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Tracing gender variation in traditional knowledge: participatory tools to promote conservation in a Quilombola community in Brazil

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Abstract

Background Based on participatory research tools and analysis with a gender focus, we aim to identify the knowledge associated with native plants of the Atlantic Forest in one Quilombola community whose territory is juxtaposed with a protected area, in South Brazil.

Methods Through the perception of the residents of the Quilombola community of São Roque, we classified the availability, harvesting intensity, abundance, and importance of fourteen plants native to the Atlantic Forest found in their territory. These fourteen plants were selected after initial interviews with a free listing of plants done with all adults (44 people), followed by plant collection and identification. A participatory workshop was built with the community to collect data through three activities: four-cell tool, environment matrix, and importance matrix. To identify the gender nuances in the knowledge within this community, all activities were separated into two groups based on the gender of the 22 participants (9 women and 13 men) and the researchers.

Results The species Pau-pra-tudo (*Picrasma crenata*), Quina (*Coutarea hexandra*), and Cipó-milome (*Aristolochia triangularis*) were similarly classified as important by both groups, which indicates the cultural and environmental relevance associated with them regardless of gender. The perceptions of other species were expressed differently between the groups, showing the variance of the ecological knowledge and the relationship between the sociocultural contexts of gender and the knowledge manifested. The final part of the workshop was a lecture given by two community experts about herbal medicines based on forest species found in the territory.

Conclusions Based on the multiple forms of results recorded in the workshop, we discuss the demand for inclusion of the traditional community in land management plans of environmental agencies, highlighting how individual characteristics, such as gender, can fill gaps in data about local biodiversity.

Keywords Traditional knowledge, Traditional ecological knowledge, Ethnobotany, Gender, Atlantic forest, Participatory tools

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Introduction

The diverse ways a given social group classifies, uses, and adapts to the environment and the uses they attribute to the plants' can be approached by ethnoecology and ethnobotany [1–3]. The individuals within these groups have diverse profiles and characteristics which are reflected in their knowledge construction.

Gender is one of these characteristics that influences and is influenced by each society, economy, and culture [4]. Thus, behaviors and cognitive processes can be directed, and gender differences can be attenuated due to the segregation and classification of groups according to their gender characteristics and ideologies [4]. Genders are usually categorized into two main groups, associated with each biological sex, in a binary perspective that assumes that males are men and females are women. These categories are then given meanings within each society, with stereotypes reflecting general expectations of members of each group [5]. Here we understand that genetic factors define the person's sex, but gender identity refers to how people identify themselves and how they express this identity externally, which can imply several gender definitions [6]. However, in this article we assumed a binary gender characterization, since it is how the community recognizes themselves as women and men.

During their day-to-day routine, women and men interact with their environments building different experiences and developing different skills. This interaction contributes to the local knowledge systems, which can be analyzed in "gender-specific knowledge domains" [7, 8]. This means that in the local knowledge systems, a person's gender directly influences the entire process of acquiring, processing and transferring knowledge [7], driven by one's functional gender role in familial and community routines. Traditional knowledge about plant species may present discrepancies between genders [9–12]. In general, women report the use and collection of species for purposes with characteristics of the domestic environment, such as care and family organization. Meanwhile, among men, knowledge and use of plants for provisioning activities predominates [11, 12]. Muller (2015) [9] identified distinct patterns of botanical knowledge between genders in different age groups in a rural community in Niger and pointed out that if this type of information is ignored, the effectiveness of natural resource management programs can be compromised [9]. The same was found by Luzuriaga-Quichimbo et al. (2019) [13], who demonstrated through quantitative analyses, the crucial role of Canelo-Kichwa women (Ecuadorian Amazon) as agents of conservation of traditional ethnobotanical knowledge due to their work role linked to family care, using medicinal plants.

Participatory research tools are useful in ethnobiological approaches because they allow the simultaneous understanding and confrontation of the multiple perceptions that a community has about a given subject. Participatory tools involve the community as agents in research and open ways for their role in decision-making processes about their own territory, such as decisions related to the management, protection and use of species [14, 15]. Furthermore, participatory tools are particularly appropriate as they make it possible to approach different groups within a human community, and the different values attributed to plant resources by those groups [16]. This type of research can trace variation of ecological knowledge about natural resources, enabling the incorporation of traditional knowledge from the perspective of the local stakeholders in the management of the territory, which consolidates their autonomy regarding the use and conservation of natural resources [17]. However, when using participatory tools it is important to recognize that there are different levels and degrees of participation in these methodologies. For example, participation can be passive, in which interaction occurs in only one direction (usually from local people to researchers); contractual, when the community participation is done in some activities and through formal agreements; consultive, when the initiative is external but is based on the desires, needs and opinions of the community [18, 19]; collaborative, when it starts from an external idea, but both parties participate in the same way in all stages of the research; among peers, when it starts from an external stimulus but encourages local projects and community self-mobilization (i.e., [15]); and community self-mobilization, in which the community mobilizes itself in identifying and solving a given problem [14]. In this research, our approach was between consultative and collaborative [18, 19].

The complementarity between traditional management systems and contemporary systems of community management for the use of natural resources or common goods has been and is still being rediscovered in the areas of conservation and development [20]. The involvement of local stakeholders and their traditional knowledge has significantly advanced in the context of in situ biodiversity conservation strategies [19, 21]. This involvement can take place not only in the research procedure but also include the community in the entire process of structuring, building, carrying out and concluding a research project, as exemplified by Rodrigues et al. [22].

Ten percent of The Brazilian Atlantic Forest territory is classified as protected areas [23]. However, many of these protected areas historically belong to traditional territories and indigenous peoples, who live in and around them [24]. Before the creation of the protected areas, and today together with them, indigenous peoples are co-responsible for the in situ conservation of biodiversity, for maintaining a relationship of interdependence and survival with the territory and its natural resources [21]. It is known that protected areas that are juxtaposed with traditional territories maintain a better index of conservation and regeneration of the forest [25]. The inclusion of traditional peoples as an active part in projects and decision-making that deal with traditional territories avoids conflicts between interested parties and allows collaboration to environmental protection and to solve territorial issues [26]. In Brazil, one important group recognized as indigenous people are the Quilombolas, which are people with African and indigenous ancestry.

The largest African Diaspora in the world happened in Brazil (± 100 million people). It was a cruel and large-enforced movement of black people from Africa to Brazil between the sixteenth and nineteenth centuries. Those people were forced to work in the farms and fields, in the hunting of whales for oil production, in the houses of lords as servants and maids, in the coffee plantations, cane fields, mines, ships, and even as a sexual commodity, all "activities" with minimal conditions and associated with physical, psychological and emotional abuse [27–29]. After the nineteenth century, Brazil approved the abolition of slavery and those people organized themselves in communities, some of them were classified as Quilombola's Communities. Nowadays, Quilombola communities have the right to land and the manifestation of their own social and cultural behavior, protected by the Brazil Law, Decree 6040/07 [30].

With the objective of identifying the knowledge associated with native plants of the Atlantic Forest in a Quilombola community whose territory overlaps with two protected areas, we aimed to support discussions and actions for sustainable management and conservation of the territory based on the diversity of Quilombola knowledge. We focused on two specific objectives: (1) identify the perceptions of women and men of the remaining Quilombola community São Roque, in Santa Catarina, about environmental availability, harvesting, distribution and importance of fourteen Atlantic Forest native plants present in their territory; and (2) collaborate with the integration between traditional and technical-scientific knowledge on sustainable management and conservation of species. Our research started with an ethnobotanical focus on the plants known and used in this community [31, 32], and then developed to a participatory approach in which the impetus for the research is external but based on the opinions and ideas of the community. The community had an active voice to give an opinion, criticize or modify the research whenever they felt it was necessary.

Methods

Study area

The research was conducted in the remaining Quilombo community of São Roque Pedra Branca (in Brazil, the word "remaining" refers to communities that remained in different places after the end of slavery), whose territory is within the Atlantic Forest domain in southern Brazil (Fig. 1a, b). Located between the municipalities of Praia Grande/Santa Catarina (SC) and Mampituba/Rio Grande do Sul (RS) (Figure c, d), the São Roque community (29°15′15″ S 50°06′46″ W) has 82 people and 32 families and an average of 45 people living within the delimitation of the traditional territory. The community has a history of occupation of this territory since 1824, associated with the transit of enslaved peoples who farmed in the coastal plains of Serra Geral, accompanied by the "Senhor do Engenho", (or the lord of the farm), slaveholders and farm owners from that time from São Francisco de Paula [33]. Thus, the time of occupation in this territory by the enslaved people and their descendants counts for more than 180 years. On June 17, 2004, the community was recognized as a Quilombola community by the Palmares Cultural Foundation [34], with the Technical Report of Identification and Delimitation published in 2007. The process of territorial regularization is still underway through the Brazilian Institute of Colonisation and Agrarian Reform (INCRA). Formerly, the community was known as the Pedra Branca community, because of the geological formation that provides one of the community's postcards, as a tourist destination (Fig. 2).

The original Quilombola territory has about 7 thousand hectares, with 36.42% of this area overlapping with two protected areas: the National Parks of Aparados da Serra and Serra Geral (Fig. 1b). These protected areas were created in the 1960s and 1990s, respectively. In those protected areas, the percentage of the traditional Quilombola territory is 36.42%, and of this percentage, the current community use in areas overlapping the national parks is 0.078% of the total parks area, but the intended percentage is 9.69% [33]. Due to this overlapping with two national parks, the São Roque Quilombola community faced conflicts related to the management of natural resources for a long time. Based on a Term of Commitment signed in 2013 and in force since 2016, the status of use of the territory and its resources were recognized as legitimate by

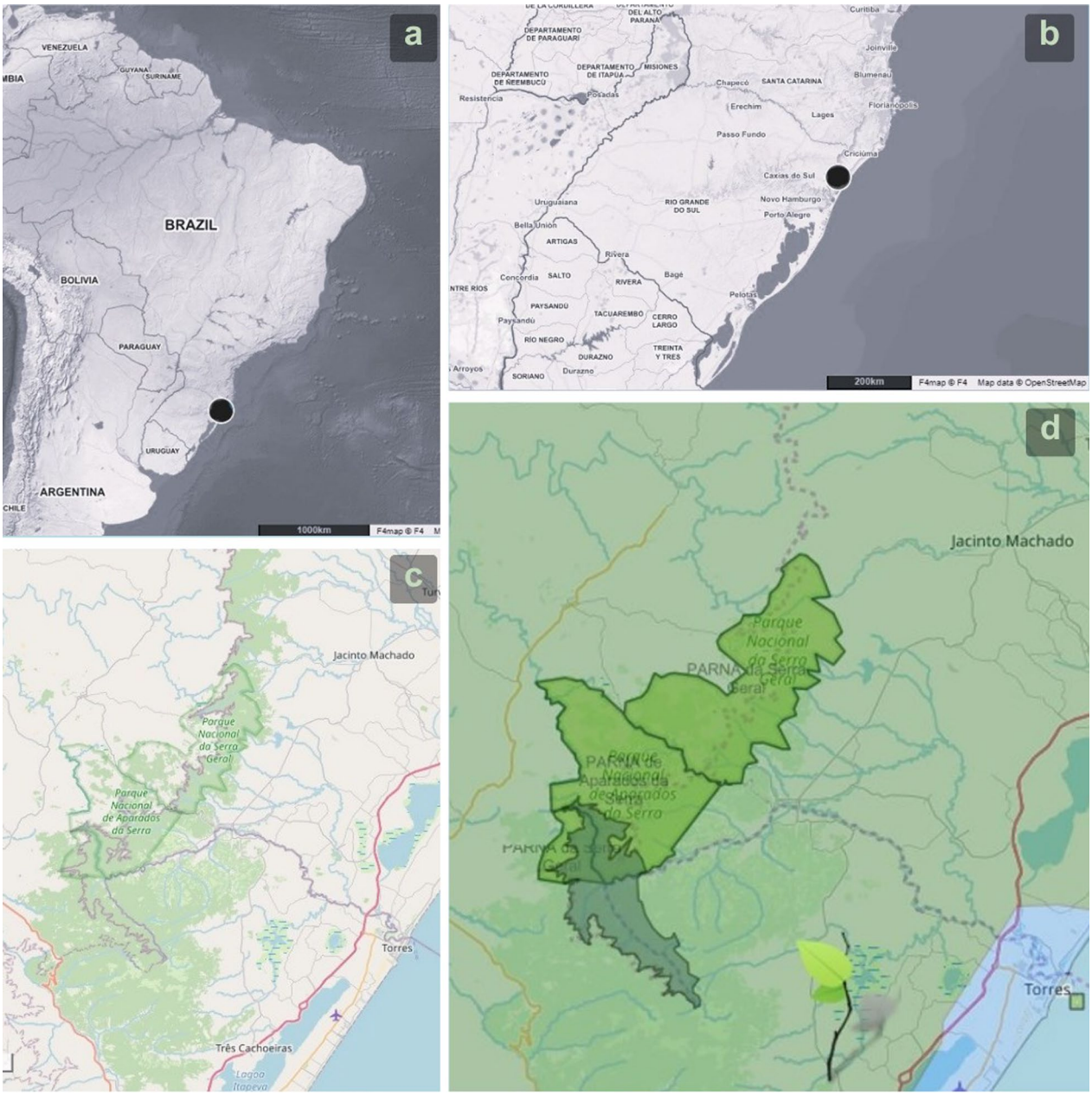

Fig. 1 Geographical representation of the Quilombola Community in Brazil and southern states. **a** and **b** Geographic location of Quilombola Community of São Roque; **c** overlapping areas of the Quilombola territory (SR) and National Parks Aparados da Serra (PNAP) and Serra Geral (PNSG); **d** Quilombola territory (SR)

the environmental agency; however, the long history of conflicts still has details that need to be resolved. Today, in addition to participating in the management council of the parks with the environmental agency, the community participates in community-based tourism actions, also focusing on conservation, territorial management and environmental education.

Data collection

This research followed the ethics guidelines of research with human beings of the Universidade Federal de Santa Catarina, with previous free informed consent for all data collection (see Supplementary Material 1). In the first step of this research, from November 2018 until June 2019, we interviewed all 44 residents of the community

Fig. 2 Local landscape view of the Quilombola Community and its surroundings. **a** Quilombola banana plantation with Pedra Branca in the background; **b** part of the territory of the Quilombola community São Roque, and Rio Mampituba seen from the top of Pedra Branca; **c** Quilombola house with Pedra Branca in the background. Photographs by Danilo Barreto

who were over 18 years old, and who lived in the original territory, being 25 men and 19 women. Semi-structured interviews were carried out to collect socioeconomic information, and a free listing technique was used to register the native plants known and used by each interviewee.

We then collected botanical samples of the main species mentioned in the interviews, for botanical identification. Most of the species collected were identified and had their determination confirmed by specialist Dr. Pedro Fiaschi from the Botany Department of the Federal University of Santa Catarina (UFSC). Plant vouchers were deposited in the EAFM herbarium of the Federal Institute of Education, Science and Technology of Amazonas, which has an ethnobotany collection (vouchers 13,013; 13,035; 13,041; 13,043; 13,056; 13,090; 13,108; 13,116; 13,117; 13,124; 13,128; 13,154; 13,169; 13,170; 13,221; 13,291; 13,335; 13,337; 13,405). For some species, it was only possible to collect non-reproductive vegetative material, making their detailed botanical identification impossible.

In the following months, and following suggestions of the community members, we organized one participatory workshop with four activities to collect data about the community's perception of the intensity of harvesting, environmental availability, and cultural importance of plant species previously selected from the interviews. The workshop happened on July 20, 2019, during the whole day, in the São Roque Communitarian Center. We organized the

groups for the workshop based on the gender of the participants, in two simultaneous working groups for the first, second, and third activities. The fourth activity was done with the whole group. Twenty-two adults participated in the activities (nine women aged between 25 and 65 years old, and thirteen men, the youngest aged 24 and the oldest aged 71 years old. The activities of each group were facilitated by a team of three people external to the community, responsible for guiding the activities, recording the participants' speeches, and taking photographs. The first author supervised and coordinated all activities, to ensure the timing of both groups in the first, second, and third activities, and to register qualitative details that could arise as the workshop was going on. In the women's group, only women researchers facilitated the activities, and the same was done with the other group, with only men researchers. This choice was made due to the recognition of the interlocutor as a similar, which provides a comfortable environment for the manifestation of the participants' knowledge [35], besides providing more accurate information [36]. All the people interviewed in the previous stage of this research were invited to participate in the workshops.

In the first part of the workshop, we proposed the four-cell tool activity, adapted from Zank et al. (2015) [19]. For this step, we selected the most important native plant species using the criterion of frequency cited to each species in the previously free listing interviews, but with the flexibility to include other species according to suggestions of the workshop participants. We drew a graph in which the horizontal axis represented the harvesting intensity and the vertical axis the availability of species in the territory (thus, the bottom quadrants indicated low availability and the right the ones with high collection intensity). In each group the participants were asked to locate each of the previously selected plants in the quadrants. The risk status of each species was accessed by consulting the National Flora Conservation Center (CNCFLORA) national list of extinction risk for the Brazilian flora [37] and the state red lists of Santa Catarina and Rio Grande do Sul [38, 39].

In the second part of the workshop, we used an environment matrix and invited the participants to indicate the environments where the selected species were found. We used amounts of seeds (from a local variety of beans) to estimate the abundance of each species in a table that listed the environments previously mentioned in the interviews and the species. Before starting the activity, the participants were asked about the characterization of each environment. As in the first activity, it was also possible to add environments that had not been previously selected.

During the afternoon, for the third part of the workshop, we invited the participants to discuss the value and importance of each plant species. The species were compared with each other regarding their importance for each group. Three levels of importance were established in a ranking matrix (very important, important, and not very important) and a maximum of five species could be allocated to each level. The participants of the workshop considered "not very important" those plants that did not have a recognized direct use, "important" were those that had some use, and "very important" were the main plants used for the community (among all categories of use, but especially medicinal use).

To conclude the workshops, the third and fourth authors, who are Quilombola elders unanimously recognized as specialists in plants, shared their knowledge about the uses and preparation of remedies with forest species. They are brothers, whose houses and land are located in the area overlapping with the National Parks, which made the practice of agriculture and the use of traditional species unfeasible for some years due to conflicts between the community and the environmental institution. This part of the workshop was requested by the community, also being a form of appreciation for the community's permission and contribution to the research.

Data analysis followed a qualitative approach and was based on Zank et al. (2015) [19] and Poderoso et al. (2017) [40]. To analyze the gender characteristics related to the knowledge about the plant species, we contrasted the responses of the groups in each activity and also compared the results with the free lists previously made.

Results

In preparation for the workshop, we selected the species most frequently cited during the free-lists data collection in individual interviews: *Cipó Pata-de-Vaca* (*Phanera microstachya*, n = 11), *Pata-de-Boi* (*Bauhinia forficata,* n = 2), *Açoita-Cavalo* (*Luehea divaricata,* n = 8), *Cipó Milome* (*Aristolochia triangularis,* n = 10), *Canjerana* (*Cabralea canjerana,* n = 8), *Guavirova* (*Campomanesia guaviroba, Campomanesia xantocharpa, Campomanesia sp.,* n = 10), *Pau-pra-tudo* (*Picrasma crenata,* n = 11), *Quina* (*Coutera hexandra* and other unidentified species, n = 16), *Araçá* (*Psidium cattleyanum,* n = 9), *Terramicina* (*Alternanthera brasiliana,* n = 14), *Ingá* (*Inga marginata,* n = 14), *Casca D'anta* (unidentified, but probably *Drymis winterii,* n = 6), *Canela-de-Velho* (*Mikania* sp., n = 2) and *Tansagem* (*Plantago* sp., n = 3). In addition to the most frequently cited species, some plants were included due to their salient presence in conversations, tales and stories (*Pata-de-Boi, Açoita-Cavalo, Canjerana, Casca D'anta*) or at the request of

workshop participants (*Canela-de-Velho* and *Tansagem*). The main characteristics of these plants and information about their use are described in Supplementary material 2 [41–54].

Environmental availability, harvesting, distribution and importance of native plants

Environmental availability and harvesting intensity

Half of the fourteen plants were allocated in the same quadrants by both groups (men and women) (*Pata-de-Boi, Canjerana, Cipó-milome, Pata-de-Vaca, Açoita-Cavalo, Pau-pra-tudo* and *Quina*) (Fig. 3). Two species (*Pau-pra-tudo* and *Quina*) were allocated in the lower right quadrant, by both groups, classified as at risk, reflecting the community's perception of plants that may be under threat. In the women's group, *Quina* was considered under threat due to its intense harvesting, while in the men's group, several opinions stood out, some participants indicated that they were concerned with its conservation because it has a high value of cultural importance in the community; others reported that it is a rare species. Of the thirteen men in the workshop, only three harvested the species. Both

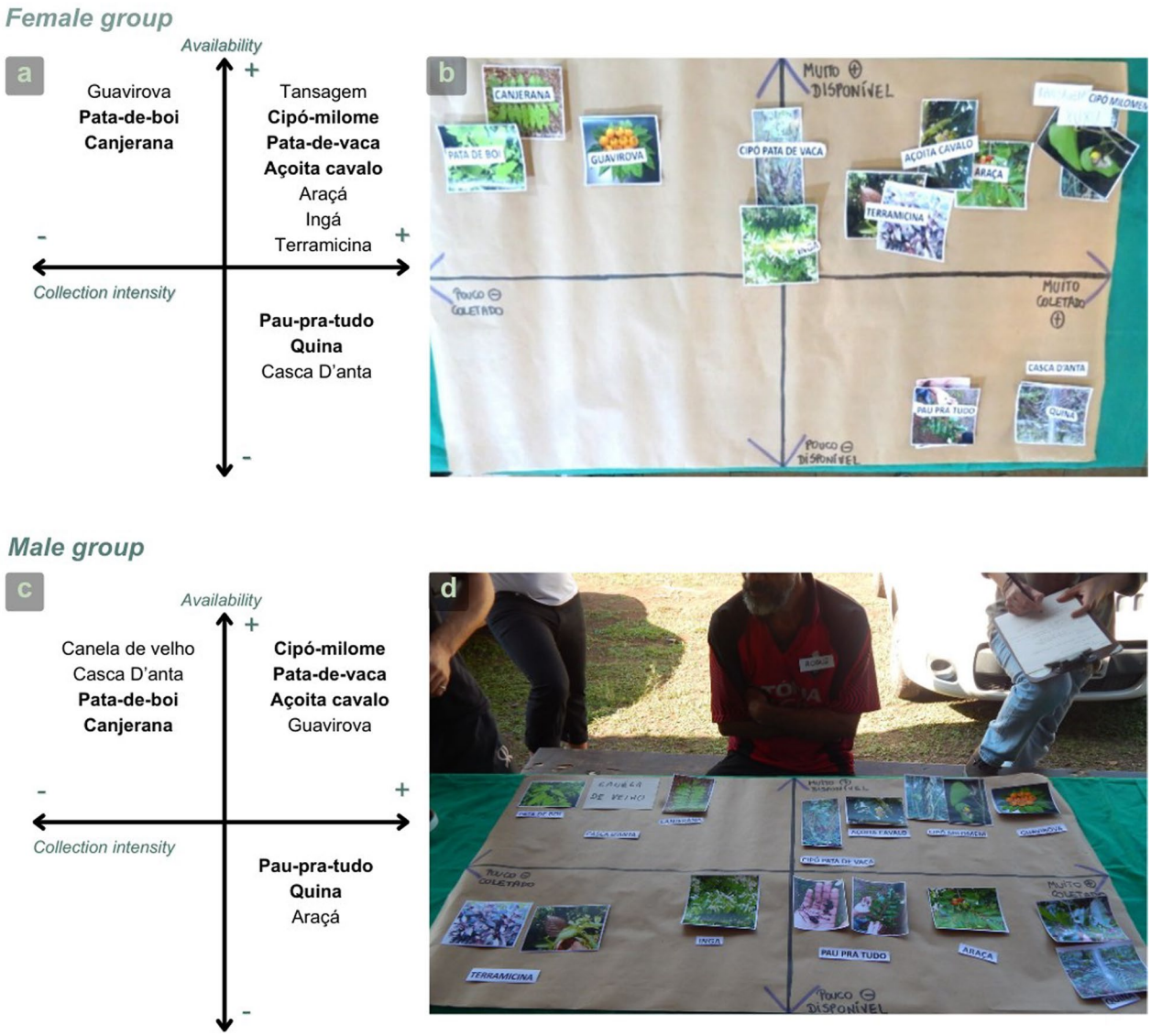

Fig. 3 Four-cell tool reflecting the perception of use and availability of vegetal species in the territory. Observe in bold the species that share the same quadrants for both groups **a** female Group graph; **b** photograph result female group; **c** male group graph; **d** photograph result male group

groups reported the low availability of *Pau-pra-tudo*, but did not delve much into its use value or importance.

Classification matrix: environments x perception of abundance

Figure 4a, b illustrates the main environments identified from the interviews. Farm (*lavoura*) is the vegetable garden that is cultivated close to the residences, and swidden (*roça*) is a cultivation area further away from the residences and with a greater amount of food produced. However, for some residents, the terms *roça* and *lavoura* can be used with the same meaning. It was established by consensus that we would treat farms (*lavouras*) in the sense of vegetable gardens close to the houses and yards (*terrero*, which is locally related to the *terra batida*, or a compacted soil area) as the space surrounding the houses, similar to backyards or gardens. There is a consensus in both groups about the presence and abundance of species in the forest (*mata*) and riverbank (*beira de rio*) areas. In the women's group, the *terrero* environment is perceived with a greater species abundance than for men, that is, the same plants were allocated in this environment, but the perception of quantities was different. For swiddens and farms, the perception differs quantitatively and qualitatively, with higher richness and abundance according to the perception of the men's group (Fig. 5). The women's group requested the addition of a roadside (*beira de estrada*) environment.

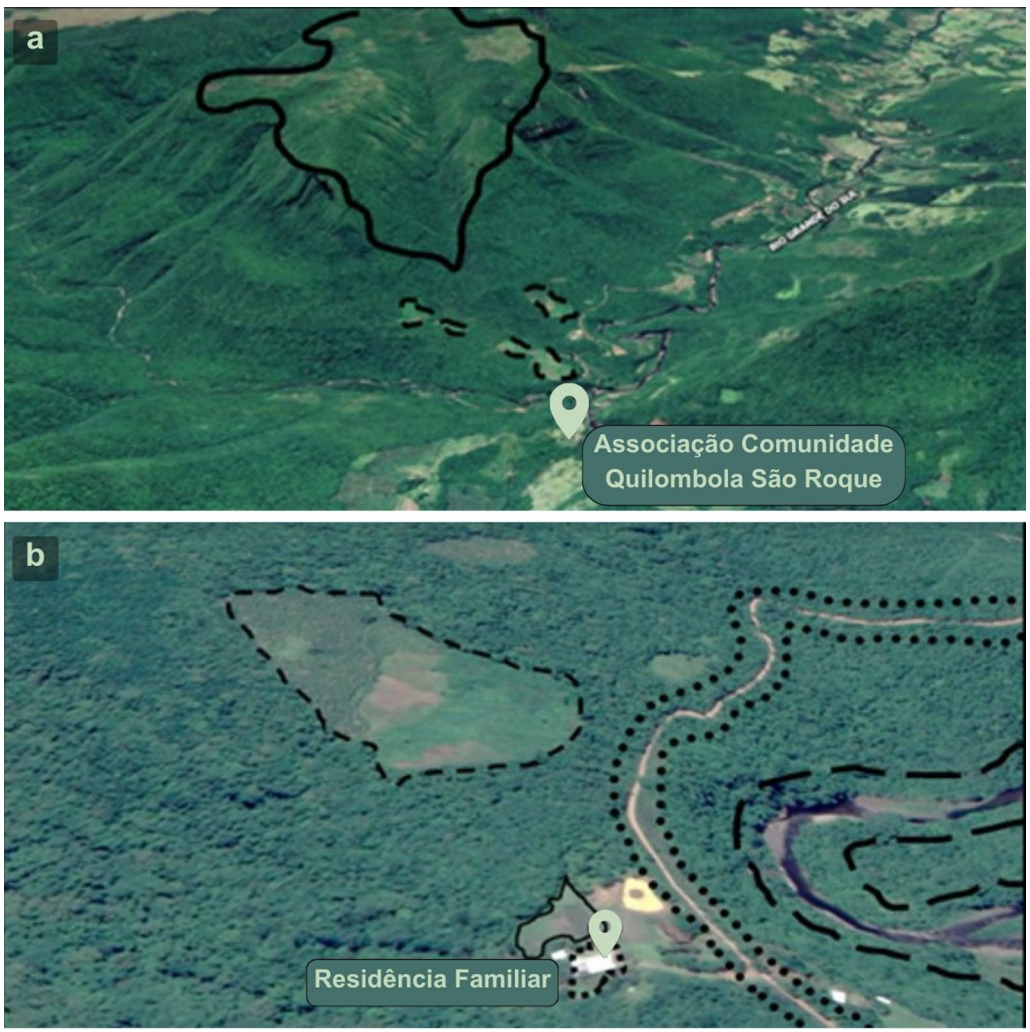

Fig. 4 Geographical representation of landscapes identified by the interviewers. Identified environments: **a** Mountains (*serra*): thick continuous line; swidden (*roça*): dashed line; pin locator: São Roque Quilombola Community Association; **b** swidden (*roça*): dashed line; roadside: dotted line; *Terrero*: small closed dotted line around the pin; riverbank: dashed line; farm (*lavoura*): thin continuous line nearby the pin; pin located at a family residence

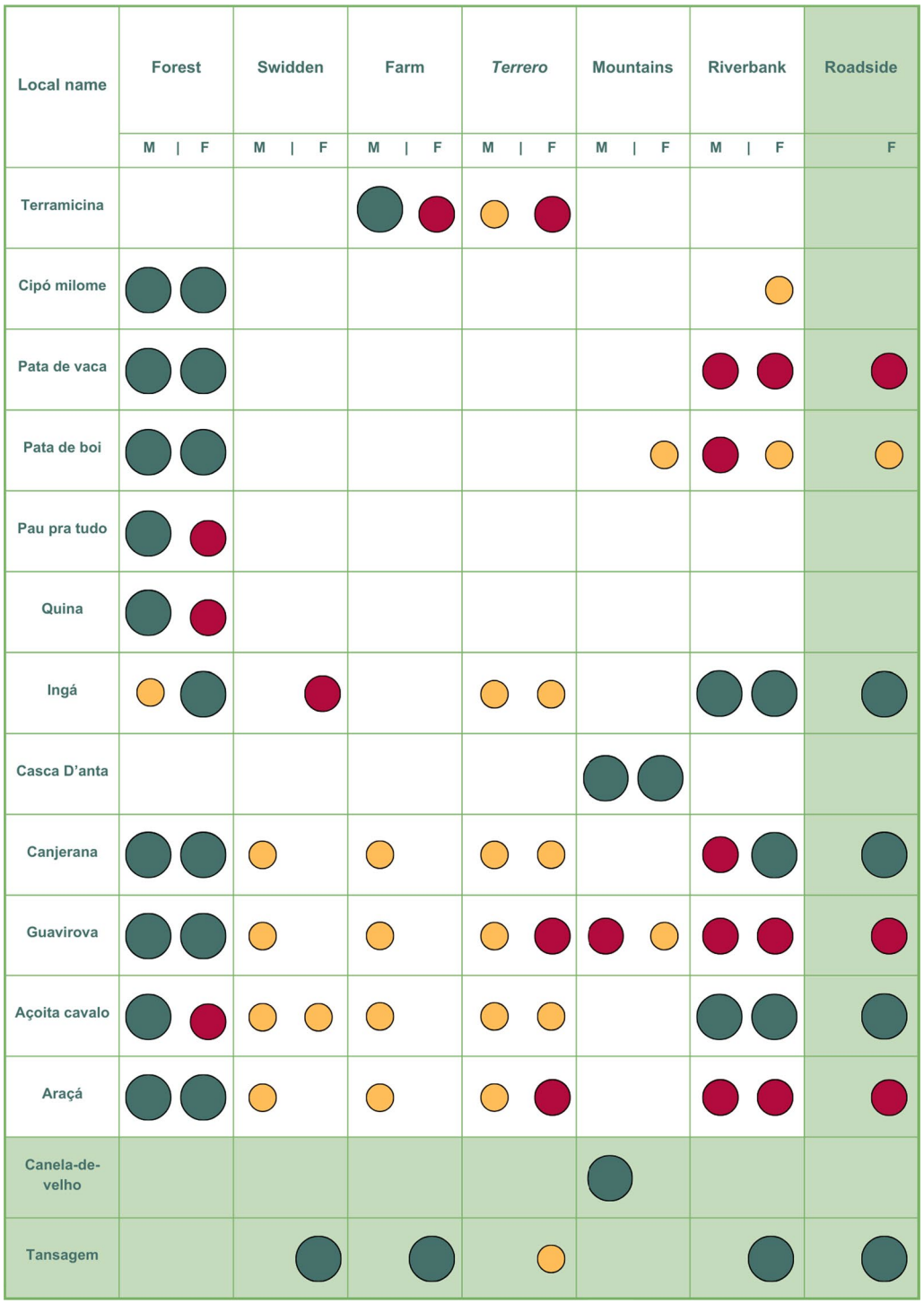

Fig. 5 Representation of seed abundance identified in both male and female groups. The circles represent the amount of seeds used to illustrate the abundance: GREEN—5 seeds, very abundant; RED—3 to 4 seeds, abundant; YELLOW—1 to 2 seeds, not very abundant. M: men's group; F: women's group. *Canela-de-Velho* and *Tansagem* and the roadside (*beira de estrada*) environment are shaded as they were added later by request of the participants, so each contains only results from the group who requested their inclusion (colour figure online)

Table 1 Perceptions of value and importance of native species for F: women's group; M: men's group

	Very important	Important	Less important
Terramicina	F	M	
Cipó milome	**FM**		
Pata de Vaca	F	M	
Pata de Boi			**FM**
Pau pra tudo		M	F
Quina	**FM**		
Ingá		F	M
Casca danta	M	F	
Canjerana		M	F
Guavirova		F	M
Açoita Cavalo		F	M
Araçá		F	M
Tansagem	*F**		
Canela-de-velho		*M**	

Bold letters highlight the plants with a similar response in both groups

The symbol (*) with identification of gender by italicized letter represents those species added by only one group

Degree of importance

The women's group classified *Quina*, *Cipó Milome*, *Pata-de-Vaca* and *Tansagem* as "very important" because of their medicinal properties (Table 1). The same plants, except *Pata-de-Vaca*, were categorized as "very important" by men. By consensus, in the male group, *Quina* and *Cipó Milome* also fall into this category due to their medicinal potential and cultural value. In addition to these, *Pata-de-Boi* was considered "not very important" by both groups. Men put it in this category justifying that its use was by the female part of the community; however, for women, the justification was that it was used only in a few moments as a medicine, with its current use linked to the purpose of firewood. For both groups, all species classified as "very important" were associated with the quality of being medicinal plants, even though for some species other uses were also mentioned. For all other species, the perceived importance was allocated at different levels by the two groups.

Sharing knowledge about medicinal plants

The lecturers of the fourth part of the workshop were taught by two brothers recognized as local specialists about medicinal plants, where they shared their traditional knowledge about forest species, including species from previous activities, elucidating their traditional use. They start the workshop from the beginning teaching how to identify the medicinal plants in the territory, and the proper way to collect them. After, they showed how to clean the utilized parts; ex. if it is leaves for tea, it needs to be sure that you clean well in water and after cleaning with the hand to take out bug eggs that the leaves can have.

For the preparations required for the workshop, they made two: one based on alcohol for superficial epidermal wounds, and one ointment, based on fat, to apply after using the alcoholic preparation, for healing wounds or rashes (Fig. 6). Wild plants from the territory, *Cipó Milome* and *Quina,* were used. Both preparations are used for "*afomentação*", the local name for the superficial application of the medicine at the site of pain or injury.

In response to this workshop, the participants could share their own experiences with the plants used to prepare the medicines. With this sharing comes different experiences and perspectives about harvesting and using plants. The specialists also pointed out and the group discussed the importance of maintaining the traditional knowledge. For the reason of the TK being an oral knowledge, sharing it between them and among colleagues, like the academic and techno-scientific communities, it can be possible to build partnerships that can register the TK, in a manner to maintain it and persist it. Thus, sharing these experiences and wisdom strengthened the local perspectives about the value of the Quilombola traditional knowledge.

Discussion

Our research made it possible to identify the diversity of perceptions about fourteen native plants of the Quilombola territory, based on gender characteristics and in the Quilombola perspectives. For the Quilombolas, ten of the fourteen species presented in the workshop are from forest areas, and of these, more than half are very abundant. In this environment, the perceptions of women and men were similar for most species, which expresses the strong connection and regular activities of all members of the community in the forest areas of their territory. Important species such as *Quina* (*Coutarea hexandra*), *Cipó-milome* (*Aristolochia triangularis*) and *Pau-pra-tudo* (*Picrasma crenata*) are recognized as medicinal and related to their historical use. *P. crenata* is also vulnerable according to the Brazilian Environment Secretariat (SEMA, 2014) [38]. Thus, we recommend that this species receive special attention from the community and environmental agencies, building together action plans involving the conservation of the region's native biodiversity.

C. hexandra is reported in the literature for malaria treatment [55, 56], with anti-inflammatory and antinociceptive effects in lyophilized aqueous extract of the inner bark of the species, showing no toxicity [57]. The traditional use of *C. hexandra* in the São Roque is to

Fig. 6 Preparation of *afomentações* with medicinal plants from the Quilombola territory. **a** Dirceu Nunes da Silva. **b** Vilson Omar da Silva. **c** medicinal plants used in the preparations (*Cipó-milome, confrei, arruda, palma-crespa, canela-de-velho, quina branca* and *quina rosa*). Photographs by Daniele Cantelli and Bianca Morais

treat fever, stomach pains and, in solution with alcohol, for superficial wounds, avoiding infections. The part used for medicinal treatments is the bark, which can pose risks to its conservation. In the workshops, the species was considered at risk, associated with forest areas and classified as very important by both men and women. We therefore suggest the development of cooperative management and environmental education actions with the management of the National Parks, for the promotion of the species in line with its traditional use.

The traditional use of *A. triangularis* is to treat stomach aches. This is another very important species for the Quilombola community, but not seen as at risk due to its high availability. Species of this genus have aristolochic acid, a toxic substance, which alerts to the recommendation for caution in the use. The ingestion of this acid can cause carcinogenic mechanisms, nephrotoxicity and it has an abortive effect [58]. Being one of the species of traditional use, it is substantially important to provide access to information about its toxicity and the proper care and precautions with its use. Of all the species used in the workshop, this is the only one that poses a health risk.

The other species had different perceptions of availability, harvesting intensity, distribution in environments, and degree of importance. These differences represent the multiple perceptions and perspectives that the same community has on their territory and biodiversity, and, in the case of the gender-mediated perceptions, reflect their functional cultural

roles [40]. Kelkar (2007) [59] discusses the domain theory of gender-specific knowledge, and this specificity is not exclusive, that is, knowledge can be shared, partially shared or specific [59], and shared knowledge can contain different degrees of a given knowledge domain [40]. In this research, it was possible to find that this community has shared and exclusive domains, as different degrees of shared knowledge.

Within the gender-specific knowledge domain [59], forest and mountain areas are identified by both the women's and men's groups as areas of male domain. Currently, most women do not go to the forests due to their advanced age, but they reported that when they were younger, some accompanied their parents, or even went alone on walks and worked in the forest. However, they themselves stated that much of what they know about the species present in the forests comes from knowledge shared by their spouses or male relatives, which is partially shared knowledge.

The *terrero* environment, perceived similarly by both gender groups, is where several species occur. The density of *terramicina* (*Alternanthera brasiliana*), *guavirova* (*Campomanesia* sp.) and *araçá* (*Psidium cattleyanum*) in this environment were perceived as higher for women than for men. The frequency with which women are in domestic areas, such as farms, yards and the road is greater than that of men, due to their social role in the family routine, which justifies these different perceptions of the abundance of species in these environments. The same occurs among the men's group for forest and swidden environments, where they have more activities linked to these environments. The residences in the Quilombo São Roque are generally on the edge of or close to the roads, justifying the addition of this environment by the female group.

Inspired by collaborative participatory methodologies [14, 17] and socio-environmental management projects [15, 18], the participatory workshop made it possible to include the community in the research as research subjects, with a leading role in its development [14, 17]. The use of these methodologies, in addition to capturing data, promotes a space for collaboration where participants learn from each other and recognize the importance of their own knowledge, especially in the in situ conservation of species [18]. Consensus building on perceptions was encouraged in the classification of species at each stage of the workshop. By dividing the groups by gender, we provide a comfortable environment, especially for women who often avoid expressing their opinions and perceptions around men, a situation we experienced during interviews and free listings.

The diversity of perceptions about plants and environments between genders justifies the attention and care that researchers and professionals in the field should give to knowledge gaps that are not addressed in socio-environmental studies and projects [35]. Recognition of the diversity of knowledge about natural resources is important, not only for ethnobiological studies but also for land management, biodiversity conservation and cultural revitalization [35].

Finally, this study also emphasizes the importance of a single event in the form of a workshop, which has several stages with the direct involvement and participation of community members, from its construction to its execution. The final part of the workshop, which consisted of sharing knowledge about medicinal plants, was entirely taught by two elders recognized as local experts on medicinal plants. This was a unique opportunity to strengthen the maintenance of traditional knowledge.

Conclusions

The interaction between natural, social and academic systems enables the feedback of information on local biodiversity, in addition to empowering community and institutional stakeholders [60]. Thus, institutional interactions, connected by space or by the level of organization, enable favorable environments for exchanges that contribute to the resilience of natural and sociocultural systems [26, 60].

Although a commitment agreement has been signed between the environmental agency in charge of the management of the protected areas and the Quilombola community, the conflicts continue to exist. Our research helps environmental managers to focus on community perspectives, which highlight the relationship between territory, traditional knowledge and nature conservation. Thus, once again, we re-emphasize the need to incorporate social and community actors into decision-making processes involving their ways of life and territories, where they can take ownership of their rightful place in decisions that may or may not change the present and future of their territories, communities and cultures. The improvement of management systems that opt for the diversity of institutional and social stakeholders and, considering individual characteristics such as gender, allows flexible management to deal with environmental disturbances, making the system less fragile and more capable of dealing with adversities. Added to all this, the recognition and promotion of increasingly participatory research processes within the scope of community inclusion is also necessary.

This project marks the contribution and sharing of knowledge by an important holder of traditional knowledge, Mr. Dirceu Nunes da Silva, the fourth author of this article, who passed away two years after the

workshop that provided unforgettable moments sharing stories, knowledge and feelings, and for this we are genuinely grateful.

Abbreviations

CNCFLORA	National Flora Conservation Center
CNPq	Brazilian Council for Scientific and Technological Development
EAFM	Herbarium of the Federal Institute of Education, Science and Technology of Amazonas
ECOHE	Laboratory of Human Ecology and Ethnobotany, Federal University of Santa Catarina
ICMBio	Instituto Chico Mendes para a Conservação da Biodiversidade/ Chico Mendes Institute for Biodiversity Conservation
INCRA	Brazilian Institute of Colonisation and Agrarian Reform
PNAP	National Park Aparados da Serra
PNSG	National Park of Serra Geral
RS	Rio Grande do Sul state
SC	Santa Catarina state
SEMA	Brazilian Environment Secretariat
SISGEN	Brazilian System for the Management of Genetic Heritage
SR	Quilombo São Roque
UFSC	Universidade Federal de Santa Catarina/Federal University of Santa Catarina
TK	Traditional knowledge

Supplementary Information

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Additional file 1

Additional file 2

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Author contributions
DC designed the study, collected and analyzed data and wrote the manuscript. MCG collected the data and contributed in the final version. VOS and DNS conducted part of the workshops in the community sharing their traditional knowledge. NH designed the study and was a major contributor in writing the manuscript. All authors read and approved the final manuscript, except DNS who agreed with this publication before passing away.

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Data availability
"Data are provided within the manuscript or supplementary information files".

Declarations

Ethical approval and consent to participate
All information obtained was preceded by an individual previous informed consent. We followed all community protocols, and this research was registered at the Brazilian System for the Management of Genetic Heritage (SISGEN) register AE2E0E3 and approved by the Ethics Committee for the Research with Human Beings of Universidade Federal de Santa Catarina (18847013.0.0000.0121).

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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