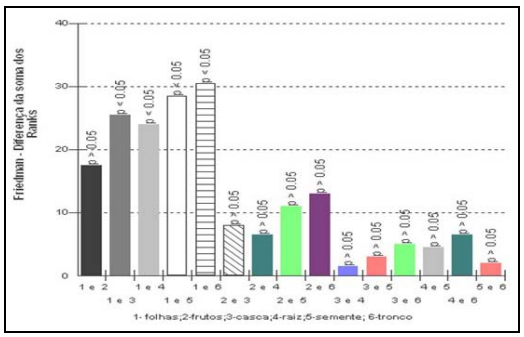

Fig 3: Shannon-Wiener Test for analysis of the diversity use of different plant organs (axis Y) (Fol=Leaf; Fru =fruits; Cas= Bark; Sem= seeds; root = Rai=roots; Tro=Trunk) by indigenous families (axis X) Maró Territory, Santarém, Pará, Brazil.

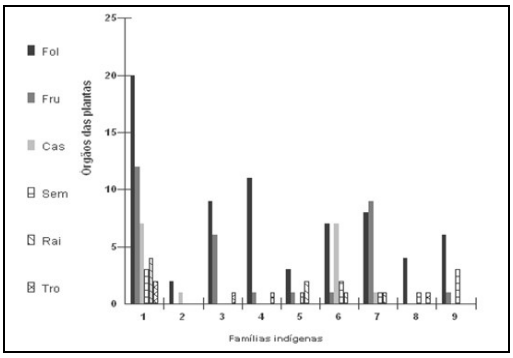

Fig 4: Relative Frequencies of Plant Citations (axis Y) of 90 Species (axis X) of medicinal, food and artisanal importance by nine families of the Maró Indigenous Territory, Santarém, Pará, Brazil.

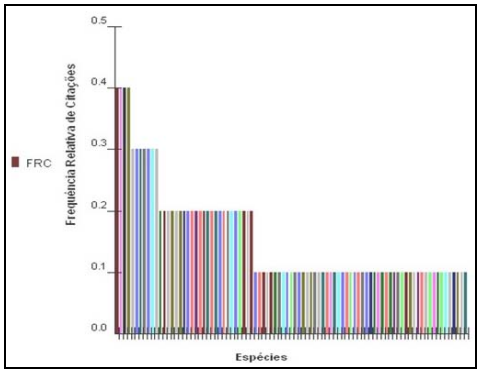

Fig 5: Main Relative Frequencies of Citations (FRC, axis Y) of Species (axis X) for medicinal and food use in indigenous, Maró Indigenous Territory, Santarém

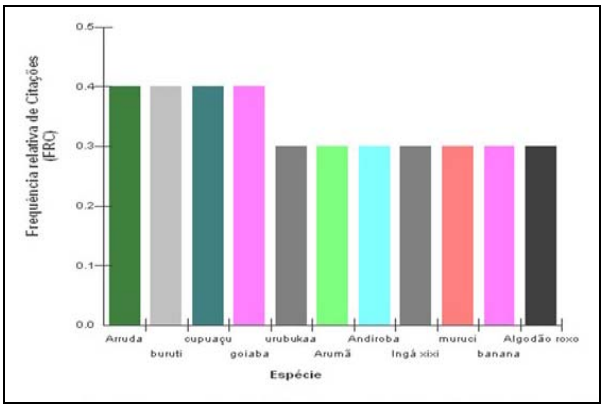

Fig 6: main relative frequencies of (frc, axis y) of medicinal and food use in indigenous territory, Santarem

4. Conclusions

Indigenous families of New Place community have a broad knowledge on the available plant resources and make use of a wide variety of them, mainly used in the preparation of medicines. Andiroba (*Carapa guianensis* Aubl.), Rue (*Ruta graveolens* L.), arumã (*Ischnosiphon obliquus* (Rudge) Korn.), Purple cotton (*Gossypium arboreum* L.), banana (*Musa sp*.), Buriti (*Mauritia flexuosa* L.), cupuaçu (*Theobroma grandiflorum*), guava (*Psidium guajava* L.), ingá pee (*Inga heterophylla* Willd.) murici (*Byrsonima crassifolia* (L.) Kunth) and urubucaá (*Aristolachia trilobata* L.) are the most important species for have higher Relative Frequency of Citations and greater value of Use. These species are therefore beyond endurance instruments of indigenous peoples in their territories, are also bio sustainability indicators of a local indigenous culture and therefore require actions for conservation and management.

5. References

1. Albuquerque UP, Lucena RFP, Cunha LVFC. Methods and techniques in ethnobotanical research and etnoecology. / series: studies & advances, 2010, 1.
2. Ahmed N, Mahmood A, Tahir SS, Bano A, Malik RN, Hassan S *et al*. Ethno medicinal knowledge and relative importance of indigenous medicinal plants of Cholistan desert, Punjab Province, Pakistan. Journal of Ethnopharmacology, 2014; 155(2):1263-1275.
3. Amorozo MCM, e Gély A. Use of medicinal plants by *Caboclos* of, Barcarena, Pará, Brazil. Boletim Museu Paraense Emílio Goeldi, Botânica 1988; 4:47-131.
4. Anderson AB, Posey DA. Cerrado management by the Kayapo Indians. Boletim do Museu Paraense Emílio Goeldi. 1985; 2:77-98.
5. Barroso RM, Reis A, Hanazaki N. Ethnoecology and ethnobotany of juçara palm (*Euterpe edulis Martius*) in the Ribeira Valley quilombo communities, São Paulo. Acta Botânica Brasílica. 2010; 24:518-528.
6. Begum S, Hassan SI, Siddiqui BS, Shaheen F, Ghayur M N, Gilani AH. *Triterpenoids* from the leaves of Psidium guajava. Phytochemistry 2002; 61:399-403.
7. DHESCA. Report of the mission to the Indigenous Territory Maró. Brasília, 2011.
8. Diegues AC. The modern myth of untouched nature. HUCITEC. São Paulo, 2001.
9. Freitas JC, Fernandes MEB. Use of medicinal plants by the Enfarrusca community, Bragança, Pará. Boletim Museu Paraense Emilio Goeldi, Ciências Naturais, Belém, 2006; 1:11-26.

10. Friedman J, Yaniv Z, Dafni A, Palewith D. A preliminary classification of the healing potential of medicinal plants, base analysis of an Ethno pharmacological field survey among Bedouins in the Neveg desert, Israel. Journal of Ethnopharmacology. 1986; 16:275-287.
11. Hubbel SP, Steege JHT. How many tree species are these in the Amazon and how many of them will go extinct? Proceedings of the National Academy of Sciences of the United States of America, 2008; 105:11498-11504.
12. IDEFLOR. Project of community development: Strengthening agroforestry and extractive economy of communities in the Gleba Nova Olinda, 2009.
13. Ilya SM, Migliato KF, Vellosa JCR, Sacramento LVS, Pietro RCLR, Isaac VLB *et al*. Phytochemical study of guava (*Psidium guajava* L.) with antioxidant potential for the development of phytocosmetics. Revista Brasileira de Farmacognosia, 2008; 18:387-393.
14. Iyamah PC, Idu M. Ethno medicinal survey of plants used in the treatment of malaria in Southern Nigeria. Journal of Ethnopharmacology, 2015; 173:287-302.
15. Menale B, De Castro O, Cascone C, Mucio R. Ethnobotanical investigation on medicinal plants in the Vesuvio National Park (Campania, Southern Italy). Journal of Ethnopharmacology. 2016; 192:320-349.
16. Pasa MC. Local knowledge and traditional medicine: ethnobotany in Cuiabá, Mato Grosso, Brazil. Boletim Museu Paraense Emilio Goeldi, Ciências Humanas, 2011; 6:179-196.
17. Pasa MC, SOARES JJ, GUARIM NETO G. Ethnobotanical study in Conceição-Açu community (alto da bacia do rio Aricá Açu, MT, Brasil). Acta botânica brasílica, 2005; 19:195-205.
18. Projeto Saúde, Alegria Maró. Indigenous Land. Santarém. Pará. Brazil, 2011.
19. Queiroz HL. Sustainable Development, Mamirauá Reserve. Estudos Avançados, 2005, 19.
20. Rossato SC, Leitão Filho H, Begossi A. Ethnobotany of Caiçaras of the Atlantic Forest Coast (Brazil). Economic Botany. 1999; 53:387-395.
21. Samoisy AK, Mahomoodally F. No pharmacological appraisal of culturally important medicinal plants and polyherbal formulas used against communicable diseases in Rodrigues Island. Journal of Ethnopharmacology, In Press. 2016.
22. Sanches NR, Cortez DAG, Schiavini CVN, Dias Filho BP. An evaluation of antibacterial activities of *Psidium Guajava* (L.). Brazilian Archives of Biology and Technology, 2005; 48:429-436.
23. Ali-Shtayeh MS, Yaniv Z, Mahajna J. Ethnobotanical survey in the Palestinian area: a classification of the healing potential of medicinal plants. Journal of Ethnopharmacology, 2000; 73(1-2):221-232.
24. Signorini MA, Piredda M, Bruschi P. Plants and traditional knowledge: an ethnobotanical investigation on Monte Ortobene (Nuoro, Sardinia). Journal of Ethnobiology and Ethno medicine. 2009; 5:6.
25. Silva AJR, Andrade LHC. Northeast Ethnobotany: a comparative study of the relationship between communities and vegetation in the coastal zone - Mata do Estado de Pernambuco, Brazil. Acta Botânica Brasílica, 2005; 19:45-60.
26. Tardío J, Pardo-de-Santana M. Cultural importance indices: a comparative analysis based on useful wild plants of Southern Cantabria (Northern Spain). Economic Botany, 2008; 62:24-39.
27. Valois ACC. Benefits and sustainable use strategies on Amazon, 2003.
28. Van Den Berg ME, Silva MHL. Contributions of Medicinal Plant of Roraima. Acta Amazonica, 1988; 18:23-35.
29. Veiga Júnior VF, Pinto AC. Medicinal plants: safe cure? Química Nova, 2005; 28(3):519-528.
30. Vieira ICG, Silva JMC, Toledo PM. Strategies to prevent the loss of biodiversity in the Amazon. Estudos Avançados, 2005, 19.
31. Yaseen G, Ahmad M, Zafar M, Sultana S, Kayani S, Cetto AA, Shaheen S. Traditional management of diabetes in Pakistan: Ethnobotanical investigation from Traditional Health Practitioners. Journal of Ethnopharmacology, 2015; 174:91-117.
32. Zuchiwschi E, Fantini AC, Alves AC, Peroni N. Limitations to the use of native forest species can contribute to the erosion of traditional ecological knowledge and local family farmers. Acta Bot. Bras. 2010; 24(1):270-282.