

Ethnopharmacobotany of Terreiro People in Salvador City, Bahia, Brazil

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Abstract

The prospection of drugs at from plants cited in ethnological studies has demonstrated promising results. Salvador city is an important center of knowledge inherent to Afro-Brazilian peoples and their syncretism with traditional Amerindian and European knowledge, making it an important place for ethnopharmacobotanical studies. In this context, the present work aimed to carry out an ethnopharmacobotanical survey of medicinal and Unconventional Food Plants (UFPs) used by Terreiro people in Salvador city and compare it with data from the scientific literature, in addition to comparing the similarity of data from Terreiros by religion and phytophysiognomies of your location. The snowball sampling methodology was used. Botanical identification was performed. Members of nine Terreiros of Candomblé and Umbanda were interviewed, located in the Administrative Region Boca Rio (RA-IX), Pituba (RA-VIII) and Brotas (RA-V) in the city of Salvador city in which 56 species were cited as medicinal plants and 18 as UFPs. Respondents reported getting the plants at street markets (46,23%), in the backyards (46,23%) and in the woods (7,55%) and the most used part was the leaves (62,71%). It has been observed a significant congruence of the uses cited by the interviewees with the scientific data from the consulted literature. The interviewees presented traditional knowledge about medicinal plants and UFPs with a high alignment with the scientific evidence presented, despite the scarcity of clinical studies for most species and the low number of *in vivo* studies.

Keywords: Medicinal plants; UFPs; Terreiro people

Introduction

The prospection of drugs and bioactive compounds at from plants cited in ethnological studies has demonstrated promising results [1,2]. Brazil represents one of the countries with the greatest biodiversity in the world, thus having an immense potential, as yet unexplored, for the prospecting of plant-derived drugs, with special attention to plants used by traditional communities that still make extensive use of plants for medicinal purposes, such as Terreiro people.

Terreiro people are traditional peoples of African origin with traditional knowledge, practices and customs focused on Afro-descendant religiosity who gather in physical spaces called Terreiros (shrine houses), where their religious and cultural activities take place [3,4]. It must be considered that, in the sociocultural and religious context of these communities, health promotion takes place through a holistic perception, in the mental, physical and spiritual dimensions, generally seen in an inseparable way [5,6].

Unconventional Food Plants (UFPs) are also often part of the daily lives of people in Terreiros. UFPs are plants, or parts thereof, that despite having food and cultural relevance for traditional populations, are not usually used by local society, do not have a highly organized production chain and do not present a significant commercial interest on the part of the local agricultural industry [5-7]. UFPs are important not only as new possibilities for promoting the reduction of food insecurity, but also for the study of bioactive substances with the potential to promote health, in addition to the nutritional aspect.

The city of Salvador has been called Black Rome and Black Mecca, not only because it has the largest black population outside Africa, but also because it is a center of religious cults from African, Amerindian and European cultural and religious syncretism [8,9]. Among these Afro-Brazilian cults, Candomblé and Umbanda stand out.

Candomblé originated through the fusion of several African religious systems, when enslaved people of different ethnic groups from Africa were grouped together in the hostile environment of captivity in Brazilian lands. Possibly, due to the need to maintain cultural identity, to promote social support and cure for their illnesses, in addition to religious exercise, a system of symbiosis between gods from different pantheons emerged, syncretizing beliefs and deities according to the members who made up their communities [10]. This religion is based on the cult of Orishas, ancestral entities that merge with the forces of nature [11] and its rituals are practiced in houses, fields, forests, waterfalls or Terreiros through songs, dances, drumbeats, offerings of vegetables, minerals and not infrequently, the sacrifice of animals [12]. Plants are of vital importance for the worship of all Orishas and there is also a specific Orishas for the cult of leaves and medicinal and liturgical

herbs, Ossian, as well as preserved natural spaces, for holding specific services and collecting sacred plants.

Umbanda, on the other hand, is cited as the only genuinely Brazilian religion, as it was officially created at the beginning of the 20th century, by Zélio Fernandino de Moraes in 1908, in the suburbs of the municipality of Rio de Janeiro, based on religions of African origin, catholicism and in spiritism [12]. Saraceni, et al., however, cites the existence of previous similar manifestations, such as the Umbanda line, which were presented in Candomblé sheds, since the mid-nineteenth century [13]. Other authors also point out the strong similarity between Umbanda and Cabula, a syncretic religious movement created in Bahia and present in Rio de Janeiro in the 19th century, involving elements of Afro-Brazilian cults and spiritist philosophy, quite similar to Umbanda, which Pombas, candles and the presence of cambones are also used, figures that help supporters during trance [10-14]. From African roots, Umbanda maintains, among other aspects, the cult of the Orishas and the elements of nature, the use of plants for liturgical and medicinal purposes and mediumistic trances.

The present study aimed to carry out a survey of medicinal plants and UFPs used by people from Candomblé and Umbanda Terreiros in the city of Salvador, to compare popular medicinal uses with already established scientific data on their potential pharmacological activities and the similarity between the data obtained in the different Terreiros, in order to provide a greater understanding of traditional knowledge about these plants and their use for medicinal and food purposes.

Materials and Methods

Study area

The municipality of Salvador, capital of the state of Bahia, Brazil, is located at the geographic coordinates 12°58'13" South and 38°30'45" West. The subdivision of the municipality into administrative regions was used, as described in Municipal Law 6,897/2005 (**Figure 1**), in order to facilitate and order the delimitation of the study area.

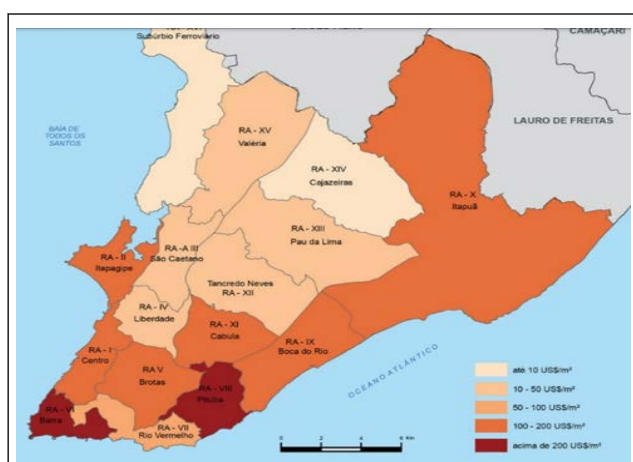


Figure 1: Map of the subdivision of the city of Salvador into administrative regions (Source: SILVA, 2014).

The city has areas of vegetation predominantly formed by remnants of native Atlantic Forest, one of the most threatened Brazilian biomes, due to extensive human action, the expansion of agricultural, extractive, livestock and mining activities and in large urban centers, as in the case of Salvador, mainly due to real estate speculation [15]. The Restinga and the Mangroves are two important ecosystems, associated with the Atlantic Forest and also present in the municipality of Salvador, the first being a set of coastal plains covered by marine deposition, with vegetation adapted to saline and sandy conditions, with creeping herbaceous species, endowed with of broad root systems and the second a coastal ecosystem of transition between terrestrial and marine environments subject to the daily action of the tides, dominated by typical plant species, being associated with the meeting of river waters with those of the sea [16].

As reported by Santos, et al., [15], the rich biological diversity of the biome, still little studied, harbors a promising area of research for the prospection of drugs and biologically active compounds.

Sample design, data collection and principles of inclusion and exclusion

The sample design was based on inclusion and exclusion criteria and the inclusion criteria were: In terms of location, the Candomblé and Umbanda Terreiros located in RA-V, RA-VIII and RA-IX in Salvador and within of these, only plants used for food and/or medicinal purposes, even if associated with liturgical or spiritual purposes. Also, only Terreiros whose representatives declared their acceptance of participation, *via* letter of consent and whose interviewed member had signed the Free and Informed Consent Term (FPIC) participated in the sampling.

On the other hand, the exclusion criteria were location outside the predefined locus, other religions of African origins, Terreiros whose representatives refused to participate in the study, or whose leaders refused to sign the free and informed consent term. With regard to plants, those not considered UFPs and/or medicinal were excluded.

After approval by the local Research Ethics Committee (REC), to obtain the primary data, a qualitative and quantitative exploratory model was chosen through the snowball sampling methodology, a non-probabilistic method, in which the initial participants of a study indicate new participants, through a chain of reference, or network of contacts, until the proposed objective is reached, maintaining the scope of the study area and the principles of inclusion and exclusion. The ethnobotanical information about the place of collection and the categorization of plants with medicinal and/or food use in liturgical services came from semi-structured interviews, with representatives of each of the participating Terreiros, as indicated by the members of the community, with only one interview per Terreiro, between July 2021 and July 2022 [17]. The interviews were transcribed and the scripts consisted of open questions and addressed

socio-cultural aspects and the ethnopharmacobotanical knowledge of the representatives of the respective Terreiros.

Obtaining plants, identification and statistical analysis

The collection of fertile samples was tentatively carried out in the places indicated by the interviewees of each participating Terreiro, or by other members, as indicated by the interviewee, in order to obtain material for deposit in collection and identification at the lowest taxonomic level possible. The collected samples were processed according to usual herborization methods [18] and registered in the Alexandre Leal Costa Herbarium of the Federal University of Bahia (ALCB). When no fertile material was obtained, the record was made through photographs of the plants *in loco*. The identification of materials was carried out based on specific literature, primarily indicated by do Brasil, et al., [19], where all the scientific names of the species were also checked.

For a better characterization of the plants as a function of the variables, the multivariate statistical analysis of clustering (cluster analysis) was used through presence and absence matrix for analysis of similarity through the statistical software PAST[®]. In addition, the results of the identification of plants (family and taxon), locations of obtaining and parts of the plant used were analyzed in terms of frequency of occurrence in the different Terreiros, with percentage analysis using the statistical software STATA[®] version 14.

Finally, the therapeutic indications of each plant mentioned in the ethno-directed interviews, the respective phytochemical compounds and pharmacological tests (*in vitro*, *in vivo*, *ex vivo* and clinical) that can support the discussion of the therapeutic use of plants by the interviewees, as well as the nutritional components and bioactive phytochemicals that can bring benefits in relation to the consumption of the mentioned UFPs.

Results and Discussion

Characterization of respondents

Leaders of nine Terreiros in Salvador city were interviewed, four from Umbanda and five from Candomblé (of these, four from the Ketu nation and one from the Angola nation). Regarding the geographical distribution, thirty-five Terreiros were contacted, of which twenty-six ceased communications for the progress of the research or refused to participate, citing several reasons, among the main ones: Suspension of activities due to the Covid-19 pandemic, incompatibility of agenda and cult secrets (considering that, in the universalist view, herbs must have their "asè" ritualistically activated for their use, through sacred words, prayers, chants and other religious

activities, restricted to initiates, some of which are of these plants considered inappropriate for a person, depending on their ruling Orisha, transmitting only medicinal knowledge would, in the view of some leaders, a cultural and religious mischaracterization).

The mean age of the participants was 49.67 ± 14.97 years and the mean time in religion was 26.53 ± 20.11 years. As for gender, 55.56% of respondents were women and 44.44% were men. All interviewees reported having experience in the Terreiro as the main source of their learning.

Place of obtaining the plants and used parts thereof

The places where medicinal plants are obtained are important, as they can affect their correct botanical identification, their phytochemical composition and be correlated with the presence of contaminants.

The main places for obtaining medicinal plants were fairs and backyards, whether in the Terreiro itself, members or neighbors (46.23% each) and the forest (7.55%). Obtaining plants at fairs raises a concern about the correct botanical identification of the species used, because, as plants are often sold already dried and crushed, even an experienced person would have difficulty identifying exchanges. Another warning factor is the origin and hygienic-sanitary conditions of handling, transport and storage, which can lead to significant contamination. One hypothesis for why plants are now obtained at fairs is the high real estate pressure in urban centers, which has considerably reduced the size of Terreiros, many of which no longer have space to grow them, as well as its members, as well as the reduction of native forest fragments, which are both a source of plants for medicinal, food and ritual purposes, as well as a place of worship. The low percentage of collection in the forests may be a natural reflection in the urban context of a large metropolis, however, it may also reflect a low environmental preservation of native forest fragments and the high sociocultural, environmental and religious impact that this represents.

The parts of the plants most used for making homemade medicines were leaves (62.71%) and flowers (15.25%), followed by the inner bark, stem or stalk, bark, fruits and seeds (3.39% each) and finally, the roots, resins and bulb (1.69%). These results corroborate a popular phrase said by practitioners of African religions in Brazil, which is "there is no life without leaves, there is no Orisha without leaves" and which demonstrates the importance of plants and their leaves for these traditional communities [20].

Characterization of medicinal plants

Based on the data obtained in the interviews, 56 species were cited for medicinal purposes (Table 1).

Table 1: Medicinal plants cited by respondents from Candomblé and Umbanda Terreiros.

Botanical classification	Common name	Popular indications of use	Used part	Obtaining place	Preparation	Quote
Adoxaceae						
<i>Sambucus nigra</i> (L.)	European elder	Flu like symptoms	Leaves	Fair	Infusion	1
Alliaceae						
<i>Allium sativum</i> (L.)	Garlic	Cough, flu like symptoms	Bulb	Fair (3)	Infusion	3
<i>Allium cepa</i> (L.)	Yellow onion	Arterial hypertension	Barks	Fair (2)	Infusion	2
Aloaceae						
<i>Aloe vera</i> (L.)	Babosa	Wound healing, gastritis, ulcer, stomach pain	Leaves (gel)	Fair (1)	In natura	3
				Backyard (2)		
Amaranthaceae						
<i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants	Mexican tea	Gastrointestinal diseases, worms, flu like symptoms and injuries	Leaves	Fair (2)	Maceration	5
				Backyard (2)		
Anacardiaceae						
<i>Schinus terebinthifolia</i> (Raddi)	Aroeira	Anti-inflammatory, healing, gynecological diseases	Barks	Backyard (3);	Decoction (bark)	7
			Leaves	Woods (3); Fair (1)	Infusion (leaves)	
Annonaceae						
<i>Annona muricata</i> (L.)	Soursoap	Arterial hypertension	Leaves	Backyard	Infusion	1
Apiaceae						
<i>Angelica archangelica</i> (L.)	Angelica	Calming	Flowers	Fair	Infusion	1
<i>Pimpinella anisum</i> (L.)	Fennel	Stomach diseases, indigestion, gas and cramps intestinais	Seeds	Fair (3)	Infusion	3

Asteraceae						
<i>Vernonia condensata</i> Barker	Alumã	Digestive problems, antidiarrheal	Leaves	Backyard	Infusion	1
<i>Arnica</i> sp. (L.)	Arnica	Rheumatic ache	Leaves/flowers	Fair	Topical tincture	1
<i>Matricaria recutita</i> (L.)	Chamomile	Soothing	Flowers	Fair	Infusion	1
<i>Blanchetia heterotricha</i> DC.	Maria-preta	Flu and breathing diseases	Leaves	Fair (1); Backyard (1)	Syrup	2
Burseraceae						
<i>Protium heptaphyllum</i> (Aubl.)	Amescla	Heart problems, glaucoma, stimulant	Leaves	Backyard	Infusion	1
<i>Commiphora myrrha</i> (Nees)	Myrrh	Aches, inflammation and throat infection	Resin	Fair	Tincture	1
<i>Commiphora leptophloeos</i> (Mart.) J.B. Gillett	Umburana	Anti-inflammatory	Leaves	Fair	Infusion	1
Celastraceae						
<i>Maytenus ilicifolia</i> Mart. ex Reissek	Espinheira-santa	Gastritis, stomach pain, ulcers and gynecological diseases	Leaves	Fair (1)	Infusion	2
				Woods (1)		
Costaceae						
<i>Costus spicatus</i> Swartz	Cana-de-macaco	Urinary infections	Leaves	Backyard	Infusion	1
Crassulaceae						
<i>Kalanchoe brasiliensis</i> Cambess and <i>Kalanchoe pinnata</i> (Lam.) Pers.	Miracle leaf	Body swelling, stomach pain, intestinal problems, eye irritation, inflammation, excess ear wax and hemorrhoid treatment	Leaves (Juice)	Backyard (6)	In natura	6
Euphorbiaceae						
<i>Euphorbia tirucalli</i> (L.)	Pencil cactus	Wart treatment	Stalk (sap)	Backyard	In natura	1
Fabaceae						

<i>Stryphnodendron adstringens</i> (Mart.)	Barbatimão	Gynecological and psychiatric diseases	Barks	Fair	Decoction	1
<i>Clitoria ternatea</i> (L.)	Asian pigeonwings	Diabetes and insulin resistance	Flowers	Backyard	Infusion	1
Humiriaceae						
<i>Endopleura uchi</i> (Huber) Cuatrec.	Uxi-amarelo	Fibroids treatment, antitumor, female infertility treatment	Barks	Fair	Decoction	1
Lamiaceae						
<i>Rosmarinus officinalis</i> (L.)	Rosemary	Mood stabilizer	Leaves	Fair	Infusion	1
<i>Lavandula</i> sp.(L.)	Lavender	calming, sedative, colic	Flowers	Fair (1); Backyard (1)	Infusion	2
<i>Melissa officinalis</i> (L.)	Lemon balm	Calming, sedative	Leaves	Backyard (3)	Infusion	3
<i>Mentha x piperita</i> (L.)	Peppermint	Gas, intestinal and stomach pain, flu-like symptoms	Leaves	Backyard (2)	Infusion	2
<i>Mentha spicata</i> (L.)	Common mint	Gas, intestinal and stomach ache, flu-like symptoms	Leaves	Fair (1); Backyard (1)	Infusion	2
<i>Ocimum basilicum</i> (L.)	Basil	Inflammation, physical and mental exhaustion	Leaves	Fair (1); Backyard (1)	Infusion	2
<i>Ocimum gratissimum</i> (L.)	African basil	Sinusitis, nasal congestion, hypertension	Leaves	Backyard (2)	Infusion	2
<i>Plectranthus barbatus</i> (Andrews)	Tapete-de-Oxalá	Stomach and digestive problems	Leaves	Fair (1); Backyard (2)	Maceration	3
Lauraceae						
<i>Laurus nobilis</i> (L.)	Bay leaf	Digestive problems and arterial hypertension	Leaves	Fair (2)	Infusion	2
Melastomataceae						
<i>Miconia albicans</i> (Sw.) DC.	Canela-de-velho	Rheumatic ache	Leaves	Woods	Infusion or maceration	1

Menispermaceae						
<i>Cissampelos fasciculata</i> Benth	Erva-mãe-boá	Gynecological diseases	Leaves	Fair	Infusion	1
Monimiaceae						
<i>Peumus boldus</i> Molina	Boldo	Digestive problems	Leaves	Backyard (4)	Infusion	4
Myristiaceae						
<i>Myristica fragrans</i> Houtt	Nutmeg tree	Arterial hypertension	Seeds	Fair (2)	In natura (grated)	2
Myrtaceae						
<i>Psidium cattleianum</i> Sabine	Strawberry guava	Intestinal cramps and diarrhea	Leaves	Fair	Infusion	1
<i>Eucalyptus</i> sp.	Eucalypt	Breathing diseases	Leaves	Woods (3)	Nebulization	3
<i>Eugenia uniflora</i> (L.)	Pitanga	Flu and colds, various infections of the respiratory tract and immunostimulant	Leaves	Backyard (3)	Infusion	3
Phyllanthaceae						
<i>Phyllanthus</i> sp.	Stonebreaker	Kidney stone	Leaves	Backyard (2)	Infusion	2
Phytolaccaceae						
<i>Petiveria alliacea</i> (L.)	Guinea	Anti-inflammatory and analgesic	Leaves	Fair (2)	Infusion	2
Piperaceae						
<i>Piper umbellatum</i> (L.)	Capeba	Muscle aches	Leaves	Backyard	Hot dressing	1
<i>Peperomia pellucida</i> Kunth	Pepper elder	Eye irritation and gynecological diseases	Leaves	Backyard (1); Fair (1)	In natura; Infusion	2
Poaceae						
<i>Cymbopogon citratus</i> (DC) Stapf.	Lemongrass	Stomach problems, insomnia, flu, cough and breathing problems and general flu-like symptoms	Leaves	Fair (3); Backyard (2)	Infusion	5

<i>Cymbopogon nardus</i> (L.) Rendle	Citronella	Mosquito repellent	Leaves	Backyard	Maceration	1
Punicaceae						
<i>Punica granatum</i> (L.)	Pomegranate	Throat infections, tonsillitis, canker sores, hair loss	Fruit	Fair (1); Backyard (1)	Decoction	2
Rosaceae						
<i>Rosa alba</i> (L.)	White rose	Anti-inflammatory and soothing	Flowers	Fair	Infusion	1
Rubiaceae						
<i>Uncaria tomentosa</i> (Willd. ex Schult.) DC.	Unha-de-gato	Antibiotic and antitumor	Stem	Fair	Decoction	1
Rutaceae						
<i>Ruta graveolens</i> (L.)	Common rue	Inflammations and colic	Leaves	Fair	Infusion	1
<i>Citrus limon</i> (L.) Burm F.	Sicilian lemon	Stimulant, immunomodulator, flu-like symptoms	Fruit	Fair (2)	Decoction	2
<i>Citrus × sinensis</i> (L.) Osbeck	Orange tree	Calming, nausea and stomach pains	Flowers	Fair (2)	Infusion	2
<i>Citrus reticulata</i> Blanco	Tangerine tree	Anxiety and insomnia	Leaves	Fair	Infusion	1
Solanaceae						
<i>Cestrum</i> sp.	Lady of the night	Muscle aches	Leaves	Backyard	Hot dressing	1
<i>Solanum americanum</i> Miller	American black nightshade	Healing	Leaves	Fair	Maceration	1
Zingiberaceae						
<i>Zingiber officinale</i> (Roscoe)	Ginger	Stimulant and immunomodulator	Root	Fair	Decoction	1
<i>Alpinia zerumbet</i> (Pers.)	Shell ginger	Insomnia, anxiety and heart diseases	Flowers	Backyard (2)	Infusion	2

The most cited medicinal plants were *Schinus terebinthifolia* Raddi, *Kalanchoe* sp. (*K. brasiliensis* Cambess and *K. pinnata* (Lam.) Pers.), *Cymbopogon citratus* (DC) Stapf and Mosyakin & Clemants and *Peumus boldus* Molina. Most usage citations are for the resolution of minor health problems, such as inflammation, injuries, flu-like symptoms and blood glucose and hyperten-

sion control; however, there are also citations for cancer treatment. Medicinal plants or herbal medicines produced from them can be an important form of treatment for self-limiting health problems, especially in regions where the public health system does not have many medicines to dispense to patients. In addition, phytochemical screening and pharmacological assays can

be useful for prospecting and isolating substances of medical interest.

The families with the highest representation of species in the interviewees' citations were *Lamiaceae*, *Asteraceae*, *Rutaceae*, *Burseraceae* and *Myrthaceae*. The *Lamiaceae* and *Asteraceae* families also appear as the two most representative families in the study by Pagnocca, et al., [4] carried out in the African matrix communities of the Island of Santa Catarina and appear as the third and second, respectively, most cited in the systematic review by Silva and collaborators, et al., [21] on ethnopharmacological studies carried out in Brazil during the 21st century. These data are in agreement with the most representative botanical

families in number of species mentioned in the pharmacopoeias of several groups native to South America, according to Bennett; Pance, et al., *Lamiaceae*, *Asteraceae*, *Poaceae*, *Fabaceae*, *Malvaceae*, *Rutaceae* and *Apiaceae*. Of these, only species of the *Malvaceae* family were not mentioned in the present study, while the families *Burseraceae* and *Myrthaceae*, two of the most cited families in this study; do not appear in the list of the most cited in South America by Bennett; Pance, et al., [22].

Table 2 presents the popular use of the plants mentioned by the interviewees and findings in the literature, in studies of pharmacological activity that may corroborate these indications for use.

Table 2: Correlation between medicinal plants, therapeutic indications and scientific studies with positive evidence for the reported indication.

Characterization of plants and claim of biological activity			Studies with positive evidence		
Botanical classification	Common name	Popular indications of use	<i>In vitro</i>	<i>In vivo ou ex vivo</i>	Clinicals
Adoxaceae					
<i>Sambucus nigra</i> (L.)	European elder	Flu-like symptoms	Zakay-Rones, et al., [23]		Mahboudi, et al.,[24]
Alliaceae					
<i>Allium sativum</i> (L.)	Garlic	Cough, flu like symptoms	Rouf, et al., [25]		Lissimman, et al., [26]
<i>Allium cepa</i> (L.)	Yellow onion	Arterial hypertension	Naseri, et al., [27]	Naseri, et al., [27]	
Aloaceae					
<i>Aloe vera</i> (L.)	Babosa	Wound healing, gastritis, ulcer, stomach pain	Jettanacheawchankit, et al., [28]		Langmead, et al., [29]
Amaranthaceae					
<i>Dysphania ambrosioides</i> (L.) Mosyakin&Clemants	Mexican tea	Gastrointestinal diseases, worms;	Monzote, et al., [30]		
		Flu like symptoms and injuries		Trivellatograssi, et al., * [31]	
Anacardiaceae					
<i>Schinus terebinthifolia</i> (Raddi)	Aroeira	Anti-inflammatory, healing		Cavalher-Machado, et al., [32]/Ribas, et al., 2006 [33]	
		Gynecological diseases		Lucena, et al., [33]	Amorim, et al., [34]
Annonaceae					

<i>Annona muricata</i> (L.)	Soursoap	Arterial hypertension		Sokpe, et al., [35]/ Oridupa, et al., 2021 [36]	
Apiaceae					
<i>Angelica archangelica</i> (L.)	Angelica	Calming		Kumar, et al., [37]/ Kumar, et al., [38]	
<i>Pimpinella anisum</i> (L.)	Fennel	Stomach diseases, indigestion, gas and cramps intestinais		Al Mofleh, et al., [39]	Ghoshegir, et al.,[40]
Asteraceae					
<i>Vernonia condensata</i> Barker	Alumã	Digestive problems	Silva, et al., [41]	Boeing, et al., [42]	
		Antidiarrheal;	---	---	---
<i>Arnica</i> sp. (L.)	Arnica	Rheumatic ache	Lyss, et al., [43]		Widrig, et al., [44]
<i>Matricaria recutita</i> (L.)	Chamomile	Calming		Viola, et al., [45]/ Bozorgmehr, et al., [46]	
<i>Blanchetia heterotricha</i> DC	Maria-preta	Breathing problems and flu	---	---	---
Burseraceae					
<i>Protium heptaphyllum</i> (Aubl.)	Amescla	Cardiac diseases		Mobin, et al., *[47]/ Carvalho, et al., 2017 [48]	
		Glaucoma		Mobin, et al., *[47]	
		Stimulating	---	---	---
<i>Commiphora myrrha</i> (Nees)	Myrrh	Pain, inflammation and throat infection		Mohamed, et al.,[49]	
<i>Commiphora leptophloeos</i> (Mart.) J.B. Gillett	Umburana	Anti-inflammatory	Dantas-Medeiros, et al., [50]	Dantas-Medeiros, et al., [50]	
Celasteraceae					
<i>Maytenus ilicifolia</i> Mart. ex Reissek	Espinheira-santa	Gastritis, stomach pain and ulcers		Jorge, et al., [51]/ Tabach, et al., [52]	
		Gynecological diseases	Colacite, et al., [53]/ Oliveira, et al., *[54]		
Costaceae					
<i>Costus spicatus</i> Swartz	Cana-de-macaco	Urinary infections	Uliana, et al., [55]	Moreno, et al., *[56]	
Crassulaceae					

<i>Kalanchoe brasiliensis</i> Cambess and <i>Klanchoe pinnata</i> (Lam.) Pers.	Miracle leaf	Body swelling, stomach pain,intestinal problems,eye irritation,inflammati on, excess ear wax and hemorrhoid treatment		Araújo, et al., *[57]/ Araújo, et al., *[58]	
		Excess ear wax	---	---	---
Euphorbiaceae					
<i>Euphorbia tirucalli</i> (L.)	Pencil cactus	Wart treatment	Betancur-Galvis, et al., *[59]/Abdel-Aty, et al., *[60]		
Fabaceae					
<i>Stryphnoden-dron adstringens</i> (Mart.)	Barbatimão	Gynecological diseases		Freitas, et al., [61]/ Kaplum, et al., [62]	
		Psychiatric problems and hallucinations	---	---	---
<i>Clitoria ternatea</i> (L.)	ASIAN pigeonwings	Diabetes and insulin resistance		Daisy, et.al., [63]	
Humiriaceae					
<i>Endopleura uchi</i> (Huber) Cuatrec.	Uxi-amarelo	Fibroid treatment, antitumor	Bento, et al., [64]/ Bento, et al., [65]		
		Female infertility treatment	---	---	---
Lamiaceae					
<i>Rosmarinus officinalis</i> (L.)	Rosemary	Mood stabilizer		Machado, et al.,[66]/ Machado, et al.,[67]	
<i>Lavandula</i> sp. (L.)	Lavender	Calming, sedative	Gilani, et al., [68]	Gilani, et al., [68]	
<i>Melissa oficinalis</i> (L.)	Lemon balm	Calming, sedative		Soulimani, et al., [69]	Kennedy, et al., [70]
<i>Mentha x piperita</i> (L.)	Peppermint	Gas, intestinal ache, stomachache			Kannah, et al., [71]
		Cough and flu-like symptoms	---	---	---
<i>Mentha spicata</i> (L.)	Common mint	Gas, intestinal ache, stomach diseases			Mahboudi, et al.,[72]
		Cough and flu-like symptoms	Karaka, et al., *[73]/ Hashmi, et al., *[74]	Rodrigues, et al., [75]	
<i>Ocium basilicum</i> (L.)	Basil	Inflammations	Selvakkumar, et al., [76]		

		Physical and mental exhaustion	---	---	---
<i>Ocimum gratissimum</i> (L.)	African basil	Sinusitis and nasal congestion	Prabhu, et al., *[77]		
<i>Plectranthus barbatus</i> (Andrews)	Tapete-de-Oxalá	Stomach and digestive problems		Alasbahi, et al., [78,79]	
Lauraceae					
<i>Laurus nobilis</i> (L.)	Bay leaf	Arterial hypertension	De Marino, et al.,[80]	Taroq, et al., [81]	
		Digestive problems		Qnais, et al., [82]	
Melastomataceae					
<i>Miconia albicans</i> (Sw.) DC.	Canela-de-velho	Rheumatic ache		Lima, et al., [83]/ Corrêa, et al., [84]	
Menispermaceae					
<i>Cissampelos fasciculata</i> Benth	Erva-mãe-boá	Gynecological diseases	Galinis, et al., *[85]/ Souza, et al., *[86]		
Monimiaceae					
<i>Peumus boldus</i> Molina	Boldo	Digestive problems		Lagos, et al., [87]	
Myristiaceae					
<i>Myristica fragrans</i> Houtt	Nutmeg tree	Arterial hypertension			Nugraha, et al., [88]
Myrthaceae					
<i>Psidium cattleianum</i> Sabine	Strawberry guava	Intestinal colic and diarrhea	Rahman, et al., [89]	Rahman, et al., [89]	
<i>Eucalyptus</i> sp.	Eucalypt	Breathing diseases			Soleimani, et al.,[90]
<i>Eugenia uniflora</i> (L.)	Pitanga	Colds and flu, various respiratory tract infections	Auricchio, et al., *[91]/Soares, et al.,*[92]		
		Immunostimulant	---	---	---
Phyllantaceae					
<i>Phyllanthus</i> sp.	Stonebraker	Kidney stones			Micali, et al., [93]
Phytolaccaceae					
<i>Petiveria alliacea</i> (L.)	Guinea	Anti-inflammatory and analgesic		Lopes-Martins, et al., [94]/Rosa, et al., 2018 [95]	
Piperaceae					

<i>Piper umbellatum</i> (L.)	Capeba	Muscle aches		Iwamoto, et al., [96]/ Arunachalam, et al., [97]	
<i>Peperomia pellucida</i> Kunth	Pepper elder	Eye irritation, gynecological diseases	Oloyed, et al., *[98]	Arrigoni-Blank, et al., *[99]	
Poaceae					
<i>Cymbopogon citratus</i> (DC) Stapf.	Lemongrass	Stomach problems, flu, cough, breathing problems and general flu-like symptoms	Boukhatem, et al., *[100]/Aiemsaard, et al., *[101]	Boukhatem, et al., *[100]	
		Insomnia	---	---	---
<i>Cymbopogon nardus</i> (L.) Rendle	Citronella	Repellent against mosquitoes	Solomon, et al., [102]		
Punicaceae					
<i>Punica granatum</i> (L.)	Pomegranate	Throat infections, tonsillitis, canker sores	Schubert, et al., *[103]/Al Zoreky, et al., *[104]		
		Loss of hear	---	---	---
Rosaceae					
<i>Rosa alba</i> (L.)	White rose	Anti-inflammatory	---	---	---
		Calming	---	---	---
Rubiaceae					
<i>Uncaria tomentosa</i> (Willd. ex Schult.) DC.	Unha-de-gato	Antibiotic	Ccahuana-Vasquez, et al., [105]		
		Antitumor	Rizzi, et al., [106]	Dreifuss, et al., [107]	
Rutaceae					
<i>Ruta graveolens</i> (L.)	Common rue	Inflammatory and colic	Raghav, et al., [108]	Park, et al., [109]	
<i>Citrus limon</i> (L.) Burm F.	Sicilian lemon	Immunomodulator		Baba, et al., [110]/ Rahman, et al., [111]	
		Stimulating	---	---	---
<i>Citrus × sinensis</i> (L.) Osbeck	Orange tree	Calming		Gusmán-Gutierrez, et al., [112]	
		Nausea and stomacaches	Handan, et al., *[113]	Gargano, et al., [114]/ Kwangjai, et al., [115]	

<i>Citrus reticulata</i> Blanco	Tangerine tree	Anxiety and insomnia			
Sonaceae					
<i>Solanum americanum</i> Miller	American black nightshade	Healing	Valya, et al., *[116]	Joshi, et al., *[117]	
<i>Cestrum</i> sp.	Lady of the night	Anti-inflammatory		Begum, et al., [118]	
Zingiberaceae					
<i>Zingiber officinale</i> (Roscoe)	Ginger	Estimulating	---	---	---
		Immunomodulator	Zakaria-Rangkat, et al., [119]	Zidan, et al., [120]/ Ahmadifar, et al., [121]	
<i>Alpinia zerumbet</i> (Pers.)	Shell ginger	Insomnia, anxiety			
		Cardiac diseases		Murakamia, et al., [122]/Bastos, et al., [123]/Paulino, et al.,	

Caption: * =Study with demonstration of pharmacological activity correlated to the cited therapeutic indication, but not with exactly the same indication description (example: Anti-inflammatory, analgesic and antimicrobial activity for “throat problems”) / --- = No type of study found for the reported indication or biological activity that corroborates the indication.

The data indicate a high correlation between the traditional knowledge of the members of the surveyed Terreiro communities and the results of pharmacological assays from *in vitro*, *in vivo/ex vivo* and clinical studies, however, it is important to emphasize the scarce clinical studies found in the literature, as well as, in most cases, the low number of *in vivo* studies, making more *in vivo* and clinical studies extremely necessary to establish the efficacy and safety of use in the reported indications. Furthermore, it is important that pharmacological assays be developed with isolated substances, for a better understanding of the mechanisms of action of the active principles of these medicinal plants.

Analysis between the use of medicinal plants in different administrative regions and between different religious strands

In order to verify whether there is formation of groups with greater similarity to each other, either due to the phytophysiognomies of the Atlantic Forest corresponding to the place where the Terreiros are installed or due to the religion and lineage/nation of the participating Terreiros, a denogram of similarity was made, from the matrix of presence and absence of citation of each species by participating terreiro (Figure 2). Denogram with classic hierarchical cluster analysis (cluster analysis) for the mentioned medicinal plants, using the UPGMA algorithm and Bray-Curtis similarity index, through the PAST® statistical software.

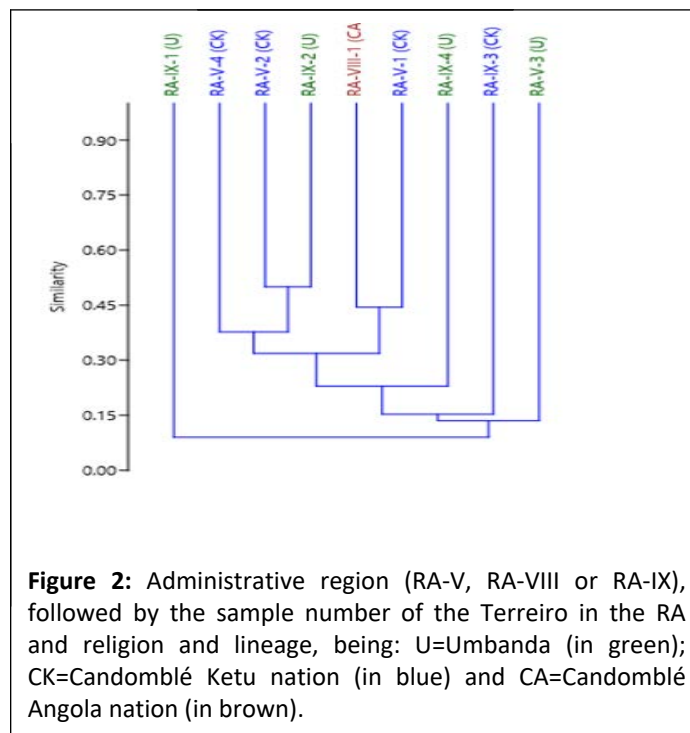


Figure 2: Administrative region (RA-V, RA-VIII or RA-IX), followed by the sample number of the Terreiro in the RA and religion and lineage, being: U=Umbanda (in green); CK=Candomblé Ketu nation (in blue) and CA=Candomblé Angola nation (in brown).

The hierarchical cluster analysis (Figure 2) did not demonstrate the formation of specific groups by degree of similarity between the mentioned medicinal plant species, neither in relation to the plant phytophysiognomies of the

Terreiros' location, nor in relation to the religion and line/nation of the Terreiros participants. This data may indicate that the use of medicinal plants by the Terreiro people went beyond the differences in the vegetation of the place where the Terreiros are inserted, since most of these plants are either cultivated or bought at fairs, as well as surpassed religion and lineage/nation, through the movement of exchange and syncretism of traditional knowledge of each line/nation, as happened with cultural and religious syncretism.

A multivariate ordering analysis was also carried out using the non-metric MDS method (Figure 3), in order to obtain a new analysis on the possible formation of groups with greater similarity due to the phytophysiognomies of the native forest where the Terreiros are located. Multivariate ordering analysis using the non-metric MDS method with the Bray-Curtis distance index, calculated using the PAST® statistical software for the medicinal plants mentioned by Terreiro.

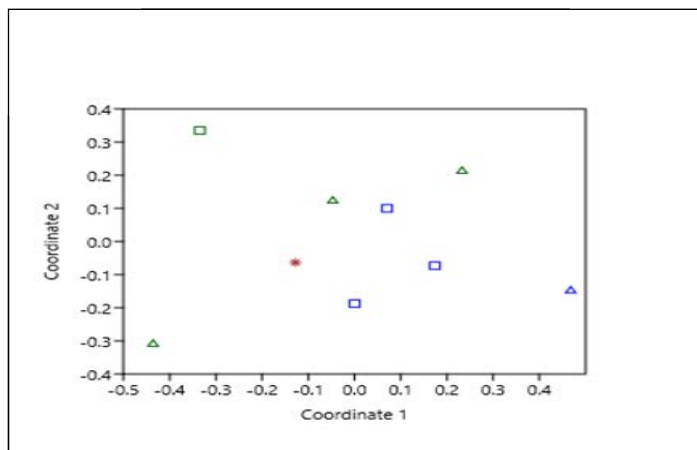


Figure 3: Square=RA-V yards; Triangle=RA-IX yards; Asterisk=RA-VIII yard. Green=Umbanda; Blue=Candomblé Ketu Nation; Brown=Candomblé Angola Nation.

The multivariate ordering analysis by the non-metric MDS method, did not demonstrate the formation of specific groups by degree of similarity between the cited species, nor in relation to the plant physiognomies of the location of the yards. These data reinforce the theory that the use of medicinal plants by the people of the Terreiro surpassed the differences in the vegetation of the place where the Terreiros are inserted, not being the phytophysiognomy of the native forest where the Terreiro is located a preponderant factor for the use of a certain medicinal plant.

Use of Unconventional Food Plants (UFPs)

After explaining to the interviewees, the concept of UFPs as plants, or parts thereof that, despite being edible, are not usually used by the local population as food, we asked them to list which plants they considered UFPs and used in food, whether ritualistic or every day. All citations were considered, as what is not considered UFPs in a given region may be considered in another [7]. Thus, it was not evaluated whether, technically, a mentioned plant would in fact be UFPs in Salvador/BA, but the perception of the interviewees of the plant in this category. We highlight, for example, the mention of ginger (*Zingiber officinale* Roscoe) which was considered UFPs by an interviewee who considered the root medicinal and unusual in cooking, despite being a common plant in oriental cuisine.

Eighteen species considered UFPs by the interviewees were cited (Table 3), the most representative being: *Talinum triangulare* Jacq. Willd (*língua-de-vaca*), *Plectranthus amboinicus* (Lour.) Spreng (Mexican mint), *Xanthosoma sagittifolium* L.(taioba), *Brassica juncea* (L.) Czern. (mustard), *Dioscorea spp.*(yam) and *Pereskia aculeata* Miller (ora-pro-nobis). Most of these species have a good supply of mineral salts, in addition to antioxidant action.

Table 3: UFPs cited by respondents.

Botanical classification	Common name	Place of obtening	Used part	Preparation mode	Items added in preparation	Quote
Annonaceae						
<i>Annona squamosa</i> (L.)	Sweetsops	Fair	Fruit	In natura	Salad to taste	1
Apiaceae						
<i>Coriandrum sativum</i> (L.)	Coriander	Marketplace	Leaves	Cooked in beans or in natura	Beans and salad	1
Araceae						
<i>Colocasia sp. e Xanthosoma sp.</i>	Cará (yam)	Fair	Roots	Boiled	Seasoning to taste	1
<i>Xanthosoma sagittifolium</i> (L.)	Taioba	Fair	Leaves	Boiled	Shrimp, onion and palm oil	3

Asteraceae						
<i>Acmella oleracea</i> (L.) R.K.Jansen	Jambú (Oripepê)	Fair	Whole herb	Boiled	Seasoning to taste	1
Brassicaceae						
<i>Brassica juncea</i> (L.) Czern.	Mostard	Fair	Leaves	Fry in olive oil and make farofa	Farinha e camarão seco	2
Cactaceae						
<i>Pereskia aculeata</i> Miller	Ora-pro-nóbis	Fair	Leaves	In natura ou refogado	Seasoning and salad to taste	2
Dioscoreaceae						
<i>Dioscorea</i> sp.	Inhame (yam)	Fair	Roots	Boiled or mush	Shrimp, onion and oliva oil	2
Euphorbiaceae						
<i>Manihot esculenta</i> (Crantz)	Manioc	Fair	Leaves	Boiled for 7 days	Seasoning to taste	1
Fabaceae						
<i>Clitoria ternatea</i> (L.)	Asian pigeonwings	Backyard	Flowers	Macerado em álcool	Food coloring	1
<i>Bauhinia forficata</i> Link.	Pata-de-vaca	Fair	Leaves	Boiled	Seasoning to taste	1
Lamiaceae						
<i>Rosmarinus officinalis</i> (L.)	Rosimary	Fair	Leaves	Boiled as seasoning	season chicken and pasta	1
<i>Plectranthus amboinicus</i> (Lour.) Spreng	Mexican mint	Backyard	Leaves	Macerated in the seasoning	Beans and others	3
<i>Ocimum basilicum</i> (L.)	Basil	Backyard	Leaves	Boiled	Mixed with vegetables	1
<i>Ocimum gratissimum</i> (L.)	African basil	Backyard	Leaves	Mixed with beans	Beans and others	1
Portulacaceae						
<i>Talinum triangulare</i> Jacq. Willd	Língua-de-vaca (efó)	Fair	Leaves and stalk	Braised or as muqueca	Seasoning to taste	4
Rutaceae						
<i>Citrus limon</i> (L.) Osbeck	Sicilian lemon	Backyard	Leaves	Infusion or juice	Not	1
Zingiberaceae						

<i>Zingiber officinale</i> (Roscoe)	Ginger	Marketplace	Roots	Onion and dried shrimp	Like seasoning	1
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The use of UFPs was not as abundant as the use of plants for medicinal purposes, which may indicate the loss of part of this knowledge over the generations or the possibility of obtaining it in the urban environment, with increasingly restricted space for cultivation, putting pressure on communities to consume foods that are easy to prepare, known as ultra-processed, as well as obtaining them at fairs, markets and supermarkets. Some plants, such as the quioiô (*Ocimum gra issimum* L.) were mentioned for both medicinal and food purposes, reinforcing the holistic and integralist view of the Terreiro people, where nutrition and therapy are closely correlated, in addition to the spiritual aspect of their knowledge ancestors.

In order to verify whether there is formation of groups with greater similarity to each other, either due to the Atlantic Forest phytophysionomies corresponding to the place where the Terreiros are installed or due to the religion and line/nation of the participating Terreiros, a denogram of similarity was made, the from the matrix of presence and absence of citation of each species by participating terreiro (Figure 4). Denogram with classic hierarchical cluster analysis (cluster analysis) for the mentioned UFPs, using the UPGMA algorithm and Bray-Curtis similarity index, through the PAST® statistical software.

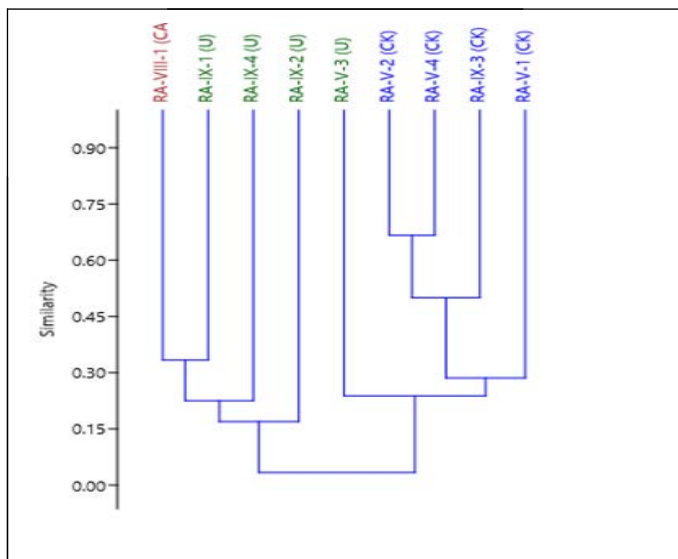


Figure 4: Administrative region (RA-V, RA-VIII or RA-IX), followed by the sample number of the Terreiro in the RA and religion and lineage, being: U=Umbanda (in green); CK=Candomblé Ketu Nation (in blue) and CA=Candomblé Angola Nation (in brown).

The hierarchical cluster analysis for the UFPs (Figure 4) demonstrated the formation of groups by degree of similarity between the cited species in relation to the religion and line/nation of the participating Terreiros and in relation to the administrative regions in which they are inserted, being possible

to verify that the Candomblé temples of the Ketu Nation have a greater degree of similarity between themselves, when compared with the Umbanda temples.

A multivariate ordering analysis was also carried out using the non-metric MDS method (Figure 5), in order to obtain a new analysis on the possible formation of groups with greater similarity due to the phytophysionomies of the native forest where the Terreiros are located. Multivariate ordering analysis using the non-metric MDS method with the Bray-Curtis distance index, calculated using the PAST® statistical software for the UFPs cited by Terreiro.

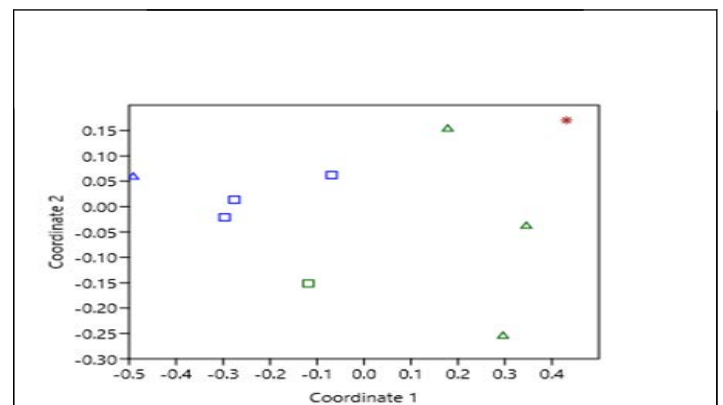


Figure 5: Square=RA-V yards; Triangle=RA-IX yards; Asterisk=RA-VIII yard. Green=Umbanda; Blue=Candomblé Ketu Nation; Brown=Candomblé Angola Nation.

The multivariate analysis of ordering by the non-metric MDS method (Figure 5) demonstrated the formation of specific groups by degree of similarity between the cited species, both in relation to administrative regions, religion and nation/line. These data suggest that the consumption of UFPs by the interviewees is more similar between Terreiros of the same line and between Terreiros located in the same region.

Conclusion

The results demonstrate an important use of medicinal plants by the African matrix communities of Salvador researched, as well as an alignment between the pharmacological actions of traditional knowledge with the *in vitro*, *in vivo*, *ex vivo* and clinical pharmacological tests surveyed, demonstrating the importance the preservation of such knowledge and new advances in ethno-directed research. The scarcity of bibliographic references regarding as clinical trials demonstrates that significant advances need to be made in relation to these two aspects, as well as the realization of a greater amount of *in vivo* research. In addition, the acquisition of plants at fairs was as high as the cultivation for personal use, probably due to the reduction in the size of Terreiros in the urban area, which makes

it impossible to plant their own and raises concerns about the correct botanical identification of the acquired plants, as well as hygienic-sanitary conditions, such as the possible presence of contaminants such as heavy metals, insecticides, pathogenic microorganisms, among others.

The use of UFPs was not as expressive as the use of medicinal plants, which may indicate the loss of such knowledge over the generations or the impossibility of access to them by the communities, pressing them to consume easily obtainable foods at fairs and markets. This fact may also be associated with the loss of physical space in urban Terreiros, which are increasingly reduced and unable to maintain the production of their vegetable items for consumption, as previously occurred in the “roças” (farms) present in the Terreiros in the recent past. Perhaps the growing movement to create urban community gardens can boost the rescue of their use, as well as work as a safe source of fresh medicinal plants for the local population.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors have no conflicts of interest to declare.

Acknowledgment

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