Ethnobotany applied to the selection of medicinal plants for agroecological crops in rural communities in the Southern End of Bahia, Brazil

DOI 10.32712/2446-4775.2021.1091

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Abstract

The present work targeted the ethnobotanical survey of medicinal plants for introduction to agroecological crops in 9 rural communities in the southern end of the state of Bahia, Brazil, as an economic and therapeutic alternative for the local populations. Prior agreement from the communities was requested and the research was submitted to the ethics committee; the registration of access to genetic heritage and associated traditional knowledge was performed. The following methodologies were used: participant observation, “snowball”, “walking in the woods”; semi-structured questionnaires and calculation of the Main Uses Concordance index (CUPc). The species were evaluated according to their origin and degree of threat. 233 species, distributed in 73 families, were cited, with emphasis on Asteraceae (27 spp.), Fabaceae (18 spp.) and Lamiaceae (16 spp.). Among these, 48% are native, 52% are naturalized and/or exotic and one vulnerable species was found (Euterpe edulis Mart.) and one endangered (Cariniana legalis (Mart.) Kuntze). The CUPc revealed 25 spp. with a value equal to or greater than 50% in at least one community. These results are expected to contribute to the selection of medicinal plants that serve as an economic and therapeutic alternative for vulnerable communities, as well as in stimulating the preservation of sociobiodiversity.

Keywords: Phytotherapy. Popular medicine. Sociobiodiversity. Traditional knowledge.
Introduction

Since the beginning of human civilization, medicinal plants have been used as resources in the treatment of diseases aiming at their prevention or even the cure. The empirical knowledge about the use of these plants has been passed down until today, becoming a common practice in popular medicine[1,2].

Although the use of medicinal plants is recurrent in popular medicine, only recently the pharmaceutical area has turned its attention to the subject. Until the mid-1980’s, the pharmaceutical industry produced medicines by means of the recognition, isolation and synthesis of molecules. However, starting in the 1990s, due to the high cost of producing these drugs and the discovery of phytocomplexes, a movement began for the valorization of the traditional use of medicinal plants, as well as the development of herbal medicines[3-5].

This valorization process was strengthened in Brazil with the implementation of the National Policy on Medicinal Plants and Herbal Plants (PNPMF)[6] which aims to promote actions, mainly focused on Sistema Único de Saúde (SUS) (Unified Health System), aimed at safe and rational use of medicinal plants and herbal medicines. Specific legal instruments have also been created, such as the Resolution of the Collegiate Board of ANVISA - RDC nº 26[7] that defines the categories of herbal medicines and traditional herbal products in addition to establishing the minimum requirements for their registration.

Even with the advent of SUS, the use of medicinal plants represents, in several Brazilian communities, the role of a sole therapeutic resource. It is believed that this practice is beneficial to human health, as long as the user has prior knowledge of its purpose, risks and benefits[8].

This scenario has been favoring ethnobotany research focused on the area of medicinal plants. According to Fonseca-Kruel et al.[9], this discipline can subsidize works on the sustainable use of biodiversity, through the utilization and valorization of the popular knowledge of human societies. Almassy Jr.[10] considers that ethnobotany, besides having a multi and interdisciplinary character, seeks, together with traditional communities, comprehension of human relations with the environment and can recover management strategies. The importance of these studies, in this context, allows the recording of information connected to ethnopharmacology, as well as the environmental preservation of the different medicinal species used[11].

It is worth mentioning that, together with these conditions, rural settlements are areas whose populations are composed of people from different regions of the country and, therefore, rich in sociobiodiversity. Thus, ethnobotanical studies also allow an evaluation of how the residents gather information brought from their places of origin with that obtained in the place where they have settled in order to adapt, in this new environment, the plants that are useful to their needs[12].

In the southern region of the state of Bahia, some of the last fragments of the remaining Brazilian Atlantic Rainforest are concentrated, in addition to several rural communities that live in isolation from the great urban centers, representing a space for research on the traditional knowledge focused on medicinal plants species.

Despite the ecological importance of the Atlantic Rainforest areas, associated with the rich sociobiodiversity, there is very little information about the potential and dynamics of these fragments. This knowledge gap is one of the causes of the slowness in the search for medicines that have long been part of the therapy of traditional communities, not to mention the fact that the value of medicinal resources derived from plants has significant potential as an alternative economic resource for the communities in the region[13].
In view of the issues presented, the purpose of the present work was to carry out an ethnobotanical survey in rural communities and agrarian reform settlements in the southern end region of Bahia, aiming at the selection of medicinal plants to be inserted in agroecological cultivation systems as an economic and therapeutic alternative for the local populations.

Methods

Areas of study

The areas of study were chosen when the Center for Innovation in Biodiversity and Health (CIBS/Farmanguinhos/Fiocruz) was invited to participate in the Agroecological Settlements Project (PAA), articulated between the Landless Rural Workers Movement (MST) and the Support Center for Culture and Extension in Education and Environmental Conservation at the Luiz de Queiroz Superior School of Agriculture of the University of São Paulo (NACE PTECA – ESALQ/USP).

CIBS was responsible for selecting plant species of medicinal interest with the purpose of inserting them into productive systems of the MST agroecological settlements (Bela Manhã, José Marti, Antônio Araújo, Jaci Rocha, Herdeiros da Terra, Abril Vermelho e São João) and in two rural communities (Ribeirão and Pouso Alegre). These areas are distributed in four municipalities in the southern end of Bahia: Itamaraju, Alcobaça, Prado and Teixeira de Freitas.

The southern end of Bahia is a region that is classified by the State of Bahia both as an identity territory, due to its cultural diversity, and as one of the main economic regions of the state. The southern end is composed of twenty one municipalities and its borders are demarcated as follows: to the North, Southwest of Bahia and the South Coast of Bahia; to the South, with the State of Espírito Santo; to the West, with the State of Minas Gerais; and, to the East, with the Atlantic Ocean[14].

This region is also known for its low Human Development Index (IDH), economies based on agriculture, monoculture of eucalyptus and problems with unemployment and violence. The monitoring of health conditions shows a large proportion of rural deaths without medical assistance, making clear the lack of inclusion of these communities in public health policies[15].

Sampling and data analysis

The data were collected from June 2016 to June 2017. At the beginning of the work, a meeting was organized with each of the nine communities in order to present the project and its objectives. In these meetings, the statement of prior consent was presented, and the consent of the community was also requested for the development of the work.

The project was submitted to the Research Ethics Committee of the Oswaldo Cruz Institute (IOC) of Fiocruz (Resolution 196/96 of the National Health Council) through Plataforma Brasil, and was approved and registered as CAAE: 56440416.6.000.5248. Since the project accesses genetic patrimony (PG) and Associated Traditional Knowledge (TK), according to Law 13,123/2015, it was also registered in the National Management System for Genetic Patrimony and Associated Traditional Knowledge (SISGEN) of the Management Council for Genetic Patrimony, receiving the following registration: AA79350.
The selection of respondents to carry out the ethnobotanical survey began through indications from the communities in the first meetings and then proceeded with the snowball method[16]. In the fieldwork, aiming to collect information on medicinal plants and socioeconomic aspects of the communities, direct observation[17] was applied along with semi-structured interviews based on a form. The collection of plant species was carried out after the interviews, with the respondents follow-up, using the “walking in the woods” method[18,19]. The plant species were herborized, assembled, identified and incorporated into the herbarium: Fiocruz’s Botanical Collection of Medicinal Plants (CBPM). The botanic identifications were performed by comparison with the material deposited at CBPM; In the herbarium of the Botanical Garden of Rio de Janeiro (RB); by consulting the relevant literature and specialists.

The spelling of the scientific names was checked using the database of Flora do Brasil 2020[20]. For the listing of the taxa, the APG IV (2016)[21] was followed.

In order to understand the relationship between conservation and indication of medicinal plants, we sought to classify the species according to their origin and degrees of threat by consulting the database of Flora do Brasil 2020[22] and of National Flora Conservation Center (CNCFlora), respectively[23].

Aiming to select, among the total species of the survey, which should be indicated for insertion in agroecological productive systems, we chose to favor the ones that presented the highest rate of Main Uses Concordance index (CUPc)[23]. The final selection included species with a CUPc equal to or greater than 50% in at least one of the communities studied and was later compared with the list of medicinal plants of interest to the Unified Health System (Renisus)[24].

### Results and Discussion

Altogether, 180 people were interviewed, citing 233 species of medicinal plants distributed in 73 botanical families (TABLE 1), and the most representative ones were: Asteraceae (27 species); Fabaceae (18 species); Lamiaceae (16 species); Euphorbiaceae (9 species); Solanaceae (9 species) e Myrtaceae (8 species). According to Guarim Neto et al.[25], the greater the number of species in a botanical family, the greater the possibility that they will be used by human populations using flora resources. Galvão et al.[26], however, believe that this probability can increase according to the presence of a great number of species of economic importance or of easy harvesting of the parts used, mainly for medicinal purposes. Consequently, the tendency of the presence of the Asteraceae, Fabaceae and Lamiaceae families can be justified among the most cited families in a large part of the ethnobotany works involving medicinal plants.

| Botanical Family / Scientific Names | Use Indication | Popular Name |
|-----------------------------------|----------------|--------------|
| Acanthaceae                        |                |              |
| Justicia gendarussa Burm.f.        | body aches     | abre-caminho |
| Justicia pectoralis Jacq.          | fever, flu, body aches | anador, imburaninha |
| Adoxaceae                         |                |              |
| Sambucus nigra L.                 | chickenpox, measles, bronchitis | sabugueiro |
| Alismataceae                      |                |              |
| Plant Name (Scientific Name) | Use | Common Name |
|-----------------------------|-----|-------------|
| Echinodorus grandiflorus (Cham. & Schltdl.) Micheli | urinary tract problems | chapéu-de-couro |
| Amaranthaceae | | |
| Alternanthera brasiliana (L.) Kuntze | anti-inflammatory, antibiotic, colic | novalgina |
| Amaranthus viridis L. | anemia | caruru |
| Celosia argentea L. | throat inflammation | crista-de-galo |
| Dysphania ambrosioides (L.) Mosyakin & Clemants | vermifuga | mentruz |
| Gomphrena globosa L. | fever | perpétua |
| Ptaffia glomerata (Spreng.) Pedersen | fever, flu, headache | doril |
| Amaryllidaceae | | |
| Allium sativum L. | expectorant | alho |
| Allium cepa L. | expectorant | cebola |
| Anacardiaceae | | |
| Anacardium occidentale L. | anti-inflammatory, wound healing and gastric problems | cajú |
| Mangifera indica L. | expectorant, accelerate labor | manga |
| Schinus terebinthifolia Raddi | anti-inflammatory, wound healing and skin allergy | aroeira |
| Spondias cf. tuberosa Arruda | pains and bone fracture treatment | amesca |
| Tapirira guianensis Aubl. | thrush (Candida albicans) | cupuba |
| Annonaceae | | |
| Annona muricata L. | diuretic, control high blood pressure and, diabetes | graviola |
| Annona squamosa L. | snake poison remedy | pinha |
| Xylopia frutescens Aubl. | body aches | pindaiba |
| Apiaceae | | |
| Coriandrum sativum L. | menstrual cramps, digestive | coentro |
| Eryngium foetidum L. | thrush (Candida albicans) inflammation of the uterus | coentro-maranhão |
| Foeniculum vulgare Mill. | sedative, control high blood pressure, gastric problems | erva-doce, funcho |
| Petroselinum crispum (Mill.) Fuss | inflammation of the uterus | salsinha |
| Apocynaceae | | |
| Geissospermum laeve (Vell.) Miers | gastric problems | doutor-embira |
| Thevetia peruviana (Pers.) K.Schum. | contusion and muscular pains | bálisamo |
| Araceae | | |
| Xanthosoma sagittifolium (L.) Schott | depurative of blood | taioba |
| Arecaceae | | |
| Cocos nucifera L. | gastric and kidney problems | coco |
| Euterpe edulis Mart. | snake poison remedy | jussara-branca |
| Aristolochiaceae | | |
| Aristolochia cymbifera Mart. & Zucc. | hernia remedy | jarrinha-da-mata |
| Asparagaceae | | |
| Agave americana L. | back problems | pita |
| Sansevieria trifasciata Prain | body aches | espada-de-são-de-jorge |
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| Family | Common Name | Scientific Name | Uses |
|--------|-------------|-----------------|------|
| **Asteraceae** | | | |
| Acanthospermum australe (Loefl.) Kuntze | | vaginal discharge | là-de-carneiro |
| Acanthospermum hispidum DC. | | fever, flu, expectorant, pneumonia | maroto |
| Achyrocline satureioides (Lam.) DC. | | sedative, control high blood pressure | marcela, macela |
| Ageratum conyzoides L. | | inflammation of the uterus, gastric problems | mentraste |
| Argemone mexicana L. | | expectorant, pneumonia, postpartum breathing problems | cardo-mexico |
| Artemisia absinthium L. | | (uterine cleansing), problems in the female reproductive system | losna-santo |
| Artemisia vulgaris L. | | menstrual cramps, problems in the female reproductive system | artemijo |
| Baccharis crispa Spreng. | | gastric tract problems | carqueja |
| Baccharis dracunculifolia DC. | | anti-inflammatory | alegre-do-campo |
| Bidens pilosa L. | | abortive, urinary tract problems, stomach ache | flor-rosa, balaio-de-velho |
| Centratherum punctatum Cass. | | anti-inflammatory | bem-me-quer |
| Chaptalia nutans (L.) Pol. | | rheumatism | desinchadeira |
| Chromolaena odorata (L.) R.M. King & H. Rob | | swelling, anti-inflammatory | rabo-de-raposa |
| Conyza bonariensis (L.) Cronquist | | skin allergies | camomila |
| Coreopsis grandiflora Hogge x Sweet | | sedative, laxative | perguai |
| Cyrtocymura scorpoides (Lam.) H.Rob. | | skin allergies | perguai |
| Eclipta prostrata (L.) L. | | wound healing, contusions | arnica |
| Gymnanthemum amygdalinum (Delile) Sch.Bip. ex Walp. | | gastric system problems | alunã |
| Helianthus annuus L. | | vermifuge | girassol |
| Lactuca sativa L. | | sedative | alface |
| Pluchea sagittalis (Lam.) Cabrera | | erysipelas | quitoco |
| Porophyllum ruderale (Jacq.) Cass. | | eye pain, mycosis | escova-de-rato, cravinho, arrudinha |
| Sonchus oleraceus L. | | anemia | serralha |
| Tagetes erecta L. | | bronchitis, body aches | cravo-de-defunto |
| Tagetes minuta L. | | bronchitis, body aches | cravo-de-defunto |
| Tithoniadiversifolia (Hemsl.) A. Gray | | stomach ache | Arnica, mão-de-Deus |
| Vernonanthura polyanthes (Sprengel) Vega & Dematteis | | expectorant, flu | assa-peixe |
| **Bignoniaceae** | | | |
| Crescentia cujete L. | | kidney problems | cabaça |
| Fridericia chica (Bonpl.) L. G. Lohmann | | cough, fever | pitanga-do-mato |
| Handroanthus chrysotrichus (Mart. ex DC.) Mattos | | rheumatism | ipê-amarelo |
| Handroanthus heptaphyllus (Vell.) Mattos | | rheumatism, bronchitis, asthma | ipê-rosa |
| Handroanthus impetiginosus (Mart. ex DC.) Mattos | | skin allergies | cinco-folhas |
| Handroanthus serratifolius (Vahl) S.Grose | | rheumatism | ipê-amarelo |
| Mansoa alliacea (Lam.) A.H.Gentry | | expectorant | cipó-alho |
| **Bixaceae** | | | |
| Bixa orellana L. | | cholesterol control | urucum, colaral |
| **Boraginaceae** | | | |
| Family          | Species                        | Use                          | Common Name               |
|-----------------|--------------------------------|------------------------------|---------------------------|
| Cordiaceae      | *Cordia rufescens* A.DC.        | kidney problems              | baba-de-boi-árvore        |
| Brassicaceae    | *Symphytum officinale* L.       | anti-inflammatory            | confrei                  |
| Varroniaceae    | *Varronia curassavica* Jacq.    | anti-inflammatory, contusions| erva-baleeira, maria-preta|
| Bromeliaceae    | *Lapidium virginicum* L.        | cough, flu                   | agrião                    |
| Ananasaceae     | *Ananas comosus* (L.) Merrill  | flu, asthma, bronchitis      | abacaxi                  |
| Bromeliaceae    | *Tillandsia usneoides* (L.) L.  | prostate problems            | barba-de-timango          |
| Cactaceae       | *Opuntia ficus-indica* (L.) Mill.| anti-inflammatory          | palma                    |
| Cactaceae       | *Pereskia grandifolia* Haw.     | anti-inflammatory            | ora-pro-nobis             |
| Caricaceae      | *Carica papaya* L.              | vermifuge                    | mamão                    |
| Cleomaceae      | *Tarenaya aculeata* (L.) Soares Neto & Roalson | urinary system problems | xixi-de-galinha |
| Combretaceae    | *Terminalia catappa* L.         | backproblems, cholesterol control | amendoim               |
| Commelinaceae   | *Commelina benghalensis* L.     | nervous system problems      | marianinha-preta, emenda-nervos |
| Convolvulaceae  | *Ipomoea batatas* (L.) Lam.    | toothache, anemia            | batata-doce              |
| Convolvulaceae  | *Ipomoea camera* Jacq.          | asthma                       | zabumba                  |
| Cucurbitaceae   | *Operculina macrocarpa* (L.) Urb.| vermifuge, depurative of blood | batata-de-purga          |
| Costaceae       | *Costus scaber* Ruiz & Pav.    | urinary system problems      | cana-de-macaco           |
| Costaceae       | *Costus spiralis* (Jacq.) Roscoe | urinary system problems      | cana-de-macaco           |
| Crassulaceae    | *Kalanchoe crenata* (Andrews) Haw. | flu, cough, bronchitis, respiratory system problems | saião                   |
| Cucurbitaceae   | *Cucurbita pepo* L.             | laxative, vermifuge          | abóbora                  |
| Cucurbitaceae   | *Feviliae trilobata* L.         | depurative of blood, gastric system problems | gindiróba               |
| Cucurbitaceae   | *Luffa cylindrica* (L.) M. Roem.| sinusitis                   | bucha                    |
| Cucurbitaceae   | *Momordica charantia* L.        | fever, flu, stomach ache     | melão-de-são-caetano     |
| Cucurbitaceae   | *Sicyos edulis*Jacq.            | control high blood pressure  | chuchu                   |
| Cyperaceae      | *Rhynchospora speciosa* (Kunth) Boeckeler | pneumonia, urinary problems | capim-estrela            |
| Dilleniaceae    | *Davilla rugosa* Poir.          | swelling, skin allergies, expectorant | cipó-caboclo, mata-pasto |
| Dioscoreaceae   | *Dioscorea bulbifera* L.        | depurative of blood          | inhame                   |
### Euphorbiaceae

| Species | Common Name | Use |
|---------|-------------|-----|
| Cnidoscolus pubescens Pohl | toothache | cansanção |
| Euphorbia hirta L. | diarrhea | tranca-rabo |
| Euphorbia prostrata Aiton | urinary system problems | quebra-pedra, quebra-pedra-rasteiro |
| Euphorbia tirucalli L. | wound healing, anti-inflammatory | pau-graveto, doutor-graveto |
| Jatropha curcas L. | wound healing, kidney problems | pinhão-branco |
| Jatropha gossypifolia L. | wound healing, injuries in the corner of the mouth | pinhão-roxo |
| Jatropha multifida L. | wound healing | mertiolate, rícina |
| Manihot esculenta | wound healing, diarrhea | mandioca |
| Ricinus communis L. | cure new belly button | mamona |

### Fabaceae

| Species | Common Name | Use |
|---------|-------------|-----|
| Amburana cearensis (Allemão) A. C. Sm. | gastric system problems | imburana |
| Bauhinia cheilantha (Bong.) Steud. | diabetes, kidney problems | pata-de-vaca-branca |
| Bauhinia variegata L. | diabetes, kidney problems | pata-de-vaca |
| Cajanus cajan (L.) Huth | flu, cold, headache | guandú, feijão-andú |
| Canavalia ensiformis (L.) DC. | appetite stimulant | feijão-de-porco |
| Desmodium incanum (Sw.) DC. | kidney problems | venta-de-vaca |
| Hymenaea courbaril L. | kidney problems, deputative of blood | jatobá |
| Indigofera cf. blanchetiana Benth | body aches | bálsamo-do-mato |
| Indigofera cf. suffruticosa Mill. | flu, expectorant, vermifuge | sena |
| Libidibia ferrea (Mart. exTul.) L. P. Queiroz | diabetes, sexual stimulant, wound healing | pau-ferro |
| Machaerium cf. isadelphum (E.Mey.) Standl. | diarrhea | sete-casaca |
| Mimosa pudica L. | whooping cough, hemorrhoid | onze-horas, mariquinha |
| Mucuna pruriens (L.) DC. | sinusitis, migraine | mucuna-preta |
| Pterodone marginatus Vogel | bronchitis, diabetes, ulcer gastritis | sucupira |
| Senna alata (L.) Roxb. | fever, flu, cough, sinusitis | fedegoso |
| Senna occidentalis (L.) Link | fever, flu, cough, sinusitis | fedegoso |
| Vigna unguiculata (L.) Walp. | toothache | feijão-de-corda |
| Zornia sericea Moric. | urinary system problems | arroizinho |

### Hernandiaceae

| Species | Common Name | Use |
|---------|-------------|-----|
| Sparattanthelium tupiniquinorum Mart. | back problems | arco-de-barbal |

### Lamiaceae

| Species | Common Name | Use |
|---------|-------------|-----|
| Aegiphila integrifolia (Jacq.) B.D.Jacks. | headache | mura |
| Leonotis nepetfolia (L.) R.Br. | diabetes | cordão-de-frade, cordão-de-São-Francisco |
| Leonurus sibiricus L. | fever, flu, abortive | erva-macaé |
| Mentha arvensis L. | expectorant, post partum uterine cleansing | alevante, hortelâ-müdo |
| Mentha piperita L. | flu, expectorant and poor digestion | hortelazinho, hortelâ-müdo |
| Mentha pulegium L. | bronchitis, expectorant, gastric system problems | poejo |
| Mentha spicata L. | expectorant, post partum uterine cleansing | alevante |
| Species                                      | Uses                      |
|----------------------------------------------|---------------------------|
| Ocimum basilicum L.                          | head problems, control high blood pressure |
| Ocimum carnosum (Spreng.) Link & Otto ex Benth. | flu                        |
| Ocimum gratissimum L.                        | flu, poor digestion,       |
| Plectranthus amboinicus (Lour.) Spreng.      | anti-inflammatory, expectorant, respiratory system problems |
| Plectranthus barbatus Andr.                 | liver and stomach problems, hangover |
| Plectranthus neochilus Schlr.               | liver problems, gastritis  |
| Rosmarinus officinalis L.                   | heart problems, control high blood pressure |
| Tetradaenia riparia (Hochst.) Codd          | toothache                  |
| Vitex agnus-castus L.                       | sinusitis, sexual stimulant |
| Cinnamomum verum J. Presl                   | flu                        |
| Persea americana Mill.                      | kidney problems, stomach problems |
| Plectranthus amboinicus (Spreng.) Link & Otto ex Benth. | flu, poor digestion,       |
| Plectranthus barbatus Andr.                 | liver and stomach problems, hangover |
| Plectranthus neochilus Schlr.               | liver problems, gastritis  |
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| Vitex agnus-castus L.                       | sinusitis, sexual stimulant |
| Cinnamomum verum J. Presl                   | flu                        |
| Persea americana Mill.                      | kidney problems, stomach problems |
| Plectranthus amboinicus (Spreng.) Link & Otto ex Benth. | flu, poor digestion,       |
| Plectranthus barbatus Andr.                 | liver and stomach problems, hangover |
| Plectranthus neochilus Schlr.               | liver problems, gastritis  |
| Rosmarinus officinalis L.                   | heart problems, control high blood pressure |
| Tetradaenia riparia (Hochst.) Codd          | toothache                  |
| Vitex agnus-castus L.                       | sinusitis, sexual stimulant |
| Cinnamomum verum J. Presl                   | flu                        |
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| Rosmarinus officinalis L.                   | heart problems, control high blood pressure |
| Tetradaenia riparia (Hochst.) Codd          | toothache                  |
| Vitex agnus-castus L.                       | sinusitis, sexual stimulant |
| Cinnamomum verum J. Presl                   | flu                        |
| Persea americana Mill.                      | kidney problems, stomach problems |
| Plant Name                          | Uses                                                                 | Common Name  |
|------------------------------------|----------------------------------------------------------------------|--------------|
| **Ficus gomelleira** Kunth         | stomach ache and e liver pain                                        | Figueira     |
| **Maclura tinctoria** (L.) D. Don ex Steud. | heart problems, control high blood pressure and cholesterol       | Amoreira     |
| **Morus nigra** L.                | heart problems, control high blood pressure and cholesterol         | Amora        |
| **Musaceae**                       |                                                                      |              |
| **Musa paradisiaca** L.           | diarrhea, wound healing, respiratory system problems                | Bananeira    |
| **Myristicaceae**                  |                                                                      |              |
| **Virola cf. gardneri** (A.D.C.) Warb. | pain killer, back problems                                         | Bicuíba      |
| **Myrtaceae**                      |                                                                      |              |
| **Corymbia citriodora** (Hook.) K.D.Hill & L.A.S. Johnson | sinusitis, rhinitis, nasal decongestant                             | Eucalipto    |
| **Eucalyptus globulus** Labil.     | sinusitis, rhinitis, nasal decongestant                             | Eucalipto    |
| **Eugenia uniflora** L.           | fever and flu                                                       | Pitanga      |
| **Plinia caimito** (Mart.) Kausel  | kidney problems                                                      | Jaboticaba   |
| **Psidium cattleianum** Sabine     | diarrhea                                                             | Aracá        |
| **Psidium guajava** L.            | diarrhea, wound healing                                              | Goiaba       |
| **Syzygium aromaticum** (L.) Merr. & L.M.Perry | flu, cold, headache                                               | Cravo-da-india |
| **Syzygium cumini** (L.) Skells    | diabetes, control high blood pressure and cholesterol                | Jamelão      |
| **Nyctaginaceae**                 |                                                                      |              |
| **Boerhavia diffusa** L.          | urinary system problems                                             | Pega-pinto   |
| **Bougainvillea glabra** Choisy   | toothache                                                           | Bouganville  |
| **Oxalidaceae**                   |                                                                      |              |
| **Averhoa carambola** L.          | diarrhea, control high blood pressure                               | Carambola    |
| **Passifloraceae**                |                                                                      |              |
| **Passiflora alata** Curtis       | sedative, control high blood pressure                               | Maracujá, maracujá-do-mato |
| **Passiflora edulis** Sims.       | sedative, control high blood pressure                               | Maracujá     |
| **Pedaliaceae**                   |                                                                      |              |
| **Sesamum indicum** L.            | rheumatism, anemia, antibiotic                                        | Gergelim     |
| **Phyllanthaceae**                |                                                                      |              |
| **Phyllanthus amarus** Schumach. & Thonn. | kidney and urinary system problems                                   | Quebra-pedra |
| **Phyllanthus tenellus** Roxb.     | kidney and urinary system problems                                   | Quebra-pedra |
| **Phytolaccaceae**                |                                                                      |              |
| **Gallesia integrifolia** (Spreng.) Harms | diabetes, rheumatism                                                | Pau-alo     |
| **Petiveria alliacea** L.         | rheumatism                                                           | Guiné        |
| **Piperaceae**                    |                                                                      |              |
| **Piper aduncum** L.              | toothache                                                            | Jaborandi    |
| **Piper arboreum** Aubl.          | toothache                                                            | Jaborandi    |
| **Piper nigrum** L.               | flu, cough, expectorant                                              | Pimenta-do-reino |
| **Piper umbellatum** L.           | urinary system problems                                             | Capeba       |
| **Plantaginaceae**                |                                                                      |              |
| **Plantago major** L.             | anti-inflammatory, expectorant, problems in the female reproductive system | Transagem, tansagem |
| **Scoparia dulcis** L.            | vision problems and uterine problems                                 | Vassourinha, vassourinha-de-nossa-senhora |
| Family   | Species                                    | Common names            |
|----------|--------------------------------------------|-------------------------|
| Poaceae  | *Coix lacryma-jobi* L.                     | kidney problems         |
|          | *Cymbopogon citratus* (DC.) Stapf.         | sedative, control high blood pressure |
|          | *Imperata brasiliensis* Trin.              | help in child teething period |
|          | *Zea mays* L.                              | urinary system problems  |
|          | *Portulaca oleracea* L.                    | toothache               |
| Portulacaceae |                                        |                         |
| Rosaceae | *Fragaria ananassa* (Duchesne ex Weston) Duchesne ex Rozier | cancer, control high blood pressure |
|          | *Rosa alba* L.                             | heart problems, control high blood pressure |
| Rubiaceae | *Borreria verticillata* (L.) G. Mey.       | diarrhea, help in child teething period |
|          | *Genipa americana* L.                      | anemia                  |
|          | *Morinda citrifolia* L.                    | diabetes, cancer         |
| Rutaceae | *Citrus × latifolia* (Yu.Tanaka) Yu.Tanaka | flu, fever, expectorant |
|          | *Citrus aurantifolia* (Christm.) Swingle   | flu, fever, expectorant |
|          | *Citrus aurantium* L.                      | flu, fever, headache    |
|          | *Citrus limon* (L.) Osbeck                 | flu, fever, expectorant |
|          | *Citrus reticulata* Blanco                 | fever and flu           |
|          | *Murraya paniculata* (L.) Jack             | mycosis                 |
|          | *Ruta graveolens* L.                       | postpartum cleansing and menstrual cramps |
| Sapotaceae | *Mimus opscoriacea* (A. DC.) Miq.          | diabetes                |
| Simaroubaceae | *Simarouba amara* Aubl.                    | prostate problems       |
| Siparunaceae | *Siparuna guianensis* Aubl.                | fever, headache, rheumatism |
| Solanaceae | *Capsicum baccatum* L.                     | hemorrhoids             |
|          | *Capsicum frutescens* L.                   | erysipelas              |
|          | *Nicotiana glauca* Graham                  | repellent, skinalergies |
|          | *Nicotiana tabacum* L.                     | repellent, skinalergies |
|          | *Physalis angulata* L.                     | antibiotic              |
|          | *Solanum asperum* Rich.                    | bronchitis, flu         |
|          | *Solanum lycocarpum* A. St.-Hil.           | sexual stimulant        |
|          | *Solanum lycopersicum* L.                  | diarrhea, erysipelas    |
|          | *Solanum paniculatum* L.                   | anti-inflammatory, diabetes, control high blood pressure |
| Talinaceae | *Talimum fruticosum* (L.) Juss.            | anemia                  |
|          | *Talimum paniculatum* (Jacq.) Gaertn.      | anemia                  |
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| Typhaceae       |  |  |
|-----------------|---------------------|-----------------|
| *Typha domingensis* Pers. | hepatitis, gastritis, kidney problems | taboa |

| Urticaceae      |  |  |
|-----------------|---------------------|-----------------|
| *Cecropia glaziovii* Snethl. | cough, whooping cough | embauiba-ropa |
| *Cecropia pachystachya* Trécul | control high blood pressure and cholesterol | embauiba-branca |
| *Pilea microphylla* (L.) Liebm. | control high blood pressure, uterine problems | brillantina |

| Verbenaceae     |  |  |
|-----------------|---------------------|-----------------|
| *Aloysia gratissima* (Gillies & Hook.) Tronc. | flu, fever, sedative | alfazema |
| *Lantana camara* L. | flu, bronchitis, expectorant | camarã, chumbinho |
| *Lippia alba* (Mill.) N.E.Br. ex Britton & P.Wilson | sedative, gastric system problems | erva-cideireira, cideirea-miu |
| *Stachytarpheta cayennensis* (Rich.) Vahl | gastric system problems, hepatitis and kidney problems | gervão, carqueja-do-campo |

| Violaceae       |  |  |
|-----------------|---------------------|-----------------|
| *Pombalia calceolaria* (L.) Paula-Souza | vermifuge, laxative, reproductive system problems | batata-de-purga |

| Xanthorrhoeaceae |  |  |
|------------------|---------------------|-----------------|
| *Aloe vera* (L.) Burm. f. | wound healing, burn injuries, stomach problems | babosa |

| Zingiberaceae    |  |  |
|------------------|---------------------|-----------------|
| *Alpinia zerumbet* (Pers.) B.L. Burtt & R.M. Sm. | sedative, control high blood pressure | água-de-colônia |
| *Curcuma longa* L. | hepatitis, menstrual cramps | açafrão |
| *Hedychium coronarium* J. Koenig | labyrinthitis, control high blood pressure | lírio-branco |
| *Zingiber officinale* Roscoe | fever, flu, expectorant | gengibre |

Among the respondents 114 are women and 66 are men, with ages varying between 15 to 94 years old, distributed among the following age groups: youngsters, up to 19 years old (1); adults, from 20 to 59 (100) and elderly, above 60 years old (79). Most of them declared being from the State of Bahia (77%), while 33% came from the states of Pernambuco, Ceará, Espírito Santo and Minas Gerais. Those who live in the communities of Ribeirão and Pouso Alegre claim to have lived in these localities for over 20 years, and the others have resided in the MST settlements since the date of its creation (on average 10 years at the time the survey was carried out). The predominance of women and elderly individuals may be related to the fact that, according to Viu et al.[27], women have historical and cultural value when considering the food tradition of a region and they are responsible for the health of the family and their food safety. Melo et al.[28], however, point out that elderly individuals in general are able to recognize a greater number of plants than younger ones and, therefore, they have more chances of being appointed as local specialists to be interviewed.

The respondents are primarily dedicated to agriculture as an economic activity (95%) and the average family income reaches up to one minimum wage for 91% of their families. As for the level of education, 53% claim to have elementary education, 7% secondary education and 37% did not have access to formal education. When asked about the origin of their knowledge about medicinal plants, 91% claim to have learned it with their own families and the remaining 8% with neighboring communities, including indigenous communities. Most of the respondents (88%) declare that they are regularly approached in order to indicate plants and their uses, however, this approach is restricted to relatives and neighbors who reside in the same community. Only 26% are approached by people outside their communities in order to indicate the use of medicinal
plants. According to Bandeira [29], ethnobiological studies involving the process of knowledge transmission and acquisition are scarce, however, it may be inferred that this local knowledge is acquired and transmitted through practices and beliefs developed by adaptive processes, which are culturally transmitted between generations [30], especially within family nuclei and among residents of a same community, as observed by Boscolo et al. [31-33]. The transmission of the wealth of this knowledge still finds obstacles frequently cited in ethnobotany studies, such as Boscolo et al. [31-33], in which the following are noted: the process of losing the tradition of transmitting knowledge to successor generations due to the lack of interest of children and grandchildren; the disarticulation of traditional life systems and geographical distance [33].

Among the 233 species of medicinal plants surveyed in the 9 communities it was found, by consulting the Flora Brasil 2020 list [20] that 48% are considered native, 26% are naturalized and 26% are exotic. As to the level of threat consulted at the CNC Flora database [22], it was observed that 94% of the species have no evaluation, while the others are distributed in: Least concern (Pfaffia glomerata (Spreng.) Pedersen; Aristolochia acymbifera Mart. & Zucc.; Handroanthus heptaphyllus (Vell.) Mattos; Tillandsia usneoides (L.) L.; Pereskia grandifolia Haw.; Operculina macrocarpa (L.) Urb.; Hymenaea courbaril L.; Abuta seloana Eichler e Genipa americana L.); Near-threatened (Handroanthus impetiginosus (Mart. ex DC.) Mattos; Amburana cearensis (Allemão) A.C.Sm.); Vulnerable (Euterpe edulis Mart.) and Endangered Cariniana legalis (Mart.) Kuntze).

The predominance of naturalized and cultivated exotic species found in the present study could be related to a trend described by Bortolotto [33], in which human populations select plants mainly for subsistence, as in rural communities. It is also worth mentioning that many species of the medicinal plant pharmacopoeia in South America were introduced in the period of the European conquests Bennett et al. [34] and are widely used until today. Another worrying factor in terms of conservation is the increasing anthropization of the southern end region of Bahia, where deforestation caused by large pulp and paper companies generates the loss of natural resources with the extensive eucalyptus culture [35]. As a consequence, plant resources for medicinal use also become increasingly scarce and the production of home medicines falls into disuse, making the search for allopathic medicines grow [36]. The presence of species at different degrees of threat observed in this study draws attention to the urgency of conducting research that values biodiversity and the traditional knowledge associated with it before these resources are lost. Thus, the importance of ethnobotany is evident for the development of sustainable exploitation of ecosystems, in contrast to the current forms of devastation [36].

Diseases related to the gastric system, respiratory and genitourinary systems (TABLE 1) were the most cited. Diseases of the gastric system can be related to the lack of basic sanitation and treated water in the communities studied [15]. The presence of a large number of citations related to the genitourinary system follows the same premise observed in Bortolotto [33], where there was also a predominance of women in the sample and they cited species with uses related to the uterus, menstrual cramps and childbirth.

In the face of economic and infrastructure infeasibility to carry out the cultivation of the 233 species resulting from the survey, it was necessary to employ quantitative methods in order to select which would be most suitable for insertion in agroecological productive systems that could be used as therapeutic resources and also as an alternative source of income in the 9 communities studied. Therefore, it was decided to favor the ones which presented and index of concordance regarding the corrected main use (CUPc) equal to or greater than 50% in at least one of the communities in which they were mentioned (TABLE 2). According to Roque et al. [61], the more respondents agree on a particular use, the greater is the probability of confirmation of this information which, in the future, may also serve as a basis for pharmacological studies.
The nine communities from the southern end of Bahia contemplated in this study live in a scenario of low income and isolation, in a region of socioenvironmental conflicts, and which until the moment of this study did not have any visibility with the local SUS. Some of these communities did not have a defined geographical delimitation or occupy the border region between two cities, creating difficulties in recognizing which municipality would be responsible for providing medical assistance to their residents. According to Pilla et al. [38], despite the fact that SUS does reach the rural zones, it is not able to properly meet the demand of the population that seeks aid with medicinal plants. Therein resides the importance of ethnobotanical studies that revitalize and systematize the traditional knowledge associated with medicinal plants that may be used to improve the quality of these populations, since for Chaves et al. [39], the healing properties of some plants are the only alternative that several communities have in order to treat diseases.

The introduction of the species (present on TABLE 2) in agroecological productive systems in the communities studied not only provides an alternative for the treatment of diseases, but it is also important for the conservation of socio-biodiversity and in the generation of income. Santilli [40] states that agroecology is a tool for the preservation of sociobiodiversity, which in turn is an essential component of sustainable...
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agricultural systems. The diversification of crops in a particular ecosystem, associated with ecological factors, guarantee stability and less need for pesticides and nitrogen fertilizers. The use of knowledge and management practices of the medicinal plants held by the respondents constitute an asset of immense value for the marketing of these products (12), since according to Ethur et al. (41), there is a market for both the commercialization of teas and parts of medicinal plants in natura or dehydrated, as for the production of seedlings, substrates and utensils.

These products cited by Ethur et al. (41) can be sold in markets and free fairs as well as offered to municipal health departments in the southern end region of Bahia, since through the National Policy on Medicinal Plants and Herbal Plants (PNPMF), there are different political and financial actions that aim to directly stimulate Brazilian municipalities to offer medicinal plants and herbal medicines to SUS.

A result that strengthens this option for the communities studied is the fact that when comparing the selection of species with the higher CUPc with the list of medicinal plants of interest to the Unified Health System (Renisus), it can be observed that 60% are included in the latter, namely: *Alpinia zerumbet* (Pers.) B. L. Burtt & R. M. Sm.; *Baccharis crispa* Spreng.; *Dysphania ambrosioides* (L.) Mosyakin & Clemants; *Eugenia uniflora* L.; *Foeniculum vulgare* Mill.; *Mentha piperita* L.; *Ocimum gratissimum* L.; *Persea americana* Mill.; *Phyllanthus tenellus* Roxb.; *Plantago major* L.; *Plectranthus barbatus* Andr.; *Psidium guajava* L.; *Punica granatum* L. and *Schinus terebinthifolia* Raddi.

It should be noted that the methodologies in ethnobotany can also help to update and improve the official lists of medicinal plants recommended by the PNPMF. In the present study we can consider the recognition of at least one species as an example of this case – *Lippia alba* (Mill.) N.E.Br. ex Britton & P. Wilson – that along with *Dysphania ambrosioides* (L.) Mosyakin & Clemants and *Plectranthus barbatus* Andr., presented a CUPc greater than or equal to 50% simultaneously in 7 or more of the 9 communities mentioned, demonstrating its high probability of effectiveness, and however, unlike the other two, *L. alba* is not listed by Renisus.

**Conclusion**

Methodologies used in ethnobotanical research, such as the concordance regarding the corrected main use (CUPc), prove to be useful in the selection of medicinal plants with a higher probability of effectiveness among the general scope of those observed in surveys. These methodologies can indicate species to be cultivated by rural communities that live in a scenario of socioeconomic vulnerability, respecting the traditional knowledge associated with them and acting as an economic and health alternative in line with the PNPMF. Other factors to be considered are the importance of these studies in stimulating the conservation and sustainable use of sociobiodiversity, as well as in updating and increasing the list of medicinal plant species that can be used by the Unified Health System.

**Acknowledgements**

We appreciate the contribution and support of all communities involved in the study, especially the partnership with the Landless Workers Movement (MST) of Brazil.
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Histórico do artigo | Submissão: 15/09/2020 | Aceite: 08/12/2020 | Publicação: 31/03/2021
Conflito de interesses: O presente artigo não apresenta conflitos de interesse.
Como citar este artigo: Neto Galvão M, Villas Bôas GK, Machado M, Silva MFO, et al. Ethnobotany applied to the selection of medicinal plants for agroecological crops in rural communities in the Southern End of Bahia, Brazil. Rev Fitos. Rio de Janeiro. 2021; 15(1): 40-57. eISSN 2446.4775. Disponível em: <http://revistafitos.far.fiocruz.br/index.php/revista-fitos/article/view/1091>. Acesso em: dd/mm/aaaa.
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