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Plants utilized as medicines by residents of Quilombo da Fazenda, Núcleo Picinguaba, Ubatuba, São Paulo, Brazil: A participatory survey

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ABSTRACT

Ethnopharmacological relevance: Participatory research can help to broaden the understanding of medical systems and beliefs of traditional communities. An ethnopharmacological survey in collaboration with local people focused on plants used in quilombos located in Southeast Region in Brazil identified cultural factors that influence plant and recipe choice.

Aim of the study:: To investigate the factors related to the therapeutic efficiency of medicinal plants from the perspective of Quilombo da Fazenda residents.

Materials and methods: University researchers collaborated with community residents for both aims and methods of the study. The local partners were trained in the gathering of ethnopharmacological data and then selected and interviewed the residents considered experts on the use of medicinal plants. Data on the use of each species were supported by voucher specimens collected by the local partners and university researchers. Participant observations and field diaries by the university researchers supplemented the data.

Results: Eight interviewees mentioned 92 medicinal species with 60 therapeutic uses, applied in 208 recipes or remedies. Asteraceae (13 species), Lamiaceae (5) and Urticaceae (5) contributed most medicinal plant species. Of the 12 etic categories of use, the circulatory system category had the highest number of plants mentioned. Decoction was the most commonly used preparation method (66.8%), and most remedies were administered orally (76.4%). Eighty-six recipes included more than one plant species and/or the addition of other components, such as sugar, salt or animal products. Several cultural factors influence medicinal plant use. Popular beliefs on the quality of blood or the humoral properties of plants and illnesses, characteristics of the plants and other factors determine which plant is used and why.

Conclusions: The participatory method identified a large number of factors that influence medicinal plant use: the patient's *blood type*; the condition of the plant and the disease (hot-cold system); the route of administration and dosage; the preventive uses of the plants; and the influence of other factors, such as the sun, the moon and dew. The participatory approach is useful for gaining insight on the decision processes of medicinal plant use in traditional societies, and also for those communities wanting to document their knowledge with or without the participation of the academy.

Abbreviations: UNIFESP/EPM, Universidade Federal de São Paulo/Escola Paulista de Medicina; UC, Conservation Units; PESM, Parque Estadual Serra do Mar; WHO, World Health Organization; SISBIO, Biodiversity Authorization and Information System; COTEC, Technical and Scientific Committee of the Forest Institute; CEP, Research Ethics Committee of UNIFESP/EPM; SISGEN, National System for the Management of Genetic Heritage and Associated Traditional Knowledge; PMSP, Municipal Herbarium – São Paulo

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1. Introduction

Participatory research has emerged as a way of recognizing and respecting traditional knowledge (Gilmore and Young, 2012). The participation of local residents allows scholars and project collaborators to see and judge their research in a different way, largely because traditional forms of knowledge are recognized and prioritized, ensuring that all collected data are connected to the traditional context and understood within this context (Mosse, 2001). According to Stepp (2004), participatory research is becoming increasingly common in the social sciences, and ethnobiologists, who are pioneers in the use of this method, have contributed to this approach.

Ethnopharmacology proposals based on participatory research build on classical studies of this discipline, that routinely report the traditional uses of plants by different cultures by ethnobotanists and ethnopharmacologists. However, the evolution of this discipline requires analyses that transcend this character and consider aspects of local development, conservation, sustainability (Schultes and von Reis, 2008) and the importance of understanding the local medical system, local beliefs and local meanings of health and disease (Reyes-García, 2010), that is, the emic perspective. Many authors have argued that ethnopharmacology and ethnobotany should be applied (Cunninghan, 2001). Involving local people as actors in this transformation can make local development more effective. Several authors argue that the communities involved should participate in the entire ethnobotanical project process, from design to data analysis and co-authoring in publications (Etkin and Ticktin, 2005; Medley and Kalibo, 2005).

Several authors have employed a participatory approach to ethnobotanical research (Goebel, 1998; Johnson et al., 2004; Ericson, 2006). However, studies published with concrete examples of surveys that involve local residents ranging from study design to data recording and analysis are rare. The project developed by Hitziger et al. (2016) in Guatemala among the Kaqchikel (highland) and Q'eqchi' (lowland) Mayans is one of the few examples.

In Brazil, several ethnopharmacological surveys focusing on medicinal plants were conducted among quilombolas, a traditional community descended from African slaves (Rodrigues and Carlini, 2004; Conde et al., 2017), but none of them had the residents' participation in all stages of the study. This study focused on (1) surveying the medicinal plants used by Quilombo da Fazenda residents by using a participatory method in which the residents themselves acted as local partners, recording their knowledge, collecting plants they commonly used and analysing the data and (2) understanding the possible elements related to the use and therapeutic efficacy of medicinal plants for community residents.

2. Research question

Does the participatory approach lead to new perspectives in the use of medicinal plants?

3. Materials and methods

3.1. Legal approvals

The following legal permits were obtained for this study: 1. To collect and transport plants: Biodiversity Authorization and Information System (SISBIO), process no. 51199-2; 2. To collect plants and conduct research in the Parque Estadual Serra do Mar (PESM) - Technical and Scientific Committee of the Forest Institute (COTEC), file no. 260108-009.510/2015); 3. To carry out this research at the Universidade Federal de São Paulo (UNIFESP): Research Ethics Committee of UNIFESP/EPM (CEP/EPM), file no. 0843/2016; and 4. To access traditional knowledge: National System for the Management of Genetic Heritage and Associated Traditional Knowledge (SisGen), registration number A648D14.

Fig. 1. Location of Quilombo da Fazenda in the Atlantic Forest, São Paulo State, Brazil. Source: Google Earth.

3.2. Study area and human group

This UC (Conservation Unit; Parque Estadual Serra do Mar, PESM) is home to several traditional communities, and covers a region of 332,000 ha, extends through 25 municipalities in the State of São Paulo, and contains approximately 1200 species of plants (Parque Estadual Serra do Mar, 2017).

The study area is located in the municipality of Ubatuba in the state of São Paulo (44°48′W and 23°22′S). According to Köppen (1948), the region's climate is classified as type Af, indicating that it has a rainy, tropical climate (it rains year-round). The annual means of precipitation and temperature for the period 1961–1990 were 2624 mm and 21.9 °C, the relative humidity of the air was always above 85%, and the soils types are Podzolic, Alluvium, and, predominately, Cambisol (Sanchez and Pedroni, 1999). Quilombo da Fazenda is located in the PESM (Fig. 1) in a historical, cultural and anthropological zone, where the direct use of natural resources is allowed, provided that a specific management plan for certain resources, agreed upon between the community and conservation unit (UC) managers, is established (São Paulo, 2006).

Quilombo da Fazenda is a former monoculture farm, currently this community is formed by Italian immigrants and migrant descendants of slaves of African origin who came to Brazil during the colonial period. According to Conde et al. (2017), some of these slaves fled the farms where they were being exploited and organized communities of refugees, called quilombos, in the local forests. They have been living from agriculture and forest resources since then. As they had to self-medicate for illnesses, they have detailed knowledge about medicinal plants in their surroundings. Since the PESM was established, land conflicts have occurred. Some areas had to be vacated for the conservation purposes of the park, and the inhabitants have resisted, still claiming their right to the land today. The region was recognized as a quilombo by the Palmares Cultural Foundation in 2005 (Fundação Cultural Palmares, 2015), and the Association of Remnants of Quilombo da Fazenda manage it. According to the residents, currently, the community is formed by approximately 170 people in an area of 5208 ha (Fundação Cultural Palmares, 2015). Tourism is a source of income for many residents who work as park guides and environmental monitors.

The community does not have a school or health centre; a medical doctor can be seen at a health centre 10.6 km away from the Quilombo da Fazenda, and, when necessary, the residents attend a public hospital 35 km away from the community. The community relies on septic tanks and water from the Rio da Fazenda for its primary sewage treatment. The residents are either evangelical or Catholic, and there are three churches in the village.

3.3. Field research

Meetings with the community initiated in April 2015 in order to plan the study according to the interests of the residents. The residents involved in the study organized and asked the university researchers to help them build tracks to where the medicinal plants are located to benefit tourism and thereby generate local income. Additionally, the residents asked for management plans for the plants used for commercial purposes to promote local conservation. With this in mind, the university researchers suggested that the study should start with the residents surveying the medicinal plants with the support of academic methods provided by the university.

Over 145 days and 24 field trips from May 2016 to March 2018, the researchers established a relationship with the residents of the Quilombo da Fazenda, met with the community to promote acknowledgement of the local partners, trained and, selected interviewees, collected data based on interviews, collected and re-collected indicated plants, and hosted a meeting with the community called a “Knowledge Exchange”. These activities are described in the following sections.

3.4. Selection and training of local partners

The Quilombo da Fazenda residents who were interested in actively participating in the process expressed their will during the meetings. Two local partners, Ginacil dos Santos (35 years old) and Silvestre Braga (42), are co-authors of this study and were trained by the technical team on the anthropological and botanical aspects of the collection of ethnopharmacological data. The two local partners received guidelines on how to interview the respondents (Bernard, 1988) and obtain their personal data (name, birth date, profession, education and from whom the person had learned about the use of the plants) and how to collect data on medicinal plants (plant name, therapeutic use, useable parts, dosage, recipe, route of administration, contraindication, and adverse reaction). The recipes represent the ways in which parts of the plants (leaves, seeds, flowers, roots, and so on) are manipulated for a particular use. The botanical data sheets were adapted according to the local partners’ suggestions during a pilot study in which they were the interviewees. The second training sought to explain the existence and importance of the scientific names in addition to the vernacular names of the plants and the necessity of collecting specific parts and taking the necessary notes for taxonomic identification. Additionally, local partners received guidelines on how to collect, press and use domestic heaters to dry the plant material reported by the interviewees.

3.5. Selection of interviewees and collection of ethnopharmacological data

Local partners identified the people in the community who had knowledge about medicinal plants and invited them to take part in the study as respondents. Eight of them agreed to participate, five women (62.5%) and three men (37.5%). The ages ranged from 43 to 81 years old, with five of them being over 60 years old. The older ones were chosen by the local partners, demonstrating that for the locals, knowledge is linked to life experience. Everyone had incomplete elementary school education except for one without any formal education. Their occupations included artisans, farmers, cooks, and traditional healers. Five of them were descended of slaves. One of the interviewees was born in Quilombo da Fazenda, and seven of them in different cities of the State of São Paulo, Brazil.

The two local partners started to record local knowledge about the medicinal plants through unstructured interviews with respondents (Bernard, 1988; Alexiades, 1996) and in the presence of the university team. The local partners were responsible for scheduling the interviews, explaining the project to interviewees and other community residents, conducting the interviews, collecting and pressing the reported plants. They attempted to conduct the interviews during walks in the forest (Alexiades, 1996). The plants were photographed and collected on site during the interviews. The botanical data sheet (plant name and code, date and place of collection, type of environment, presence of an aroma, flavour or exudate, months of flowering and fruiting, etc.) was also completed during the collection of the plants. The material was pressed and dried (Alexiades, 1996) and taken to the Municipal Herbarium (PMSP) for identification. The vouchers were deposited at PMSP and Florestal Institute Herbaria (SPSF).

The community in question has long been in contact with the official medicine of Brazil through health posts and public hospitals in the region. The community has easy access to these services with public or private transport. Official medicine is commonplace in the daily life of the residents of this and other nearby quilombos. The university researchers, in consultation with local partners, correlated the emic and etic terms regarding the therapeutic uses of the plants. Participant observations and field diaries (Bernard, 1988) were recorded by the co-author (Yazbek) to capture the perceptions of the interviewees and local partners about their relationships with the plants, their emic terms for the plants, their explanations and other observations that were pertinent to the understanding of those relationships. These methods and techniques sought to complement the quality of the data collected

by the local partners. Yazbek, a pharmacist, attempted to clarify doubts during the interview between a local partner and an interviewee so that uncertainties about therapeutic uses, symptoms and other particular characteristics could be resolved in the attempt to approach the etic terms as much as possible.

3.6. Data checking

A meeting organized by the university researchers and local partners, together with the interviewees and other residents, reviewed the information collected throughout the project and assisted in the categorization of the therapeutic uses of the plants. Botanical data sheets were prepared with photos of all collected plants and their therapeutic uses. The sheets were checked and pasted onto cardboard by the members of the community discussing plant usage. Methods of using and preparing the plants, which had been previously noted by the local partners, were checked with each interviewee to ensure that all data were correct.

3.7. Analysis of qualitative and quantitative data

All information obtained during the interviews and collections was quantitatively analysed using "Total Use" method (Phillips, 1996), by which the frequencies of the different use categories are estimated.

The annotations in field diaries were grouped according to common themes, allowing the analysis on themes, which were both convergent and divergent. They also helped to understand the place studied, the interactions with the environment and consequent interpretations (Hubermam and Miles, 1994), which were then explored in the qualitative analysis.

Medicinal plants were grouped into categories of use depending on their therapeutic uses, following the biomedical systems and with consideration of the emic terms. The "Therapeutic use" column of Table 1 includes the emic terms as expressed by the interviewees and the respective etic terms. In this same column, two types of information are included: some information on the possible pharmacological activities of plants (digestive, for example) and other information on the symptoms they treat (hepatitis, for example). The emic terms and textual citations of the residents are highlighted in italics in Table 1 and throughout the text.

4. Results and discussion

4.1. Socio-cultural aspects of traditional healing

Older members of the community are the main healers, and they learned the practices from their ancestors. According to the interviewees, the knowledge was acquired verbally and through practise with their parents, in-laws, grandparents and community elders. Knowledge was also often acquired through dreams and spiritual therapeutic uses, demonstrating that, just as in Amazonian societies, these sources of knowledge are also seen as legitimate (Carneiro da Cunha, 2009).

4.2. Botanical identification: academic vs quilombola approach

The study distinguished 92 botanical species distributed across 46 taxonomic families. The families with the highest number of species were Asteraceae (13 species), Lamiaceae (5) and Urticaceae (5). Asteraceae and Lamiaceae were also the most important species in studies carried out in the fishing community of Praia do Sono, Paraty, Rio de Janeiro, Brazil (de Brito and de Senna-Valle, 2011). Of the 92 species, 47 (51.1%) were native to Brazil, and they are marked by an asterisk in Table 1. Other studies conducted with Afro-descendants in Brazil show a higher index of native plants, such as those in the quilombolas of Sesmaria Mata Cavalos in which 80.6% of the plants in the local medical system were native (Rodrigues and Carlini, 2004). According to Pedrollo et al. (2016), some ethnobotanical/ethnopharmacological studies in Brazil showed a higher representation of native species among riverine populations in the Amazon, for example: 64.45% (Bieski et al., 2015), 66% (Rodrigues, 2006), and 76% (Silva et al., 2007). On the other hand, other studies showed a more significant proportion of non-native species independent of the biome or the human group (Amorozo and Gély, 1988; Begossi et al., 2002; Albuquerque et al., 2009), thus showing that there does not seem to be a pattern in ethnobotanical/ethnopharmacological findings regarding the number of native/exotic species in traditional medical systems of the region.

In some cases, a plant vernacularly recognized by community residents was identified as more than one botanical species by taxonomic researchers, such as the *embaúba*, identified as *Cecropia pachystachya* Trécul and *Cecropia glaziovii* Snethl, and *urtiga-branca*, identified as *Boehmeria caudata* Sw. and *Urera caracasana* (Jacq.) Griseb. The opposite also occurred, and in these cases, one plant received two different common names, as was the case of the *picão* (black-jack) and the *picão-preto* (black black-jack), both identified as *Bidens pilosa* L. For this reason, the 92 taxonomic species correspond to 95 ethnoespecies in the present study. These data show that there are differences between the identification criteria used by academic science and those used by the quilombolas, as already observed in 1966 by Berlin, Breedlove and Raven; however, generally, there was a good coincidence.

4.3. Medicinal plants: uses and therapeutic categories

Ninety-two medicinal species with 60 therapeutic uses were reported by the eight interviewees (Tables 1 and 2). They were grouped in 12 categories of use: circulatory system (26 species), gastrointestinal system (23), respiratory system (21), inflammatory processes (18), central nervous system (14), osteomuscular system (13), genitourinary system (12), parasitic diseases (9), endocrine system (8), other (8), skin and subcutaneous tissue diseases (3) and eye diseases (1).

The large number of species indicated for use in gastrointestinal system and respiratory ailments was also found in other studies carried out in quilombola communities in the Atlantic Forest (de Santana et al., 2016; Beltreschi et al., 2018). According to field observations, the high number of species indicated for gastrointestinal system is related to the past absence of basic sanitation, which consequently caused a greater number of diseases acquired through the fecal-oral route. The large number of species indicated for respiratory diseases, bronchitis, cough and asthma, is probably due to high humidity of the Atlantic Forest. Other studies carried out in this biome have found this also (Garcia et al., 2010). The number of species indicated in Quilombo da Fazenda for the circulatory system, particularly for anaemia, coagulation, wound repair, oedema, hypertension and haematoma, was notable and higher than in the studies mentioned above. Farming and forest activities often result in accidents such as cuts or bruises, so wound-healing plants are important.

The category of medicinal uses with the greatest number of therapeutic uses (diseases and illness treated) are the gastrointestinal system (9 therapeutic uses: 15%), and the circulatory and genitourinary system (7–11.7% each) (Table 2). The category others (7–11.7%) covers the uses that did not specifically fit into any of the previous categories, thus the uses in this category act on different systems. For example, some of the uses include: treating measles and snake bites, acting as a fortificant for children or as mosquito repellent, and aiding in weight loss.

The 92 plant species mentioned above are used in 208 recipes; 139 of them are prepared through decoction (66.8%) and 159 are administered orally (76.4%). Eighty-six of the recipes (41.3%) include the use of more than one plant species and/or the addition of other components, such as sugar, salt, milk, or animal products. Twenty-eight (13.5%) rely on the use of sugar and/or honey, mainly to improve

Table 1
The 92 medicinal species registered by the two local collaborators during the ethnopharmacological survey in Quilombo da Fazenda, vernacular names, therapeutic use (in *emic* and etic terms), useable parts, recipes, routes of administration and medicinal use-reports. The same species may belong to more than one of 12 categories of use.

Family	*Species* (voucher)	Vernacular name(s)	Therapeutic use (*emic* - etic terms)	Part	Recipe	Route	Medicinal use-reports
CATEGORY: CIRCULATORY SYSTEM – 26 species							
Amaranthaceae	*Dysphania ambrosioides* (L.) Mosyakin & Clemants – SB010	*erva-de-Santa Maria*	*feridas* - wounds	le	ma	tr	5
Anacardiaceae	*Anacardium occidentale* L.[a] – GDS014	*cajueiro*	*inchaço* – oedema	ba	de	tr, or	3
Araceae	*Colocasia esculenta* (L.) Schott – SB011	*inhame*	*inimia* - anaemia	ro	co	or	2
Asteraceae	*Ageratum conyzoides* L.[a] – SB043	*erva-de-São-João*	*machucadura roxa* - haematoma	le	ma	tr	5
	Bidens pilosa L. – SB002	*picão*	*anemia* - anaemia	wp	de	or	6
	Erechtites valerianifolius (Wolf) DC.[a] - GDS008	*gondó*	*bom pro sangue*- depurative and *inimia* – anaemia	wp	na	or	3
	Vernonanthura beyrichii (Less.) H.Rob.[a] – SB015	*cambará-preto ou cambará-roxo*	*machucadura roxa* - haematoma	le	de	or	4
Bignoniaceae	*Handroanthus impetiginosus* (Mart. ex DC.) Mattos[a] – PBY063	*ipê-roxo*	*bom pro sangue* - depurative	ba	de	or	4
	Jacaranda puberula Cham.[a] – SB048	*carobinha*	*parar de sangrar* - coagulant	le	de	tr, or	1
	Varronia curassavica Jacq.[a] – GDS031	*erva-baleeira*	*machucadura roxa* - haematoma	le	ma	tr	3
Fabaceae	*Hymenaea altissima* Ducke[a] – SB049	*jatobá ou jataí*	*parar de sangrar* – coagulant and *inimia* - anaemia	ba, ex	de	tr, or	7
	Swartzia oblata R.S.Cowan[a]– GDS006	*barbatimão*	*parar de sangrar* - coagulant	ba	de	tr, or	8
Lauraceae	*Cryptocarya mandioccana* Meisn.[a] – PBY020	*noz-moscada*	*machucadura roxa* - haematoma	se	de, ma	or	11
	Cryptocarya saligna Mez[a] – PBY024	*canela -assafraize*	*bom pro sangue* - depurative	ba	ma	or	2
Loranthaceae	*Struthanthus marginatus* (Desr.) Blume[a] – SB004	*erva-de-passarinho*	*parar de sangrar* – coagulant	le	ma	or, tr	5
Lythraceae	*Cuphea carthagenensis* (Jacq.) J.F.Macbr.[a] – SB003	*sete-sangria*	*bom pro coração, pressão alta* - antihypertensive	wp	de	or	6
Meliaceae	*Cedrela fissilis* Vell.[a] – SB034	*cedro-rosa*	*machucadura roxa* - haematoma	ba	de	tr	1
Musaceae	*Musa* x *paradisiaca* L. – PBY069	*banana*	*parar de sangrar* - coagulant	ex	na	tr	1
Piperaceae	*Piper mollicomum* Kunth[a] - GDS010	*perta-rução*	*parar de sangrar* - coagulant	le	ma	tr, or	5
Plantaginaceae	*Plantago australis* Lam.[a] – SB009	*trançagem, tanchagem*	*parar de sangrar* - coagulant	le	ma	tr	6
Poaceae	*Saccharum officinarum* L. – SB070	*cana*	*pressão alta* - antihypertensive	le	de	or	1
Rutaceae	*Zanthoxylum rhoifolium* Lam.[a] – GDS054	*mamica-de-porca*	*depuração do sangue* - depurative	ba	de	or	3
Urticaceae	*Urera baccifera* (L.) Gaudich. ex Wedd.[a] – GDS007	*urtiga-roxa*	*sangue fraco* - anaemia	le	na	or	4
			machucadura roxa - haematoma	le	in	tr	1
Verbenaceae	*Lippia alba* (Mill.) N.E.Br. ex P.Wilson[a] – GDS037	*melissa, ponta-livre*	*pressão alta* - antihypertensive	le	in	or	5
	Stachytarpheta cayennensis (Rich.) Vahl[a] – GDS057	*gervão*	*machucadura roxa* - haematoma	le	ma	tr	2
Zingiberaceae	*Renealmia petasites* Gagnep.[a] – SB046	*picova*	*bom pro coração* - antihypertensive	se	ma	or	1
CATEGORY: GASTROINTESTINAL SYSTEM – 23 species							
Anacardiaceae	*Anacardium occidentale* L.[a] – GDS014	*cajueiro*	*hemorroida* – hemorrhoid	ba	de	tr, or	3
Asteraceae	*Baccharis* sp. [Sect. *Caulopterae* DC.] - PBY74	*carqueja*	*dor de barriga* – diarrhea	le	ma	or	1
			bom pro estomago - digestive	le	de	or	1
	Bidens pilosa L. – SB002	*picão, picão-preto*	*hepatite* - hepatitis	wp	de	or	6
	Emilia sonchifolia (L.) DC. - PBY105	*serralha*	*gastrites* - gastritis	le	de	or	1
	Gamochaeta pensylvanica (Willd.) Cabrera – PBY087	*macelinha*	*intestino preso* – constipation	wp	de	vr	1
	Gymnanthemum amygdalinum (Delile) Sch.Bip. ex Walp. – GDS066	*boldo-sem-pelo*	*bom pro estomago* - digestive	le	de	or	1
	Montanoa bipinnatifida (Kunth) K.Koch – GDS065	*flor-de-maio*	*úlça* – ulcer	le	de	or	1
Bignoniaceae	*Handroanthus impetiginosus* (Mart. ex DC.) Mattos[a] – PBY063	*ipê-roxo*	*virosis* - virus	ba	de	or	4
Celastraceae	*Maytenus ilicifolia* Mart. ex Reissek[a] – GDS018	*espinheira-Santa*	*dor de estômago* – stomachache	le	de	or	1
Clusiaceae	*Garcinia gardneriana* (Planch. & Triana) Zappi – PBY021	*bacupari*	*gastrites* - gastritis	ba	de	or	1
Crassulaceae	*Kalanchoe pinnata* (Lam.) Pers. – GDS035	*saião-roxo*	*úlça* – ulcer	le	ma	or	3
	Sedum cf. *dendroideum* Moc. & Sessé ex DC. – SB072	*bálsamo*	*ajuda na digestão* - digestive	le	na	or	1
Cucurbitaceae	*Momordica charantia* L. – GDS063	*melãozinho-do-mato*	*úlça* – ulcer	le	de	or	2
Fabaceae	*Hymenaea altissima* Ducke[a] – SB049	*jatobá ou jataí*	*bom para o estômago* - digestive	ba	de	or	7
Lamiaceae	*Cryptocarya mandioccana* Meisn.[a] – PBY020	*noz-moscada*	*para dor no estômago* – ulcer	se	de	or	11
	Plectranthus barbatus Andrews – SB037	*boldo-com-pelo*	*ressaca, fígado – hangover recovery*	le	de	or	1
Loranthaceae	*Struthanthus marginatus* (Desr.) Blume[a] – SB004	*erva-de-passarinho*	*bom para o estômago* - digestive	le	ma	or	5
Lythraceae	*Cuphea carthagenensis* (Jacq.) J.F.Macbr.[a] – SB003	*sete-sangria*	*hepatite* - hepatitis	wp	de	or	6
	Eugenia uniflora L.[a] – SB007	*pitanga*	*dor de barriga* - diarrhea	le, fr	de	or	5
	Psidium cattleianum Sabine[a] – SB047	*araçá*	*dor de barriga* - diarrhea	le	de	or	2
	Psidium guajava L. – GDS034	*goiaba-branca*	*diarreia, dor de barriga* - diarrhea	le	de	or	2
Plantaginaceae	*Plantago australis* Lam.[a] – SB009	*trançagem, tanchagem*	*disintiria, dor de barriga* - diarrhea	le	de	or	6

(*continued on next page*)

Table 1 (*continued*)

Family	*Species* (voucher)	Vernacular name(s)	Therapeutic use (*emic* - etic terms)	Part	Recipe	Route	Medicinal use-reports
Verbenaceae	*Lippia alba* (Mill.) N.E.Br. ex P.Wilson[a] – SB016	*melissa, cidrão ou ponta-livre*	*bom pro estômago* - digestive	le	in	or	5
CATEGORY: RESPIRATORY SYSTEM – 21 species							
Acanthaceae	*Justicia pectoralis* Jacq. – PBY064	*doril*	*gripe* - flu	wp	de	or	2
Amaranthaceae	*Alternanthera brasiliana* (L.) Kuntze[a] – PBY061	*terramicina*	*gripe* – flu	le	de	or	3
	Pfaffia glomerata (Spreng.) Pedersen[a] – SB001	*novalgina*	*gripe* - flu	le	de	or	4
Apiaceae	*Foeniculum vulgare* Mill. – CC025	*erva-doce*	*resfriado* - cold	wp	de	or	3
Asteraceae	*Achillea millefolium* L. – GDS058	*camomila*	*tirar catarro* - expectorant	wp	de	or	2
	Ageratum conyzoides L.[a] – SB043	*erva-de-São-João*	*resfriado* - cold	le	de	or	5
	Mikania laevigata Sch.Bip. ex Baker[a] – GDS005	*guaco*	*tosse* – antitussive	le	de	or	7
	Vernonanthura beyrichii (Less.) H.Rob.[a] – SB015	*cambará-preto, cambará-roxo*	*pneumonia* - pneumonia	le	de	or	4
Bromeliaceae	*Bromelia antiacantha* Bertol.[a] – PBY031	*picova-amarelo, caraguatá-de-gancho*	*gripe* – flu and *bronquite* - bronchitis	fr	de	or	2
Caricaceae	*Carica papaya* L. – SB005	*mamão*	*tosse* – antitussive	fl	in	or	2
Lamiaceae	*Mentha pulegium* L. – SB013	*poejo*	*para catarro no peito* - expectorant	le	de	or	5
	Mentha sp. – SB061	*hortelã-de-bicha*	*gripe* - flu	le	de	or	4
	Ocimum gratissimum L. – SB031	*favacão*	*tosse* – antitussive	le	sy	or	1
			gripe - flu	le	de	or	1
	Plectranthus amboinicus (Lour.) Spreng. – SB032	*hortelã-castelo, hortelã-de-carne*	*gripe* - flu	le	de	or	1
Lauraceae	*Cryptocarya mandioccana* Meisn.[a] – PBY020	*noz-moscada*	*bronquite* - bronchitis	se	de	or	11
Myrtaceae	*Eugenia uniflora* L.[a] – SB007	*pitanga*	*tosse* – antitussive	le	de	or	5
Rutaceae	*Citrus* x *limon* (L.) Osbeck – GDS040	*limão*	*tosse* – antitussive	ba	de	or	3
	Citrus reticulata Blanco – GDS069	*laranja-mixirica*	*gripe* - flu	le	de	or	1
	Citrus sinensis (L.) Osbeck – GDS003	*laranja*	*gripe* - flu	le	de	or	2
Urticaceae	*Cecropia glaziovii* Snethl. – PBY068	*embaúba, bauibeira*	*bronquite* - bronchitis	le	de, sy	or	3
	Cecropia pachystachya Trécul[a] - PBY022	*embaúba, bauibeira*	*bronquite* - bronchitis	le	de, sy	or	3
CATEGORY: INFLAMMATORY PROCESSES – 18 species							
Araceae	*Philodendron martianum* Engl.[a] – SB030	*banana-do-mato*	*caspa* – dandruff	ex	na	tr	1
Asteraceae	*Mikania laevigata* Sch.Bip. ex Baker[a] – GDS005	*guaco*	*dor de garganta* – sore throat	le	de	or	7
Convolvulaceae	*Ipomoea batatas* (L.) Lam. – SB063	*batata*	*dor de dente* – toothache	le	he	tr	1
Cucurbitaceae	*Cucurbita* cf. *maxima* Duchesne – SB041	*abóbora*	*dor de ouvido* – earache	fl, se	he	otr	2
Fabaceae	*Mimosa pudica* L.[a]– SB006	*dormideira*	*dor de garganta* – sore throat	le	in	or	2
	Swartzia oblata R.S.Cowan[a]– GDS006	*barbatimão*	*antiinflamatório* – anti-Inflammatory	ba, le	de	or,vr, tr	8
Lamiaceae	*Mentha pulegium* L. – PBY107	*poejo*	*dor de garganta* – sore throat	le	in	or	5
Loranthaceae	*Struthanthus marginatus* (Desr.) Blume[a] – SB004	*erva-de-passarinho*	*dor de garganta* – sore throat	le	ma	or	5
Malvaceae	*Sida planicaulis* Cav. – PBY091	*vassoura-guanxuma*	*furúnco* – furuncle	le	he	tr	1
	Sida rhombifolia L.[a] – GDS019	*vassoura-guanxuma*	*furúnco* – furuncle	le	he	tr	1
Myrtaceae	*Eugenia uniflora* L.[a] – SB007	*pitanga*	*dor de garganta* – sore throat	le	de	or	5
Nyctaginaceae	*Mirabilis jalapa* L. [a]– GDS025	*maravilha*	*furúnco* – furuncle	le	he	tr	3
Plantaginaceae	*Plantago australis* Lam.[a] – SB009	*trançagem, tanchagem*	*dor de garganta* – sore throat	le	de	or	6
Polygalaceae	*Polygala paniculata* L.[a] – SB021	*gelol*	*dor de dente* – toothache	wp	ma	tr	3
Rutaceae	*Citrus* x *limon* (L.) Osbeck – GDS040	*limão*	*dor de garganta* – sore throat	ba	de	or	3
Solanaceae	*Solanum capsicoides* All.[a] – GDS032	*arrebenta-cavalo*	*furúnco* – furuncle	fr	na	tr	1
Urticaceae	*Boehmeria caudata* Sw. – SB044	*urtiga-branca*	*dor de garganta* – sore throat	le	de	tr	1
			furúnco – furuncle				1
	Urera caracasana (Jacq.) Griseb.[a] – SB044	*urtiga-branca*	*dor de garganta* – sore throat	le	de	tr	1
			furúnco – furuncle				1
CATEGORY: CENTRAL NERVOUS SYSTEM– 14 species							
Acanthaceae	*Justicia pectoralis* Jacq. – PBY064	*doril*	*dor de cabeça* – headache	wp	de	or	2
Adoxaceae	*Sambucus* cf. *canadensis* L. – GDS055	*sabugueiro*	*febre* - fever	le	de	or	2
Amaranthaceae	*Alternanthera brasiliana* (L.) Kuntze[a] – PBY061	*terramicina*	*dor de cabeça* – headache	le	de	or	3
	Pfaffia glomerata (Spreng.) Pedersen[a] – SB001	*novalgina*	*dor de cabeça* – headache and *febre* - fever	le	de	or	4
Apiaceae	*Foeniculum vulgare* Mill. – CC025	*erva-doce*	*calmante* – anxiolytic	wp	de	or	3
Asteraceae	*Acmella ciliata* (Kunth) Cass.[a] – GDS043	*anestesia*	*para anestesiar* – anesthetic	fl	ma	tr	1
Bignoniaceae	*Handroanthus impetiginosus* (Mart. ex DC.) Mattos[a] – PBY063	*ipê-roxo*	*dor de cabeça* – headache	ba	de	or	4
Fabaceae	*Mimosa pudica* L.[a] – SB006	*dormideira*	*dormir melhor* – hypnotic	le	na	or	2
Lamiaceae	*Mentha* sp. – SB061	*hortelã-de-bicha*	*calmante* – anxiolytic	le	de	or	4
Piperaceae	*Piper scutifolium* Yunck – GDS049	*jaborandi*	*anestesia* – anesthetic	ro	ma	tr	1
Polygalaceae	*Polygala paniculata* L.[a] – SB021	*gelol*	*dor de cabeça* – headache	wp, ro	ma	ir	3
Verbenaceae	*Lippia alba* (Mill.) N.E.Br. ex P.Wilson[a] – SB016	*melissa, cidrão, ponta-livre*	*calmante* – anxiolytic	le	in	or	5

(*continued on next page*)

Table 1 (*continued*)

Family	*Species* (voucher)	Vernacular name(s)	Therapeutic use (*emic* - etic terms)	Part	Recipe	Route	Medicinal use-reports
Zingiberaceae	*Curcuma longa* L. – PBY067	*açafrão*	*para ajudar a falar após AVC* - stroke recovery	ro	ma	or	3
	Hedychium coronarium J.Koenig – SB071	*angélica*	*dor de cabeça* – headache and *febre* - fever	le	in	or	1
CATEGORY: OSTEOMUSCULAR SYSTEM – 13 species							
Amaranthaceae	*Dysphania ambrosioides* (L.) Mosyakin & Clemants – SB010	*erva-de-Santa- Maria*	*machucadura* – bone trauma	le	ma	tr	5
Anacardiaceae	*Anacardium occidentale* L.[a] – GDS014	*cajueiro*	*machucadura* – bone trauma	ba	de	tr, or	3
Asteraceae	*Ageratum conyzoides* L.[a] – SB043	*erva-de-São-João*	*machucadura* – bone trauma	le	de	tr	5
	Vernonanthura beyrichii (Less.) H.Rob.[a] – SB015	*cambará-preto, cambará-roxo*	*machucadura* – bone trauma	le	de	or	4
Boraginaceae	*Varronia curassavica* Jacq.[a] – GDS031	*erva-baleeira*	*machucadura* – bone trauma	le	de	tr, or	3
			dor na coluna – back pain				1
Fabaceae	*Swartzia oblata* R.S.Cowan[a]– GDS006	*barbatimão*	*dor na coluna* – back pain	ba	de	or	8
Lauraceae	*Cryptocarya mandioccana* Meisn.[a] – PBY020	*noz-moscada*	*machucadura* – bone trauma	se	de	or	11
Loranthaceae	*Struthanthus marginatus* (Desr.) Blume[a] – SB004	*erva-de-passarinho*	*machucadura* – bone trauma	le	ma	or	5
Piperaceae	*Piper mollicomum* Kunth[a] – GDS010	*perta-ruão*	*machucadura externa*- joint dislocation	le	ma	tr, or	5
Polygalaceae	*Polygala paniculata* L.[a] – SB021	*gelol*	*dor muscular* – joint dislocation	wp, ro	ma	tr	3
Urticaceae	*Urera baccifera* (L.) Gaudich. ex Wedd.[a] – GDS007	*urtiga-roxa*	*machucadura* – bone trauma	le	in	tr, or	4
Verbenaceae	*Stachytarpheta cayennensis* (Rich.) Vahl[a] – GDS057	*gervão*	*machucadura* – bone trauma	le	ma	tr	2
Zingiberaceae	*Curcuma longa* L. – PBY067	*açafrão*	*dor na coluna* – back pain	ro	ma	tr	3
CATEGORY: GENITOURINARY SYSTEM – 12 species							
Alismataceae	*Echinodorus grandiflorus* (Cham. & Schltdl.) Micheli[a] – GDS013	*chapéu-de-couro*	*para o rim, urina* – kidney stone	le	de	or	4
Amaranthaceae	*Alternanthera brasiliana* (L.) Kuntze[a] – PBY061	*terramicina*	*dor de urina* – urinary infection	le	in	or	3
Boraginaceae	*Varronia curassavica* Jacq.[a] – GDS031	*erva-baleeira*	*problema de útero* - myoma	le	de	or	3
Costaceae	*Costus arabicus* L.[a] – SB012	*caninha-do-brejo*	*quando não consegue urinar* – urinary infection	le, wp	de	or	3
Euphorbiaceae	*Euphorbia thymifolia* L.[a] – SB036	*quebra-pedra-roxo*	*bom pro rim* – to prevent kidney stone	wp	de	or	4
Fabaceae	*Swartzia oblata* R.S.Cowan[a]– GDS006	*barbatimão*	*infecções de mulher* – vaginal discharge	ba, le	de	or, vr	8
Lauraceae	*Persea americana* Mill. – GDS059	*abacate-roxo*	*pedra no rim, rim, dor de cadeira* – kidney stone	le	de	or	3
Lythraceae	*Cuphea carthagenensis* (Jacq.) J.F.Macbr.[a] – SB003	*sete-sangria*	*bom pro rim* – to prevent kidney stone	wp	in	or	6
Phyllanthaceae	*Phyllanthus niruri* L.[a] – SB028	*quebra-pedra -branca*	*bom pro rim* – to prevent kidney stone	wp	in	or	2
Plantaginaceae	*Plantago australis* Lam.[a] – SB009	*trançagem, tanchagem*	*urina presa* - urinary infection	wp	in	or	6
Urticaceae	*Urera baccifera* (L.) Gaudich. ex Wedd.[a] – GDS007	*urtiga-roxa*	*câncer de próstata* – prostate cancer	ro	de	or	4
Zingiberaceae	*Curcuma longa* L. – PBY067	*açafrão*	*problema de útero* - myoma	ro	ma	tr	3
CATEGORY: PARASITIC DISEASES – 9 species							
Amaranthaceae	*Dysphania ambrosioides* (L.) Mosyakin & Clemants – SB010	*erva-de-Santa- Maria*	*para não ter vermes* – to avoid helminthiases	le	ma	or	5
Apocynaceae	*Tabernaemontana laeta* Mart.[a] – SB054	*guaraná*	*berne* - myiasis (human botfly)	ex	na	tr	1
Asparagaceae	cf. *Furcraea foetida* (L.) Haw.[a] – SB059	*pita*	*sarna* - scabies	le	ma	tr	1
Asteraceae	*Achillea millefolium* L. – GDS058	*camomila*	*acalmar bicho* - helminthiases	wp	de	or	2
			lombrigueira - helminthiases	le	de	or	1
Convolvulaceae	*Cuscuta obtusiflora* Kunth[a] – SB042	*cipó-chumbo*	*para sarna*- scabies	wp	de	tr, or	1
Cucurbitaceae	*Momordica charantia* L. – GDS063	*melãozinho-do- mato*	*sarna* - scabies	le	ma	tr	2
Fabaceae	*Swartzia oblata* R.S.Cowan[a]– GDS006	*barbatimão*	*sarna* - scabies	le	de	tr	8
Lamiaceae	*Mentha* sp. – SB061	*hortelã-de-bicha*	*para tirar o verme das crianças* – helminthiases	le	de	or	4
Urticaceae	*Urera baccifera* (L.) Gaudich. ex Wedd.[a] – GDS007	*urtiga-roxa*	*sarna* - scabies	le	de	tr, or	4
CATEGORY: ENDOCRINE SYSTEM – 8 species							
Alismataceae	*Echinodorus grandiflorus* (Cham. & Schltdl.) Micheli[a] – GDS013	*chapéu-de-couro*	*diabetes* - diabetes	le	de	or	4
Annonaceae	*Annona muricata* L. – GDS052	*graviola*	*diabetes* - diabetes	le	de	or	1
Asteraceae	*Ageratum conyzoides* L.[a] – SB043	*erva-de-São-João*	*faz descer a menstruação* – menstrual regulator	le	de	or	5
Fabaceae	*Bauhinia forficata* Link[a] - GDS62	*pata-de-vaca*	*diabetes* - diabetes	le	de	tr	1
	Hymenaea altissima Ducke[a] – SB049	*jatobá ou jataí*	*diabetes* - diabetes	ba	de	or	7
Hypoxidaceae	*Hypoxis decumbens* L.[a] - SB008	*cebolinha-do-mato*	*diabetes* - diabetes	bu	de	or	1
Myrtaceae	*Syzygium jambos* (L.) Alston – GDS001	*jambo ou jambolão*	*diabetes* - diabetes	le	de	or	1
Rutaceae	*Zanthoxylum rhoifolium* Lam.[a] – GDS054	*mamica-de-porca ou manataru*	*diabetes* - diabetes	ba	de	or	3
CATEGORY: SKIN AND SUBCUTANEOUS TISSUE DISEASES – 3 species							

(*continued on next page*)

Table 1 (*continued*)

Family	*Species* (voucher)	Vernacular name(s)	Therapeutic use (*emic* - etic terms)	Part	Recipe	Route	Medicinal use-reports
Asteraceae	*Conyza* cf. *canadensis* (L.) Cronquist[a] – GDS028	*taporava*	*manchas no corpo, pano branco* – antimycotic	le	he	tr	1
Crassulaceae	*Kalanchoe pinnata* (Lam.) Pers. – GDS035	*saião-branco*	*para friera* – antimycotic	le	he	tr	3
Polygonaceae	*Polygonum* sp. – PBY079	*erva-fogo*	*queimadura* - burns	le	de	tr	1
CATEGORY: EYE DISEASES – 1 species							
Dilleniaceae	*Davilla rugosa* Poir.[a] – PBY053	*cipó-caboclo*	*catarata* – cataract	ex	na	ofr	1
CATEGORY: OTHER – 8 species							
Adoxaceae	*Sambucus* cf. *canadensis* L. – GDS055	*sabugueiro*	*sarampo* - measles	fl	sy	or	2
Apiaceae	*Eryngium foetidum* L. – GDS030	*coentro-natural*	*picada de cobra* – snake bite	wp	de	or	1
Euphorbiaceae	*Manihot esculenta* Crantz[a] – GDS016	*mandioca-doce*	*vitamina para crianças* – fortificant for children	le	bk	or	2
Fabaceae	*Hymenaea altissima* Ducke[a] – SB049	*jatobá, jataí*	*vitamina boa* - fortificant	ba, ex	de	or	7
Lauraceae	*Cryptocarya saligna* Mez[a] – PBY024	*canela-sassafraize*	*bom para sarampo* - measles	ba	de	or	2
Plantaginaceae	*Plantago australis* Lam.[a] – SB009	*trançagem, tanchagem*	*para esmagrecer* – to lose weight	le	de	or	6
Poaceae	*Coix lacryma-jobi* L. – PBY039	*capiá*	*para mulher ganhar nenê* – to facilitate labor	le	de	tr	1
	Cymbopogon nardus (L.) Rendle – SB068	*citronela*	*contra borrachudo* - mosquito repellent	le	ma	tr	1

Bake – bk; Bark - ba; Bulb – bu; Cook – co; Decoction – de; Exudate – ex; Flower - fl; Fruit - fr; Infusion – in; Heat – he; Inhalatory Route - ir; In natura - na; Leaves - le; Maceration – ma; Oftalmic Route – ofr; Oral Route – or; Otologic Route – otr; Root– ro; Seeds – se; Syrup – sy; Transdermic Route – tr; Vaginal Route – vr; Whole plant – wp.

[+] The number of citation corresponds to the number of times the species has been cited. It does not distinguish therapeutic uses.

[a] Native to Brazil.

palatability or to obtain a syrup for remedies of the respiratory system. Salt is added to nine (4.3%) recipes to facilitate the crushing of the leaves. Cooking oil and *cachaça* (a Brazilian alcoholic beverage) are added to eleven (5.3%) recipes to improve extraction of the active components. The other ten therapeutic uses (4.8%) rely on the use of animal fat. Some other recipes include the use of synthetic drugs, suggesting the coexistence or complementarity of traditional practices and biomedicine, as observed in several studies (Calvet-Mir et al., 2008; Giovannini et al., 2011; Zank and Hanazaki, 2017). The combined use as well as the components found in the remedies of the quilombos are known from other studies in traditional communities (Rodrigues, 2006, 2007).

The species with the highest value of medicinal use-reports (Table 1) were *Cryptocarya mandioccana* Meisn. (11), which is largely employed to heal haematoma, ulcer, bronchitis and bone trauma, and *Swartzia oblata* R.S.Cowan (8) indicated as coagulant, anti-inflammatory, to back pain, vaginal discharge and scabies. Both have been indicated by many interviewees which have been selected by local partners, guided by local partner's interest in registering as many plants and use-reports as possible, that is, they wanted to interview people who had a distinct knowledge so they would be able to gather diverse data. It directly reflected in the diversity of species collected and in the values of medicinal use-reports. Thus, it is interpreted as an influence of participatory research in this quantitative analysis.

4.4. Elements related to use and efficacy

For Quilombo da Fazenda residents, some characteristics of the plants and ailments interrelate with the choice of medicinal species, the forms of use and appropriate dosages. These elements are discussed in this section.

4.4.1. Blood type

Blood characteristics, such as *weak* or *thin, good* or *strong, thick* or *bad* and *sweet*, determine the development of some ailments and their treatments.

Weak or *thin blood* has a lighter red colour. This type of blood makes people weak, tired and anaemic. According to the interviewees, the hair becomes weak, the eye becomes whiter and the skin becomes yellow. Treatment requires the ingestion of food rich in *vitamins*, promoting blood *thickening*. Some species are able to fortify blood, such as the cinnamon bark *sassafraize* (*Cryptocarya saligna* Mez) and *inhame* (yam) (*Colocasia esculenta* (L.) Schott). Species with red and/or purple coloration, such as the *urtiga-roxa* - purple nettle (*Urera baccifera* (L.) Gaudich, ex Wedd.) and *gondó* - tropical burnweed (*Erechtites valerianifolius* (Wolf) DC) are considered to thicken the blood.

The opposite type of blood is *thick* or *bad blood*. "It is almost black"—and has a thicker consistency. According to the interviewees, this type of blood "*does not circulate properly, causes varicose veins and bruises that do not heal, clogs the heart, causes stroke*". When the blood is very thick, it should be refined by blood cleansing, by ingesting tea from the bark of *mamica-de-porca* (*Zanthoxylum rhoifolium* Lam.), *ipê-roxo* - purple ipê (*Handroanthus impetiginosus* (Mart. ex DC.) Mattos) and *sete-sangrias* (*Cuphea carthagenensis* (Jacq.) J.F. Macbr.). Although the last two species have purple flowers, some residents say that one should not eat purple food, such as beetroot and red cabbage, because it thickens the blood even more. In addition, according to some residents consuming a large amount of *vitamins* and *beetroot*, for example, may have been responsible for making the blood thick.

Sweet blood is the old name given to diabetes. The blood is considered sweet because it has too much sugar. As explained by a resident, people are already born with thin or thick blood, but food contributes to it: "*A person who has thick blood and diabetes cannot eat too much beetroot because it thickens the blood even more, because it is purple. Too much maize flour also thickens the blood*". Therefore, an analogy exists between the food colour, its textures and its functions in the human body—in this case, in the blood. *Good* or *strong blood* is liquid blood that circulates well, promotes wound healing, and prevents kidney and heart problems. In Brazil, an ethnopharmacological study conducted among quilombolas from the pantanal wetland biome also recorded the use of plants as blood thinner (Rodrigues and Carlini, 2004), and as blood purifier among migrants living in Atlantic Forest (Garcia et al., 2010). Among inhabitants of Calamuchita, Argentina, it is admitted that consumption of fat-rich food is responsible to make the blood "fat," "thick," or "dirty". These blood alterations are treated by criollos with beverages made from depurative plants (Martínez, 2008). Blood purifier plants were also described in studies conducted between Andean people of Canta, Lima, Peru (De-la-Cruz et al., 2007), in Jalala, District Mardan, Pakistan (Akhtar and Begum, 2009), and in Saravan region, Bluchistan, Iran (Sadeghi et al., 2014), so the use of blood purifier

Table 2
Proportion of the 60 therapeutic uses (in etic terms), of the 92 plant species and 232 medicinal use-reports belonging to the categories of medicinal uses by eight interviewees from Quilombo da Fazenda, Ubatuba, S.P., Brazil.

Categories of medicinal uses	Proportion of therapeutic use	Number of plant species	%All species	Medicinal Use-reports	%All medicinal use -reports
1. Gastrointestinal System	hemorrhoid diarrhea digestive hepatitis gastritis constipation ulcer virosis stomachache 15%	23	25,00%	33	13,87%
2. Circulatory System	wounds oedema anaemia haematoma depurative coagulant antihypertensive 11.7%	26	28,26%	40	16,81%
3. Genitourinary System	to facilitate labor kidney stone urinary infection myoma to prevent kidney stone vaginal discharge prostate câncer 11.7%	12	13,04%	22	9,24%
4. Other	measles snake bite fortificant for children fortificant to lose weight mosquito repellent hangover recovery 11.7%	8	8,70%	12	5,04%
5. Central Nervous System	headache fever anxiolytic anesthetic hypnotic stroke recovery 10%	14	15,22%	17	7,14%
6. Inflammatory Processes	dandruff sore throat toothache earache anti-inflammatory furuncle 10%	18	19,57%	27	11,34%
7. Respiratory System	flu cold antitussive bronchitis pneumonia expectorant 10%	21	22,38%	41	17,23%
8. Parasitic Diseases	to avoid helminthiases myiasis (human botfly) helminthiases scabies 6.7%	9	9,78%	12	5,04%
9. Osteomuscular System	bone trauma back pain joint dislocation 5%	13	14,13%	18	7,56%
10. Endocrine System	diabetes menstrual regulator 3.3%	8	8,70%	11	4,62%
11. Skin and Subcutaneous Tissue Diseases	antimycotic burns 3.3%	3	3,26%	4	1,68%
12. Eye Diseases	cataract	1	1,09%	1	0,42%

92 medicinal species were found in Quilombo da Fazenda; however, the same species may belong to more than one category of medicinal use.

plants is a wide-spread concept which takes into account blood characteristics to guide the selection of plants.

4.4.2. Hot vs cold classification system

In addition to blood types, there is a classification system for diseases, plants and animal fat that distinguishes between *hot, non-hot* and *cold*, with the *non-hot* and *cold* categories being used in opposition to *hot*.

Cold diseases are usually caused by being in *cold* weather: leaving the house and being in the cold, being in the rain, drinking cold drinks, or exposing oneself to a fan or air conditioning. *Cold* diseases, such as *influenza*, should be treated with *hot* medicines because they heat the patient's body and expel symptoms, such as catarrh, cough, body aches and fever. Some of the diseases included the presence of something "from the outside" that "should not be there" and that should be expelled, such as airway secretions in the cases of colds, bronchitis, coughs and influenza and pus in the case of boils. When *hot* medicines are used for treatment, the patient cannot be in the cold for a certain amount of time depending on how *hot* the plant is, *i.e.*, there is a calibration of the existing condition. Additionally, the *hotter* the plant, the more the patient will sweat and the more the disease will come out.

Cold plants are used for diarrhea, burns, kidney problems and leg wounds—illness caused by the loss of something that should be present, such as body hydration in the case of diarrhea and skin in the case of burns and wounds.

The model explained above resembles the humoral medical systems observed in Latin America (Weller, 1983; Frei et al., 1998; Casagrande, 2002; García-Hernández et al., 2015) and China (Anderson, 1987) in which diseases and health depend on a balance between contrasting characteristics in the body—cold versus hot (Laplantine, 1991). The treatment of a disease includes the use of substances that have the opposite characteristics of the disease (Weller, 1983; Anderson, 1987), as seen in Quilombo da Fazenda. Although this *hot-cold* system may be related to temperature, other qualities and properties also determine the classification of plants and diseases, such as colour, smell and taste of plants (Leonti et al., 2002; Geck et al., 2017). Additionally, additive or subtractive properties related to something that must be expelled or something that is lacking are used to maintain body balance (Laplantine, 1991; Geck et al., 2017).

4.4.3. Security and preventive aspects

Although an effort has been made to record all the quantities in the recipes and the dosages of the medicinal plants, as presented in Table 1, there is some individual variation, as this information derives from oral knowledge organized by personal experiences. Furthermore, the security aspects as well as treatment's success were associated with the dose, number of application and correct route of administration - oral or topic (Table 1).

Many of the plants reported as medicinal are cited as *good* for some use or for some part of the body without that use being connected to a pathological process. Plants are often used to strengthen the immune system. According to the interviewees, this system is one that is related to body care: *"to have good health, to be strong, to avoid the contraction of diseases",* to be able to perform daily activities and have energy to work. One of the residents reported that he frequently drinks tea every week, because tea produced with leaves of plants makes him stronger and prevents diseases. Other plants, used previously only as medications, were more recently incorporated in the diet, such as *Hortelã-de-bicha* - mint (*Mentha* sp.), *serralha* - lilac tasselflower (*Emilia sonchifolia* (L.) DC.) and *gondó* - tropical burnweed (*Erechtites valerianifolius* (Wolf) DC.), aiding in the prevention of different classes of diseases.

4.4.4. The influence of the sun, the moon and the open air on the use of species and the recipes

In Quilombo da Fazenda, the bark of the *ipê-roxo* - purple ipê (*Handroanthus impetiginosus* (Mart. *ex* DC.) Mattos) must be removed from the tree on the side on which the sun rises. According to an interviewee, "*The side that the sun rises has a vision, the other has a dark side"*. Also, the removal of this specific side is intended to protect the tree. The interviewee said the trees are almost extinct because people take the bark off the wrong way. Nevertheless, considering the therapeutic use of this species for *headache*—a *cold* disease—a possible relation can be seen between the use of the bark from the side on which the sun is born, the *heat* generated by the sun, and the treatment of a *cold* disease. The use of tree bark from the side on which the sun rises was also observed by Turner and Hebda (1990) in a study conducted with Salishan elders from the southeast part of Vancouver Island, Canada. People indicated that they used bark from this specific side because they consider the healing of both the tree and the patient to be faster that way.

The decoction of the *caninha-do-brejo* (*Costus arabicus* L.), used for kidney stones, and the *saião-roxo* - air plant (*Kalanchoe pinnata* (Lam.) Pers.), used for ulcers, must be done at night and it must be kept in the open air to absorb the energy of the night. According to one interviewee, leaving the preparation outside, in the open air, is more effective than leaving it in the warm indoors. Thus, the *cold* represented by the dew is responsible for the greater effectiveness of these species. These plants are classified as *cold*. Thus, the drug is further "cooled" by the *energy* of the night, and thus strengthened.

Additionally, the moon phase was indicated as a condition for removal of the *jatobá* - courbaril exudate (*Hymenaea altissima* Ducke). The *wine* used as a tonic should be taken from the tree on the first full moon in January. This practice has two possible explanations: the exudate has a greater therapeutic effect when extracted on the first full moon of the year, and/or extracting it only during one moon phase per year is a way to conserve the plant species because it allows the tree to recover from the "injury" for a full year. Nevertheless, one of the residents mentioned that "*They said that the tree had no wine in other periods of the year"*. As observed by Coelho-Ferreira (2009), the exudate volume may dilute and thus higher in the rainy season.

Traditional medical systems do not consist of isolated pieces of information but are constructed by a complex set of observations and beliefs that only make sense when viewed as a whole (Reyes-García, 2010). The entire context of use goes beyond the bioactive effect of the plant because it involves social and symbolic issues that give meaning to a species (Moerman, 2007).

After recording the ethnopharmacological data and during the "Knowledge Exchange", the local partners together with university researchers decided how to organize the data in a booklet and a video (Quilombo da Fazenda, 2018; Yazbek et al., 2018), both available in internet and in printed and audiovisual formats, respectively. The participation of local partners during the whole research have permitted a new way of collecting and dealing with data. First of all, because they were interested in documenting their knowledge through a booklet and a video.

In the begging of this research, local partners have selected the interviewees with locally reputed specialist knowledge. As seen by Hitziger et al. (2016), it "took advantage of local knowledge and perceptions of healer's skill, experience and reputation". Despite practical limitations, it has also facilitated interaction with community members throughout the research, since local partners have already built a reliable relationship with local healers, what have collaborated to a further understanding of local cosmology, representativeness of results, comprehension and classification of conditions treated and species used. These perspectives permitted to adopt a categorization of use records taking into account emic conceptions, as argued by Staub et al. (2015).

Some of the elements listed in sections 3.4.1; 3.4.2, 3.4.3 and 3.4.4 have already been identified and discussed in other studies (Martínez, 2008; Coelho-Ferreira, 2009; García-Hernández et al., 2015), however, this research shows how the whole set can be established through a participatory approach that was developed according to the wishes of local residents, strengthening the knowledge and ways of knowing of the quilombolas.

5. Conclusion

Participation of local residents in all the stages of the present survey confirmed that it is possible to train community members who want to document their knowledge with or without the participation of the academy, and this is important for many issues related to intellectual property debated worldwide, and empowerment of community members.

The participatory approach lead to new perspectives in the use of medicinal plants, yielding important data on the context of medicinal plants use. The characteristics of plant species, blood types, plant and disease humoral conditions, routes of administration and dosages of recipes, and preventive uses as well as the influences of other factors such as the sun, the moon and the night dew are some of the elements that, for the community residents, are related to the choice of medicinal plants used to treat certain diseases and their therapeutic efficacy. Even that some of this factors have been addressed in previously research, this work shows how important and integrated these factors are.

Author contributions

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