The “Hidden Diversity” of Medicinal Plants in Northeastern Brazil: Diagnosis and Prospects for Conservation and Biological Prospecting

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Increases in ethnobotanical studies and knowledge in recent decades have led to a greater and more accurate interpretation of the overall patterns related to the use of medicinal plants, allowing for a clear identification of some ecological and cultural phenomena. “Hidden diversity” of medicinal plants refers in the present study to the existence of several species of medicinal plants known by the same vernacular name in a given region. Although this phenomenon has previously been observed in a localized and sporadic manner, its full dimensions have not yet been established. In the present study, we sought to assess the hidden diversity of medicinal plants in northeastern Brazil based on the ethnospecies catalogued by local studies. The results indicate that there are an average of at least 2.78 different species per cataloged ethnospecies in the region. Phylogenetic proximity and its attendant morphological similarity favor the interchangeable use of these species, resulting in serious ecological and sanitary implications as well as a wide range of options for conservation and bioprospecting.

1. Introduction

Medicinal plants are freely circulated in Brazil, particularly in informal trade settings where several types of plants are marketed for a wide range of illnesses (see [1]). Limited access to specialty medicine and an increasing interest in the so-called natural treatments account for the rapid increase of the trade in such products in Brazil [2].

The most important vendors of medicinal plants are located in urban centers, namely, in fairs and public markets, where consumers have easy access to a wide variety of medicinal plant species together with the corresponding therapeutic indications [3]. More specifically, the regional public markets act as spaces representative of the cultural production and biological diversity of a given area [1, 4] and as centers where the empirical knowledge retained in different areas and with different origins is aggregated, conserved, and spread. Thus, the regional public markets are the pillars of a complex, open, and dynamic system of knowledge [1].

Although promising for the biological prospecting of novel drugs and pharmaceutical products, actual research at such markets has some limitations, as the identity of the vast majority of the plant species traded there cannot be safely established by means of conventional methods [1, 5–7].

In contrast with community-based ethnobotanical surveys, where the investigated resources are directly accessible in loco [8–11], research at markets and fairs is much more complex, as a significant proportion of the plant products offered to the consumers are uncharacteristic or lack the elements required for accurate taxonomic identification.
In ethnobotanical studies were initially detected by several vernacular name. Such events of semantic correspondence that multiple plant species are frequently known by the same ethnobotanical data collected at public markets is the fact species, another factor that makes it difficult to interpret the present study, we sought (1) to measure the hidden diversity, that is, the number of medicinal plant species subsumed under the same common name in the Brazilian northeast region; (2) to establish the different types of underdifferentiation of homonym ethnospecies; and (3) to assess the influence of biological diversity on the number of homonym ethnospecies. Finally, we sought to indicate some of the possible implications for conservation and biological prospecting.

Assuming that the variety of homonym ethnospecies in a given region depends on the region's biodiversity, one might expect the following: (1) for the variation in the number of homonym ethnospecies to be directly proportional to the size of the sampled area, as larger areas theoretically include a wider variety of environments, and consequently, also greater biological diversity and (2) that a significant number of the homonym ethnospecies should be representative of the native flora compared to the group of species with one-to-one correspondence.

2. Materials and Methods

2.1. Characterization of the Study Area. The northeast region of Brazil includes nine federal units and represents a total area of 1,558,196 km², which corresponds to 18% of the country's territory. It is located in an intertropical zone limited by the Atlantic Ocean to the east and north, the Amazonia rainforest to the northwest, and the Cerrado (Brazilian savannah) domain to the west and southwest [34]. The vegetation is mainly xerophytic, being the Caatinga (Brazilian xeric shrubland), a highly peculiar biome with a high degree of endemism [35–37]. Atlantic ombrophilous forest predominates in the coastal area. Currently, this forest is one of the most seriously threatened biomes in the world, and only 5% of its original area remains [38,39]. Enclaves of Cerrado and rainforest are widely present as areas of disjunct vegetation [40–43], making the Brazilian northeast region a strategic area from the perspective of global richness and biological diversity [44,45].

From the demographic point of view, the total population of the northeast region comprises approximately 49 million inhabitants, primarily distributed along the coastal area where most state capitals and major cities are located, which together host approximately 40% of the population [34]. The cultural diversity of the northeast region is high due to the ethnic miscegenation resulting from the colonization of Brazil [46,47], and the population includes Europeans, mostly Portuguese and Dutch, black slaves from Africa, and the various indigenous peoples. In addition, it is worth observing that in the last ten years, the economic growth of the region was significantly higher than the national average [34].
2.2. Data Survey. Six of the nine northeastern states were included in the analysis based on the need to survey the widest possible diversity of cultural representations and environments and the need to take into account the logistics of access and permanence at the study sites. For the purposes of the present study, we assumed that the expression of the regional culture is more diversified at the state capitals because they exhibit the largest population density, including immigrants from other states and/or the inland cities.

The states and corresponding capitals sampled were as follows: Maranhão/São Luiz, Ceará/Fortaleza, Paraíba/João Pessoa, Pernambuco/Recife, Alagoas/Maceió, and Sergipe/Aracaju. The primary site of medicinal plant trade in each state capital was identified, and thus the following markets were selected: the Mercado Central (Central Market) in São Luiz/MA, Mercado de São Sebastião (St. Sebastian Market) in Fortaleza/CE, Mercado Central in João Pessoa/PB, Mercado São José (St. Recife Market) in Recife/PE, Mercado da Produção (Production Market) in Maceió/AL, and Mercado Albano Franco (Albano Franco Market) in Aracaju/SE.

Following an initial exploratory visit, an appointment was made for data collection. The plant vendors at each selected market were informed as to the nature of the study and invited to participate. Some vendors refused immediately, and others initially agreed and then went back on their original agreement. As a result, a total of 22 respondents were interviewed and provided a representative sample of the vernacular names of the plants traded in the region. In the state of Pernambuco, the ethnobotanical studies in public markets are already more advanced. Albuquerque and colleagues [1] previously found a significant decrease in the availability of plant vendors in this state based on only two samples obtained over an eight-year period. The in situ observations and data collected for the present study suggest that this decrease in availability may represent a general trend that can be explained by several factors. For instance, the lack of regulation and control of the sector in regards to health and ecological aspects may generate mistrust and insecurity among vendors. The vendors may also experience a lack of return research or "benefits" that would otherwise entice them to be informants. In addition, the harsh economic conditions of the country have removed a significant number of vendors from the market, and unrelenting derogatory campaigns have undermined the informal trade markets in the media. Vendors in the informal trade markets also experience increasing competition with food stores, which are common in large urban centers and usually have better infrastructure, availability, and sanitary conditions. There is also a lack of interest in new generations to continue the family traditions of using and trading medicinal plants.

After the study was explained, the respondents freely signed an informed consent form. The study was approved by the Research Ethics Committee of the Federal University of Pernambuco (Universidade Federal de Pernambuco—UFPE) no. 0039.0.172.0000-10, FR (Folha de Rosto—Title Page) 3139660.

Although some authors [1] have reported that several terms are used to describe vendors of medicinal plants, eventually including hierarchical criteria, in the present study, we used the generic term "herbalist" (locally known as "erveiro") to allude to any type of vendor of medicinal plants. The term ethnospecies is used in the present study to allude to the common or vernacular names given to the medicinal plants.

Using a field notebook, we made records of the catalogs of plants traded by the herbalists as mentioned in semistructured interviews [48]. For the purposes of the study, the plants available in stock at the time of the study as well as those traded in the previous 12 months were taken into consideration. The common names of the plants were recorded as spelled by the respondents.

2.3. Data Analysis. The ethnobotanical data supplied by the herbalists in the various studied northeastern states were transcribed and entered in digital spreadsheets using MS Excel 2003 software, thus creating a Market Relational Database (MRD). The MRD was used to map the geographical distributions of the ethnospecies across the Brazilian northeast region and identify the most frequently occurring ones.

In parallel, an Ethnobotanical Survey Database (ESD) was created and populated. For that purpose, 55 ethnobotanical surveys of the northeastern states were identified, and the listed species and ethnospecies were entered in the ESD. The plants not identified at the species level were not included. Only relevant studies were selected: most (45) were published in major scientific journals, seven were Master's dissertations, one was a doctoral thesis, one a book, and one the Development Plan of a major Brazilian university (Federal University of Bahia—Universidade Federal da Bahia, UFBA).

The data entered in both databases (MRD and ESD) were then crosschecked to produce a detailed list of the ethnospecies mentioned both in the ethnobotanical surveys and by the respondents in our study, with the corresponding species. This step allowed for the identification of the homonym species and their clustering around the corresponding ethnospecies.

We selected a sample corresponding to 40% of the ethnospecies included in both databases (MRD and ESD) based on their frequency in the ethnobotanical surveys. Thus, only the 165 most frequent ethnospecies out of a total of 406 listed in the ethnobotanical surveys were selected for analysis.

The sampling criteria used were based on two assumptions: (1) ethnobotanical research is still incipient in most of the northeast region, and thus, infrequent ethnospecies might suggest a merely temporary pattern of semantic correspondence, consequently masking the results, the number of one-to-one correspondences in particular and (2) the ethnospecies most frequently mentioned in the regional ethnobotanical surveys might represent the patterns of semantic correspondence in a more unequivocal and reliable manner.

The corresponding species were allocated to three groups: one comprised the species with one-to-one correspondences, the second, the homonym ethnospecies with type 1 underdifferentiation, and the third, the homonym ethnospecies with type 2 underdifferentiation, according to Berlin’s [23] classification. The corresponding species were subjected to synonym analysis; the names that are currently valid were duly recorded based on the List of Species of the Brazilian
Flora 2012 [49] and the database of the Missouri Botanical Garden [50], which were also used to establish the biogeographic status of each species to classify them as native or exotic.

To assess whether underdifferentiation (sensu Berlin [23]), expressed as the number of homonym ethnospesies, varies as a function of the biological diversity of a given area, we compared the results corresponding to the northeast region with a geographically narrower sample, based on the assumption that the larger the area, the wider the environmental variety, and thus, the more diversified the flora.

That narrower sample was represented by the state of Pernambuco, which is the northeastern state most thoroughly studied from an ethnobotanical perspective. The numbers of homonym ethnospesies and one-to-one correspondences of the northeast region were compared to those of Pernambuco. The frequency of species in the respective categories of semantic correspondence (i.e., one-to-one and underdifferentiation) was analyzed by means of \( G \) tests [51] as were the percentages of native and exotic species in each group.

3. Results

The ethnospesies (\( n = 165 \)) sampled based on the data collected at the visited markets exhibited correspondence with 459 species, corresponding to 228 genera and 90 families (Table 1). The ratio of species to ethnospesies was 2.78. From the total number of analyzed ethnospesies, only 41 (25%) exhibited one-to-one correspondence, whereas 124 (75%) exhibited underdifferentiation and correspondence to 418 species. Approximately 62% of the homonym ethnospesies exhibited two or three corresponding species, although in some cases, a single ethnospesies included up to nine corresponding homonym species, as, for example, “quebra-pedra” (stonebreaker) (Table 1).

Analysis of the data corresponding to the state of Pernambuco alone identified 138 out of the 165 ethnospesies found in the northeast region, which exhibited correspondence with 203 species. The ratio of species to ethnospesies was 1.46. The pattern of correspondence included 89 (64%) instances of one-to-one correspondence and 49 (36%) of underdifferentiation; the homonym ethnospesies represented a total of 114 species.

Comparison of the data from the state of Pernambuco and the northeast region showed variation in the number of one-to-one correspondences that was inversely proportional to the size of the sampled area, whereas the number of homonym ethnospesies varied in proportion to the size of the sampled area, as shown in Figure 1. Consequently, the homonym ethnospesies predominated in the northeast (NE) sample (\( G = 48.41; \) df = 1; \( P < 0.00001 \)).

In the group of homonym ethnospesies, 309 (74%) were representative of the native flora, and 109 (26%) were exotic species. In the group of ethnospesies with one-to-one correspondence, 15 (37%) were representative of the native flora and 26 (63%) were exotic species (Figure 2). The proportion of native species relative to the proportion of exotic species was therefore significantly greater for the under-differentiated ethnospesies compared to the one-to-one ethnospesies (\( G = 22.52; \) df = 1; \( P < 0.00001 \)).

Among the 418 homonym ethnospesies, 256 (61.3%) were congeneric (type 1 underdifferentiation), and 77 (18.4%) exhibited correspondence at the genus level only (type 2 underdifferentiation). That is to say, 61% of the species bear correspondence to at least one other species of the same genus with the same vernacular name, whereas 18.4% of the homonym ethnospesies exhibited correspondence with one or more species belonging to other genera in the same family. In some cases (20.3%), the homonym ethnospesies belonged to different families, such as the ethnospesies “fedegoso” (coffee senna) and “capeba” (cow-foot leaf) (Table 1).

4. Discussion

4.1. Hidden Diversity in Regional Markets. Knowledge of the hidden diversity of medicinal plant species represents an
| Vernacular name | Family            | Scientific name in the original source | Valid scientific name | Origin | Literature | State       |
|----------------|-------------------|----------------------------------------|-----------------------|--------|------------|-------------|
| Aroeira        | Anacardiaceae     | Myracrodruon urundeuva Allemão         | Myracrodruon urundeuva Allemão | N      | [1, 3, 9, 52–78] | PE, PB, SE, CE, PI, MA, RN, BA |
|                |                   | Schinus terebinthifolius Raddi          | Schinus terebinthifolius Raddi | N      | [1, 11, 65, 79–84] | PE, RN, BA |
| Cajá           | Anacardiaceae     | Spondias mombin L.                     | Spondias mombin L.     | N      | [56, 57, 63, 67, 76, 82, 85–87] | PE, PB, PI, BA |
|                | Schizaeaceae      | Schinus terebinthifolius (L.) Raddi     | Schinus terebinthifolius (L.) Raddi | N      | [1, 65] | PE |
|                |                   | Lygodium venustum Sw.                  | Lygodium venustum Sw.  | N      | [1, 65] | PE |
| Abre Caminho   | Fabaceae          | Centrosema brasilianum (L.) Benth.     | Centrosema brasilianum (L.) Benth. | N      | [88] | PB |
|                |                   | Lygodium venustum Sw.                  | Lygodium venustum Sw.  | N      | [1, 65] | PE |
|                |                   | Lygodium volubile Sw.                  | Lygodium volubile Sw.  | N      | [1, 65] | PE |
| Açôita cavalo  | Tiliaceae         | Luehea divaricata Mart.                | Luehea divaricata Mart. | N      | [66, 68] | MA |
|                |                   | Luehea ochrophylla Mart.               | Luehea ochrophylla Mart. | N      | [69] | PB |
|                |                   | Luehea grandiflora Mart.               | Luehea grandiflora Mart. | N      | [61, 68] | MA |
|                |                   | Luehea speciosa Willd.                 | Luehea speciosa Willd. | N      | [57] | PI |
| Acônito        | Amaranthaceae     | Pfaffia glomerata (Spreng.) Pedersen   | Pfaffia glomerata (Spreng.) Pedersen | N      | [56, 65] | PE |
|                |                   | Alternanthera brasiliana (L.) Kuntze    | Alternanthera brasiliana (L.) Kuntze | N      | [77] | PB |
| Amburana       | Fabaceae          | Amburana cearensis (Allemão) A. C. Sm. | Amburana cearensis (Allemão) A. C. Sm. | N      | [68–70, 78, 79] | PB, CE, MA, BA |
|                | Burseraceae       | Commiphora leptophloeos (Mart.) J. B. Gillett | Commiphora leptophloeos (Mart.) J. B. Gillett | N      | [1, 3, 62–64, 70, 71, 73, 76, 80, 88] | PE, PB, RN, BA |
| Cumaru         | Fabaceae          | Amburana cearensis (Allemão) A. C. Sm. | Amburana cearensis (Allemão) A. C. Sm. | N      | [3, 52, 53, 55, 59, 60, 62, 67, 70–72, 76, 77] | PE, PB, CE, RN |
|                |                   | Dipteryx odorata (Aubl.) Willd.        | Dipteryx odorata (Aubl.) Willd. | N      | [81] | RN |
| Angelica       | Rubiaceae         | Guettarda platypoda DC.                | Guettarda platypoda DC. | N      | [56, 89] | PE, PB |
|                |                   | Guettarda anglica Mart. ex Mull. Arg.  | Guettarda anglica Mart. ex Mull. Arg. | N      | [90] | RN |
| Araticum       | Annonaceae        | Annona crassiflora Mart.               | Annona crassiflora Mart. | N      | [83] | PB |
|                |                   | Annona coriacea Mart.                  | Annona coriacea Mart.  | N      | [78, 91] | PB, CE |
| Angico         | Fabaceae          | Anadenanthera colubrina (Vell.) Brenan | Anadenanthera colubrina (Vell.) Brenan | N      | [3, II, 52–54, 56, 59, 60, 62–64, 67, 69, 70, 72–74, 76–80, 85, 88, 92–94] | PE, PB, CE, PI, RN, BA |
|                |                   | Anadenanthera macrocarpa (Vell.) Brenan| Anadenanthera macrocarpa (Vell.) Brenan | N      | [79] | BA |
|                |                   | Piptadenia colubrina (Vell.) Benth.    | Piptadenia colubrina (Vell.) Benth. | N      | [82] | BA |
| Assa-peixe     | Asteraceae        | Vernonanthura phosphorica (Vell.) H. Rob. | Vernonanthura phosphorica (Vell.) H. Rob. | N      | [79] | BA |
|                |                   | Vernonanthura brasiliana (L.) H. Rob.  | Vernonanthura brasiliana (L.) H. Rob. | N      | [60] | CE |
|                |                   | Vernonanthura ferruginea (Less.) H. Rob. | Vernonanthura ferruginea (Less.) H. Rob. | N      | [82] | BA |
|                |                   | Gochnatia velutina (Bong.) Cabrera     | Gochnatia velutina (Bong.) Cabrera | N      | [79] | BA |
|                |                   | Gochnatia velutina (Bong.) Cabrera     | Gochnatia velutina (Bong.) Cabrera | N      | [79] | BA |
| Euphorbiaceae  |                   | Verbena macrophylla (Mull.) S. F. Blake | Verbena macrophylla (Mull.) S. F. Blake | N      | [83] | BA |
|                |                   | Acalypha multicaulis Mull. Arg.        | Acalypha multicaulis Mull. Arg. | N      | [95] | SE |
| Vernacular name | Family       | Scientific name in the original source | Valid scientific name | Origin | Literature | State |
|-----------------|--------------|----------------------------------------|-----------------------|--------|------------|-------|
| **Balaio de veio** | Asteraceae   | Conversia prasiifolia (DC.) R. M. King and H. Rob. | Conversia prasiifolia (DC.) R. M. King and H. Rob. | N      | [58, 95, 96] | SE    |
| Chrysobalanaceae |              | Conocliniopsis prasiifolia               | Conocliniopsis prasiifolia               | N      | [82]       | BA    |
|                 |              | Centratherum punctatum Cass.             | Centratherum punctatum Cass.             | N      | [96]       | SE    |
|                 |              | Ageratum conyzoides L.                   | Ageratum conyzoides L.                   | N      | [78]       | CE    |
| **Batata de Purga** | Convolvulaceae | Operculina alata Urb.                     | Operculina alata Urb.                     | N      | [11, 56, 66, 92] | PE, CE, MA |
|                 |              | Operculina convolvulus Silva Manso       | Operculina macrocarpa (L.) Urb.          | N      | [9, 11, 57–59, 66, 94, 97] | PE, PB, SE, CE, PI, RN |
|                 |              | Ipomoea purga (Wender.) Hayne            | Ipomoea dunsosa (Benth.) L. O. Williams  | E      | [68]       | MA    |
|                 |              | Operculina hamiltonii (G. Don) D. F. Austin and Staples | Operculina hamiltonii (G. Don) D. F. Austin and Staples | N      | [72, 88]   | PB    |
| **Burdão de velho** | Fabaceae     | Pithecellobium saman (Jacq.) Benth. Samanea saman (Jacq.) Merr. | Samanea saman (Jacq.) Merr. Samanea tubulosa (Benth.) Barneby and J. W. Grimes | E      | [56, 61]   | PE, MA |
|                 |              | Samanea tubulosa (Benth.) Barneby and J. W. Grimes | Samanea tubulosa (Benth.) Barneby and J. W. Grimes | N      | [86]       | PB    |
|                 |              | Albizia polyzeophala (Benth.) Killip     | Albizia polyzeophala (Benth.) Killip    | N      | [85]       | PB    |
| **Canafistula**  | Fabaceae     | Senna spectabilis (DC.) H. S. Irwin       | Senna spectabilis (DC.) H. S. Irwin     | N      | [3, 60, 67, 70, 75, 77, 90] | PE, PB, CE, RN |
|                 |              | Samanea tubulosa (Benth.) Barneby and J. W. Grimes | Samanea spectabilis (DC.) H. S. Irwin and Barneby Samanea tubulosa (Benth.) Barneby and J. W. Grimes | N      | [75]       | PE    |
|                 |              | Albizia inunata (Mart.) Barneby and J. W. Grimes | Albizia inunata (Mart.) Barneby and J. W. Grimes | N      | [73]       | PE    |
|                 |              | Peltophorum dubium (Spreng.) Taub.       | Peltophorum dubium (Spreng.) Taub.      | N      | [82]       | BA    |
| **Capeba**       | Begoniaceae  | Begonia viifolia Schott                   | Begonia reniformis Dryand.              | N      | [1, 11, 56, 65, 94] | PE    |
|                 |              | Begonia reniformis Dryand.               | Begonia reniformis Dryand.              | N      | [1, 11, 56, 65, 94] | PE    |
|                 |              | Pothomorphie peltata (L.) Miq.           | Piper pelatum L.                        | N      | [67]       | BA    |
|                 |              | Pipper marginatum Jacq.                  | Pipper marginatum Jacq.                 | N      | [53]       | PE    |
|                 |              | Pipper umbellatum L.                     | Pipper umbellatum L.                    | N      | [84]       | BA    |
| **Murici**       | Malpighiaceae| Byronsonia sericce DC.                    | Byronsonia sericce DC.                   | N      | [11, 56, 63, 82, 86, 87, 89, 98] | PE, PB, CE, PI, BA |
|                 |              | Byronsonia verbascifolia (L.) DC.         | Byronsonia verbascifolia (L.) DC.        | N      | [98]       | CE    |
|                 |              | Byronsonia coccolobolia Kunth             | Byronsonia coccolobolia Kunth            | N      | [98]       | CE    |
|                 |              | Byronsonia gardneriana A. Juss.           | Byronsonia gardneriana A. Juss.          | N      | [74, 85]   | PB, PI |
|                 |              | Byronsonia corvejifolia A. Juss.          | Byronsonia corvejifolia A. Juss.         | N      | [57]       | PI    |
| **Mulungu**      | Fabaceae     | Erythrina velutina Willd.                 | Erythrina velutina Willd.                | N      | [1, 3, 56, 59, 60, 63, 67, 71–73, 75–77, 86, 88, 89, 93, 94, 97] | PE, PB, SE, CE, RN |
| Vernacular name | Family       | Scientific name in the original source | Scientific name in the source | Valid scientific name | Origin | Literature | State |
|----------------|-------------|----------------------------------------|-------------------------------|-----------------------|--------|------------|-------|
| Muçambê        | Cleomaceae  | Cleome hassleriana Chodat              |                               | Tarenaya hassleriana  | N      | [94]       | PE    |
|                |             | Cleome spinosa Jacq.                  |                               | Tarenaya spinosa      | N      | [3, 9, 56, 57, 59, 65, 71, 72, 75, 92, 93] | PE, PB, CE, PI, RN |
| Mororô         | Fabaceae    | Bauhinia cheilantha (Bong.) Steud.     |                               | Bauhinia cheilantha   | N      | [3, 58, 60, 62–64, 71–73, 75–78, 85, 90, 95, 99] | PE, PB, SE, CE, RN |
|                |             | Bauhinia forficata Link               |                               | Bauhinia forficata    | N      | [57, 68, 81, 93] | PE, MA, RN |
|                |             | Bauhinia subclavata Benth.            |                               | Bauhinia subclavata   | N      | [80]       | BA    |
|                |             | Bauhinia spinosifolia Burch. ex Benth.|                               | Bauhinia spinosifolia | N      | [90]       | RN    |
|                |             | Bauhinia acurana Moric.               |                               | Phanera outimouta     | N      | [78]       | CE    |
|                |             | Bauhinia unguulata L.                 |                               | Bauhinia unguulata    | N      | [74]       | PI    |
|                |             |                                    |                               | Phyllanthus niruri L.  | N      | [61, 66, 68] | MA    |
|                |             | Phyllanthus amarus Schumach. and Thonn.|                               | Phyllanthus amarus    | N      | [9, 52, 53, 55, 56, 63, 72, 76, 92–94] | PE, PB, CE |
|                |             | Phyllanthus tenelius Roxb.            |                               | Phyllanthus tenelius   | N      | [79, 83]   | BA    |
|                |             | Phyllanthus corovodens Müll. Arg.     |                               | Euphorbia hysopifolia | N      | [75, 95]   | PE, SE |
|                |             | Chamaesyce hysopifolia (L.) Small     |                               | Euphorbia hysopifolia | N      | [56]       | PE    |
|                |             | Euphorbia thymifolia L.               |                               | Euphorbia thymifolia  | N      | [75]       | PE    |
|                |             | Euphorbia prostrata Aiton             |                               | Euphorbia prostrata   | N      | [69]       | BA    |
|                |             | Phyllanthus flaviflorus (K. Schum. and Lauterh.) Airy Shaw | | Phyllanthus flaviflorus (K. Schum. and Lauterh.) Airy Shaw | E | [78] | CE |
|                |             | Phyllanthus urinaria L.               |                               | Phyllanthus urinaria   | E      | [58]       | SE    |
|                |             | Oxalis divaricata Mart. ex Zucc.      |                               | Oxalis divaricata Mart. ex Zucc. | N | [9, 11, 56, 67, 67, 76, 79, 92, 99] | PE, CE, RN, BA |
| Sabugueiro     | Adoxaceae   | Sambucus australis Cham. and Schldl.  |                               | Sambucus australis     | N      | [11, 56, 67, 76, 79, 92, 99] | PE, CE, RN, BA |
|                |             | Sambucus racemosa L.                  |                               | Sambucus racemosa L.   | E      | [69]       | BA    |
|                |             | Sambucus nigra L.                     |                               | Sambucus nigra L.      | E      | [1, 11, 65, 67, 76, 79, 92, 99] | PE, CE, RN, BA |
## Table 1: Continued.

| Vernacular name | Family             | Scientific name in the original source         | Valid scientific name         | Origin | Literature | State |
|-----------------|--------------------|------------------------------------------------|------------------------------|--------|------------|-------|
| Fedegoso        | Boraginaceae       | *Heliotropium indicum* L.                      | *Heliotropium indicum* L.    | N      | [1, II, 52, 55, 56, 62, 63, 71, 75, 76, 85, 88–90, 92, 94] | PE, PB, CE, RN |
|                 |                    | *Heliotropium elongatum* Hoffm. ex Roem. and Schult. | *Heliotropium elongatum* Hoffm. ex Roem. and Schult. | N      | [3, 53, 59, 72] | PE, PB, RN |
|                 |                    | *Heliotropium procumbens* Mill.                | *Heliotropium procumbens* Mill. | E      | [60]       | CE    |
|                 | Fabaceae           | *Senna occidentalis* L.                       | *Senna occidentalis* L.      | N      | [57, 67, 69, 80, 83, 84, 88, 95] | PB, SE, PI, BA |
|                 |                    | *Senna uniflora* (Mill.) H. S. Irwin and Barnebly | *Senna uniflora* (Mill.) H. S. Irwin and Barnebly | N      | [66]       | MA    |
| Favela          | Euphorbiaceae      | *Cnidoscolus quercifolius* Pohl                | *Cnidoscolus quercifolius* Pohl | N      | [3, 9, 58–60, 62, 70, 71, 74, 77, 88] | PB, SE, CE, PI, RN |
|                 |                    | *Cnidoscolus phyllacanthus* (Mull. Arg.) Pax and L. Hoffm. | *Cnidoscolus phyllacanthus* (Mull. Arg.) Pax and L. Hoffm. | N      | [9, 60, 71, 74, 88] | PB, CE, PI |
| Vela            | Euphorbiaceae      | *Croton rhamnifolius* Willd.                  | *Croton rhamnifolius* Kunth  | N      | [3, 57, 59, 62–64, 70, 73, 75, 76, 80, 85, 94, 95] | PE, PB, SE, PI, RN, BA |
|                 |                    | *Croton heliotropifolius* Kunth                | *Croton heliotropifolius* Kunth | N      | [61, 93]   | PE, MA  |
|                 |                    | *Croton sonderianus* Mull. Arg.               | *Croton sonderianus* Mull. Arg. | N      | [69, 71, 74, 78, 92] | PB, CE, PI, BA |
|                 |                    | *Croton campestris* A. St.-Hil.               | *Croton campestris* A. St.-Hil. | N      | [57]       | PI    |
|                 |                    | *Croton tenuifolius* Pax and K. Hoffm.        | *Croton betacens* Baill.      | N      |            |       |
| Acansu          | Fabaceae           | *Periandra dulcis* Mar. ex Benth. *Periandra mediterranea* (Vell.) Taub. | *Periandra mediterranea* (Vell.) Taub. | N      | [53, 80, 89] | PE, PB, BA |
| Chanana         | Turneraceae        | *Turnera ulmifolia* L.                        | *Turnera ulmifolia* L.        | E      | [1, II, 56, 57, 60, 61, 65, 66, 68, 71, 89] | PE, PB, CE, PI, MA |
|                 |                    | *Turnera subulata* Sm.                        | *Turnera subulata* Sm.        | N      | [55, 59, 62, 78, 88, 95] | PB, SE, CE, RN |
|                 |                    | *Turnera chamaedrifolia* Cambess.             | *Turnera chamaedrifolia* Cambess. | N      | [77]       | PB    |
|                 |                    | *Turnera guianensis* Aubl.                    | *Turnera guianensis* Aubl.    | N      | [68]       | MA    |
| João Mole       | Nyctaginaceae      | *Guapira opposita* (Vell.) Reitz              | *Guapira opposita* (Vell.) Reitz | N      | [85, 86]   | PB    |
|                 |                    | *Guapira noxia* (Netto) Lundell               | *Guapira noxia* (Netto) Lundell | N      | [95]       | SE    |
| Unha de gato    | Rubiaceae          | *Lycopodium cernua* (L.) Pic. Serm.           | *Lycopodium cernua* (L.) Pic. Serm. | N      | [56]       | PE    |
|                 |                    | *Echinocloa colona* (L.) Link                 | *Echinocloa colona* (L.) Link | N      | [75]       | PE    |
|                 |                    | *Uncaria tomentosa* (Willd.) DC.              | *Uncaria tomentosa* (Willd.) DC. | N      | [11, 54, 68, 72] | PE, PB, MA |
|                 | Fabaceae           | *Acacia paniculata* Willd.                    | *Acacia paniculata* Willd.    | N      | [9, 52, 60, 63, 64, 73, 76] | PE, CE |
|                 |                    | *Mimosasomnians* Humb. and Bonpl. ex Willd.   | *Mimosasomnians* Humb. and Bonpl. ex Willd. | N      | [95]       | SE    |
|                 |                    | *Mimosa sensitiva* L.                         | *Mimosa sensitiva* L.         | N      | [58]       | SE    |
Table 1: Continued.

| Vernacular name | Family       | Scientific name in the original source | Valid scientific name | Origin | Literature | State |
|-----------------|--------------|----------------------------------------|-----------------------|--------|------------|-------|
| Lacre           | Clusiaceae   | Vismia guianensis (Aubl.) Pers.        | Vismia guianensis (Aubl.) Pers. | N      | [1, II, 53, 56, 65, 78, 86, 89, 94] | PE, PB, CE |
|                 |              | Vismia brasiliensis Choisy             | Vismia brasiliensis Choisy | N      | [87]       | PI    |
|                 |              |                                        |                       |        |            |       |
| Jurubeba        | Solanaceae   | Solanum paniculatum L.                 | Solanum paniculatum L. | N      | [1, II, 52, 53, 56, 63, 67, 74–77, 80, 86, 88, 93, 94] | PE, PB, PI, BA |
|                 |              | Solanum paludosum Moric.               | Solanum paludosum Moric. | N      | [58, 89, 90] | PB, SE, RN |
|                 |              | Solanum absconditum Agra               | Solanum absconditum Agra | N      | [85]       | PB    |
|                 |              | Solanum auriculatum Aiton              | Solanum auriculatum Aiton | N      | [97]       | SE    |
|                 |              | Solanum erianthum D. Don               | Solanum erianthum D. Don | N      | [78]       | CE    |
|                 |              | Solanum polytrichum Moric.             | Solanum polytrichum Moric. | N      | [82]       | BA    |
|                 |              | Solanum altidum Dunal                  | Solanum altidum Dunal | E      | [55]       | CE    |
|                 |              | Solanum tabacifolium Vell.             | Solanum tabacifolium Vell. | N      | [79] | BA |
|                 |              | Solanum lyocarpum A. St.-Hil.         | Solanum lyocarpum A. St.-Hil. | N      | [66] | MA |
| Cedro           | Meliaceae    | Cedrela fissilis Vell.                  | Cedrela fissilis Vell. | N      | [80, 86, 93] | PE, PB, BA |
|                 |              | Cedrela odorata L.                     | Cedrela odorata L.      | N      | [1, II, 52, 53, 56, 63, 67, 73, 76, 84, 85] | PE, PB, BA |
|                 |              | Luehea grandiflora Mart.               | Luehea grandiflora Mart. | N      | [69]       | BA    |
| Crista de galo  | Amaranthaceae| Celosia cristata L.                    | Celosia argentea L.     | E      | [61, 63, 94] | PE, MA |
|                 |              | Plumbago scandens L.                   | Plumbago scandens L.    | N      | [95]       | SE    |
|                 |              | Heliotropium indicum L.                | Heliotropium indicum L. | N      | [58, 78, 83, 88] | PB, SE, CE, BA |
|                 |              | Heliotropium angiospermum Murray       | Heliotropium angiospermum Murray | N      | [11]       | PE    |
|                 |              | Heliotropium tiaridioides Cham.        | Heliotropium tiaridioides Cham. | N      | [74]       | PI    |
| Manjerona       | Lamiaceae    | Ocimum americanum L.                   | Ocimum americanum L.    | E      | [1, 56, 65] | PE    |
|                 |              | Origanum majorana L.                   | Origanum majorana L.    | E      | [66, 84, 99, 100] | PB, MA, RN, BA |
| Angelim         | Fabaceae     | Andira nitida Mart. ex Benth.          | Andira nitida Mart. ex Benth. | N      | [56]       | PE    |
|                 |              | Piptadenia obliqua (Pers.) J. F. Macbr. | Piptadenia obliqua subsp. brasiliensis (G. P. Lewis) Luckow and R. W. Jobson | N      | [60]       | CE    |
|                 |              | Andira vermiiffuga Mart. ex Benth.     | Andira vermiiffuga Mart. ex Benth. | N      | [74]       | PI    |
|                 |              | Andira paniculata Benth.               | Andira paniculata Benth. | N      | [87]       | PI    |
|                 |              | Luetzelburgia auriculata (Allemão)     | Luetzelburgia auriculata (Allemão) | N      | [87]       | PI    |
| Vernacular name    | Family       | Scientific name in the original source                  | Valid scientific name                  | Origin | Literature name | State |
|-------------------|--------------|---------------------------------------------------------|----------------------------------------|--------|----------------|-------|
| Arrozinho         | Polygalaceae | *Polygala gracilis* Kunth                               | *Polygala gracilis* Kunth              | N      | [88]           | PB    |
|                   | Polygalaceae | *Polygala paniculata* L.                                | *Polygala paniculata* L.               | N      | [88]           | PB    |
|                   |              | *Zornia latifolia* Sm.                                   | *Zornia latifolia* Sm.                 | N      | [67]           | BA    |
| Anil estrelado    | Schisandraceae | *Illicium verum* Hook. f.                                | *Illicium verum* Hook. f.              | E      | [1, 11, 53]    | PE    |
| Cavalinha         | Equisetaceae | *Equisetum hyemale* L.                                   | *Equisetum hyemale* L.                 | E      | [54]           | PB    |
|                   |              | *Equisetum giganteum* L.                                 | *Equisetum giganteum* L.               | N      | [93]           | PE    |
|                   |              | *Equisetum arvense* L.                                   | *Equisetum arvense* L.                 | E      | [84]           | BA    |
| Chumbinho         | Verbenaceae  | *Lantana camara* L.                                      | *Lantana camara* L.                    | N      | [11, 53, 56, 58, 63, 64, 67, 73, 76, 82, 86, 88-90, 95, 96, 98] | PE, PB, SE, CE, RN, BA |
|                   | Oxalidaceae  | *Oxalis insipida* A. St.-Hill.                           | *Oxalis psoraleoides* Kunth            | N      | [93]           | PE    |
|                   | Sapindaceae  | *Cardiospermum corindum* L.                              | *Cardiospermum corindum* L.            | N      | [74]           | PI    |
|                   |              | *Cardiospermum halicacabum* L.                           | *Cardiospermum halicacabum* L.         | N      | [74]           | PI    |
| Camará            | Verbenaceae  | *Lantana camara* L.                                      | *Lantana camara* L.                    | N      | [60, 67, 71, 74, 88] | PE, PI, BA |
|                   | Lantana canescens Kunth | *Lantana canescens* Kunth                           | *Lantana canescens* Kunth              | N      | [58]           | SE    |
|                   | Asteraceae   | *Verbesina diversifolia* DC.                             | *Verbesina diversifolia* DC.           | N      | [86]           | PB    |
|                   | Sapindaceae  | *Cardiospermum corindum* L.                              | *Cardiospermum corindum* L.            | N      | [74]           | PI    |
| Canela de velho   | Melastomataceae | *Miconia albicans* (Sw.) Steud.                        | *Miconia calyptrolymphum* Tul.         | N      | [74]           | PI    |
|                   | Fabaceae     | *Cardiospermum corindum* L.                              | *Cardiospermum corindum* L.            | N      | [74]           | PI    |
|                   | Primulaceae  | *Cybianthus detergens* Mart.                             | *Cybianthus detergens* Mart.           | N      | [78]           | CE    |
| Catuaba           | Bignoniaceae | *Anemopogma arvense* (Vell.) Steffeld and J. F. Souza    | *Anemopogma arvense* (Vell.) Steffeld and J. F. Souza | N      | [68]           | MA    |
|                   | Erythroxylaceae | *Erythroxylum amplifolium* (Mart.) O. E. Schulz            | *Erythroxylum amplifolium* (Mart.) O. E. Schulz | N      | [78]           | CE    |
|                   |              | *Erythroxylum vaccinifolium* Mart.                        | *Erythroxylum vaccinifolium* Mart.      | N      | [66, 69]       | MA, BA |
| Japecanga         | Smilacaceae  | *Smilax campestris* Griseb.                              | *Smilax campestris* Griseb.            | N      | [78]           | CE    |
|                   |              | *Smilax iapeanca* Griseb.                                | *Smilax iapeanca* Griseb.              | N      | [98]           | CE    |
|                   |              | *Smilax cissoides* Mart. ex Griseb.                      | *Smilax cissoides* Mart. ex Griseb.    | N      | [85]           | PB    |
|                   |              | *Smilax rotundifolia* L.                                 | *Smilax rotundifolia* L.               | N      | [11]           | PE    |
| Vassourinha       | Plantaginaceae | *Scoparia dulcis* L.                                     | *Scoparia dulcis* L.                   | N      | [9, 59, 61, 66, 67, 71, 74, 78, 80, 83, 88] | PE, PI, MA, RN, BA |
|                   | Asteraceae   | *Emilia sonchifolia* (L.) DC.                            | *Emilia sonchifolia* (L.) DC.          | N      | [93]           | PE    |
|                   | Brassicaceae | *Nasturtium officinale* W. T. Aiton                       | *Nasturtium officinale* W. T. Aiton    | E      | [93]           | PE    |
|                   | Scrophulariaceae | *Capraia biflora* L.                                   | *Capraia biflora* L.                   | N      | [60]           | CE    |
|                   | Polygalaceae | *Polygala paniculata* L.                                 | *Polygala paniculata* L.               | N      | [67]           | BA    |
|                   | Rubiaceae    | *Borreria scabiosoides* Cham. and Schidl.                 | *Borreria scabiosoides* Cham. and Schidl. | N      | [89]           | PB    |
|                   | Alismataceae | *Spermacoce verticillata* L.                             | *Borreria verticillata* (L.) G. Mey.   | N      | [57]           | PI    |
| Transagem         | Plantaginaceae | *Plantago major* L.                                     | *Plantago major* L.                    | E      | [53, 54, 67, 69, 72, 79, 83, 84, 94] | PE, PB, BA |
|                   | Alismataceae | *Echinodorus grandiflorus* (Cham. and Schidl.) L. Micheli | *Echinodorus grandiflorus* (Cham. and Schidl.) L. Micheli | N      | [76, 93]       | PE    |
| Vernacular name | Family       | Scientific name in the original source | Valid scientific name | Origin | Literature | State    |
|----------------|--------------|----------------------------------------|-----------------------|--------|------------|----------|
| Alcachofra     | Asteraceae   | Vernonia condensata Baker              | Gymnanthemum amygdalinum (Delile) Sch. Bip. ex Walp. | N      | [1, 53, 56, 63, 67, 76, 94] | PE       |
|                |              | Cynara scolymus L.                     | Gymnanthemum amygdalinum (Delile) Sch. Bip. ex Walp. | E      | [52, 63, 84] | PE, BA   |
|                |              | Gymnanthemum amygdalinum               | Gymnanthemum amygdalinum (Delile) Sch. Bip. ex Walp. | N      | [11]       | PE       |
| Açafrão         | Zingiberaceae| Curcuma longa L.                       | Curcuma longa L.       | E      | [72, 84]   | PB, BA   |
| Alfavaca       | Lamiaceae    | Ocimum basilicum L.                    | Ocimum basilicum L.    | E      | [68, 81]   | MA, RN   |
|                |              | Ocimum campechianum Mill.              | Ocimum campechianum Mill. | N      | [9, 53, 60, 83] | PE, CE, BA |
|                |              | Ocimum gratissimum L.                  | Ocimum gratissimum L.  | E      | [1, 55, 56, 61, 78] | PE, CE, MA |
| Catolé         | Areaceae     | Syagrus oleracea (Mart.) Becc.         | Syagrus oleracea (Mart.) Becc. | N      | [85]       | PB       |
|                |              | Syagrus picrophylla Barb. Rodr.        | Syagrus picrophylla Barb. Rodr. | N      | [55]       | CE       |
|                |              | Syagrus cearensis Noblick              | Syagrus cearensis Noblick | N      | [78]       | CE       |
| Mentrasto      | Asteraceae   | Ageratum conyzoides L.                 | Ageratum conyzoides L.  | N      | [58–60, 69, 78, 83, 94, 99] | PE, SE, CE, RN, BA |
|                |              | Stilpnopappus scaposus DC.             | Stilpnopappus scaposus DC. | N      | [96]       | SE       |
|                |              | Blainvillea rhomboidea Cass.           | Blainvillea acmella (L.) Philipson | N      | [96]       | SE       |
|                |              | Prolobus nitidulus (Baker) R. M. King and H. Rob. | Prolobus nitidulus (Baker) R. M. King and H. Rob. | N      | [96]       | SE       |
|                | Polygalaceae | Polygala violacea Aubl.                | Polygala violacea Aubl. | N      | [95]       | SE       |
| Catingueira    | Fabaceae     | Caesalpinia pyramidalis Tul.           | Poincianella pyramidalis (Tul.) L. P. Queiroz | N      | [3, 9, 11, 52, 53, 56, 58, 59, 62, 63, 67, 70, 71, 75–77, 88, 90, 95, 99] | PE, PB, SE, CE, RN |
|                |              | Poincianella bracteosa Tul.            | Poincianella bracteosa (Tul.) L. P. Queiroz | N      | [57, 60]   | CE, PI   |
|                |              | Poincianella microphylla (Mart. ex G. Don) L. P. Queiroz | Poincianella microphylla (Mart. ex G. Don) L. P. Queiroz | N      | [80]       | BA       |
| Marmeleiro     | Euphorbiaceae| Croton blanchetianus Baill.            | Croton blanchetianus Baill. | N      | [3, 52, 59, 63, 64, 70, 73, 76, 78, 80, 95] | PE, PB, SE, CE, RN, BA |
|                |              | Croton sonderianus Mull. Arg.          | Croton sonderianus Mull. Arg. | N      | [55, 62, 71, 72, 74, 75, 81, 90] | PE, PB, CE, PI, RN |
|                |              | Croton rhamnifolius Willd.             | Croton rhamnifolius Kuntz | N      | [98]       | CE       |
|                |              | Croton urticifolius Lam.               | Croton urticifolius Lam. | N      | [86]       | PB       |
|                |              | Croton argyrophyllodes Mull. Arg.      | Croton argyrophyllodes Mull. Arg. | N      | [76]       | PE       |
| Oiticica       | Chrysobalanaceae| Licania rigida Benth.                 | Licania rigida Benth.  | N      | [9, 55, 59, 60, 70–72, 77, 85, 99] | PB, CE, RN |
| Picão          | Asteraceae   | Bidens pilosa L.                       | Bidens pilosa L.       | E      | [61, 67]   | MA, BA   |
| Barriguda      | Malvaceae    | Ceiba glaziowii (Kuntze) K. Schum.     | Ceiba glaziowii (Kuntze) K. Schum. | N      | [9, 77, 85, 88] | PB, CE   |
|                | Bombacaceae  | Chorisia glaziowii (Kuntze) E. Santos  | Chorisia glaziowii (Kuntze) E. Santos | N      | [63, 64, 73, 75] | PE       |
|                | Lamiaceae    | Hynenia salzmannii (Benth.) Harley    | Hynenia salzmannii (Benth.) Harley | N      | [57]       | PI       |
| Vernacular name | Family               | Scientific name in the original source | Valid scientific name                        | Origin | Literature | State    |
|----------------|----------------------|----------------------------------------|----------------------------------------------|--------|------------|----------|
| Vique          | Polygalaceae         | Polypogal paniculata L.                | Polypogal paniculata L.                      | N      | [67, 90]   | RN, BA   |
|                | Lamiaceae            | Mentha spicata L.                      | Mentha spicata L.                            | E      | [66, 68]   | MA       |
|                |                      | Mentha pulegium L.                     | Mentha pulegium L.                           | E      | [56]       | PE       |
| Agrião         | Brassicaceae         | Nasturtium officinale W. T. Aiton       | Nasturtium officinale W. T. Aiton            | E      | [9, 53, 56, 69, 81, 93, 94, 99] | PE, CE, RN, BA |
|                |                      | Rorippa pumila (Camb.) A. Lima          | Rorippa pumila (Camb.) A. Lima               | E      | [65]       | PE       |
|                | Asteraceae           | Acmella cilata (Kunth) Cass.           | Acmella cilata (Kunth) Cass.                | N      | [57]       | PI       |
|                |                      | Acmella oleracea (L.) R. K. Jansen      | Acmella oleracea (L.) R. K. Jansen           | N      | [72]       | PB       |
| Algodão        | Malvaceae            | Gossypium hirsutum L.                   | Gossypium hirsutum L.                        | E      | [57, 78, 93] | PE, CE, PI |
|                |                      | Gossypium herbaceum L.                 | Gossypium herbaceum L.                       | E      | [66, 68, 69, 75, 83, 84] | PE, MA, BA |
|                |                      | Gossypium arboreum L.                  | Gossypium arboreum L.                        | E      | [61]       | MA       |
| Ameixa         | Olacaceae            | Ximenia americana L.                    | Ximenia americana L.                         | N      | [3, 9, 11, 53, 55, 57−60, 62, 70, 74, 78, 90, 97] | PE, PB, SE, CE, PI, RN |
|                | Sapotaceae           | Chrysophyllum arenarium Allemão         | Chrysophyllum arenarium Allemão              | N      | [98]       | CE       |
|                | Myrtaceae            | Eugenia cumini (L.) Druce               | Syzygium cumini (L.) Skeels                  | E      | [68]       | MA       |
|                | Rosaceae             | Prunus domestica L.                     | Prunus domestica L.                          | E      | [81]       | RN       |
| Anador         | Lamiaceae            | Plectranthus barbatus Andrews           | Plectranthus barbatus Andrews                | E      | [68]       | MA       |
|                |                      | Ocimum selilloi Benth.                  | Ocimum carnosum (Spreng.) Link and Otto ex Benth. | N      | [67]       | BA       |
|                |                      | Justicia gendarussa                    | Justicia gendarussa                         |        |            |          |
|                | Acanthaceae          | Burm. f.                               | Burm. f.                                    | E      | [53]       | PE       |
|                |                      | Justicia pectoralis Jacq.              | Justicia pectoralis Jacq.                   | N      | [52, 55, 63, 94] | PE, CE |
|                | Amaranthaceae        | Alternanthera brasiliana (L.) Kuntze    | Alternanthera brasiliana (L.) Kuntze         | N      | [67, 69]   | BA       |
|                |                      | Pfaffia glomerata (Spreng.) Pedersen   | Pfaffia glomerata (Spreng.) Pedersen         | N      | [67, 79]   | BA       |
|                | Asteraceae           | Artemisia vulgaris L.                   | Artemisia vulgaris L.                        | E      | [72, 78]   | PB, CE   |
|                |                      | Iodina rhombifolia Hook. and Arn.      | Iodina rhombifolia (Hook. and Arn)           | N      | [100]      | PB       |
| Arruda         | Rutaceae             | Ruta graveolens L.                      | Ruta graveolens L.                           | E      | [1, 9, 11, 52−57, 63, 65−69, 72, 75, 76, 78, 79, 81, 83, 84, 93, 94, 99−101] | PE, PB, SE, CE, PI, MA, RN, BA |
| Artemisia      | Asteraceae           | Artemisia vulgaris L.                   | Artemisia vulgaris L.                        | E      | [54, 69, 83, 84, 94] | PE, PB, BA |
| Vernacular name | Family       | Scientific name in the original source | Valid scientific name                           | Origin | Literature | State |
|----------------|--------------|----------------------------------------|------------------------------------------------|--------|------------|-------|
| Bambu          | Poaceae      | Dendrocalamus giganteus Wall. ex Munro | Dendrocalamus giganteus Wall. ex Munro          | E      | [11, 56]   | PE    |
|                |              | Bambusa arundinacea (Retz.) Willd.     | Bambusa bambos (L.) Voss                       | E      | [69]       | BA    |
|                |              | Bambusa vulgaris Schrad. ex J. C. Wendl.| Bambusa vulgaris Schrad. ex J. C. Wendl.       | E      | [84]       | BA    |
| Janauba        | Apocynaceae  | Himatanthus bracteatus (A. DC.) Woodson | Himatanthus bracteatus (A. DC.) Woodson         | N      | [82]       | BA    |
|                |              | Himatanthus sucuuba (Spruce ex Mull. Arg.) Woodson | Himatanthus sucuuba (Spruce ex Mull. Arg.) Woodson | N      | [66]       | MA    |
|                |              | Himatanthus drasticus (Mart.) Plumel   | Himatanthus drasticus (Mart.) Plumel           | N      | [78, 98]   | CE    |
| Barbatimão     | Fabaceae     | Stryphnodendron adstringens (Mart.) Coville | Stryphnodendron adstringens (Mart.) Coville    | N      | [1, 79, 92, 94, 99] | PE, CE, RN, BA |
|                |              | Stryphnodendron barbatimam (Gomes)      | Abarema cochliacarpus (Gomes) Barneby and J. W. | N      | [11, 53, 56, 69] | PE, BA |
|                |              | Pithecellobium cochliacarpum (Gomes) J. F. Macbr. | Stryphnodendron coriaceum Benth.                | N      | [54, 71, 78, 87, 98] | PB, CE, PI |
| Bom nome       | Celastraceae | Maytenus rigida Mart.                  | Maytenus rigida Mart.                          | N      | [1, 3, 9, 52–54, 56, 58, 60, 61, 63, 67, 71, 73, 75–77, 88, 95–97] | PE, PB, SE, CE |
|                |              | Maytenus distichophylla Mart.          | Maytenus distichophylla Mart.                  | N      | [78]       | CE    |
| Caju           | Anacardiaceae| Anacardium occidentale L.               | Anacardium occidentale L.                      | N      | [9, 11, 54, 56–58, 61, 63, 66–68, 71, 75, 78, 79, 81–84, 86, 87, 89, 92–94, 99] | PE, PB, SE, CE, PI, MA, RN, BA |
| Cardo santo    | Papaveraceae | Argemone mexicana L.                   | Argemone subfusiformis G. B. Ownbey             | E      | [1, 11, 53, 60, 71, 75, 77, 79, 81–84, 86, 87, 89, 92–94, 99] | PE, PB, CE, BA |
|                | Asteraceae   | Argemone subfusiformis G. B. Ownbey    | Carduas benedictus Gaert.                      | E      | [84]       | BA    |
| Candeia        | Fabaceae     | Platythemia reticulata Benth.           | Platythemia reticulata Benth.                  | N      | [61, 74]   | PI, MA |
|                | Asteraceae   | Gochnatiella oligocephala (Gardner)    | Gochnatiella oligocephala (Gardner)            | N      | [80]       | BA    |
| Canela         | Lamiaceae    | Cinnamomum zeylanicum Blume            | Cinnamomum verum J. Presl                      | E      | [11, 33, 53, 56, 59, 76, 81, 83, 84, 93] | PE, RN, BA |
|                | Lauraceae    | Nectandra cuspidata Nees and Mart.     | Nectandra cuspidata Nees and Mart.             | N      | [56]       | PE    |
|                |              | Nectandra leucantha Nees and Mart.     | Nectandra leucantha Nees and Mart.             | N      | [94]       | PE    |
| Vernacular name | Family            | Scientific name in the original source | Valid scientific name                  | Origin | Literature                          | State |
|-----------------|-------------------|----------------------------------------|----------------------------------------|--------|-------------------------------------|-------|
| Mandacaru       | Cactaceae         | Cereus jamaicura DC.                   | Cereus jamaicura DC.                   | N      | [1, 9, 52, 53, 56, 58–60, 63, 71, 75, 76, 78, 80, 88, 93–95] | PE, PB, SE, CE, RN, BA |
|                 |                   | Opuntia ficus-indica (L.) Mill.        | Opuntia ficus-indica (L.) Mill.        | E      | [66]                                | MA    |
| Carqueja        | Asteraceae        | Baccharis trimera (Less.) DC.           | Baccharis crispa Spreng.               | N      | [1, 68, 79, 83, 99]                  | PE, MA, RN, BA |
| Cidreira        | Verbenaceae       | Lippia alba (Mill.) N. E. Br. ex Britton and P. Wilson | Lippia alba (Mill.) N. E. Br. ex Britton and P. Wilson | N      | [1, 3, 9, 11, 52, 53, 55, 57, 58, 61–63, 67–69, 72, 75, 76, 78, 79, 83, 93–95, 99, 100] | PE, PB, SE, CE, PI, MA, RN, BA |
|                 |                   | Lippia citroidora Kunth                | Aloysia citroidora Palau               | E      | [97]                                | SE    |
|                 |                   | Melissa officinalis L.                 | Melissa officinalis L.                 | E      | [66, 81, 84, 92, 93]                  | PE, CE, MA, RN, BA |
| Pra tudio       | Crassulaceae      | Kalanchoe brasiliensis Cambess.         | Kalanchoe crenata (Andrews) Haw.      | E      | [75]                                | PE    |
|                 |                   | Cardiospermum halicacabum L.           | Cardiospermum halicacabum L.          | N      | [77]                                | PB    |
|                 |                   | Zanthoxylum hamadryadicum Pirani       | Zanthoxylum hamadryadicum Pirani      | N      | [74]                                | PI    |
|                 |                   | Acmospum dasycarpum (Vogel)            | Leptobium dasycarpum Vogel            | N      | [78], [79]                          | CE    |
| Copaiba         | Fabaceae          | Copaifera langsdorffii Desl.           | Copaifera langsdorffii Desl.          | N      | [61, 66]                            | MA    |
|                 |                   | Copaifera coriacea Mart.               | Copaifera coriacea Mart.              | N      | [87]                                | PI    |
|                 |                   | Copaifera reticulata Ducke             | Copaifera reticulata Ducke            | N      | [68]                                | MA    |
|                 |                   | Copaifera officinalis (Jacq.) L.       | Copaifera officinalis (Jacq.) L.      | N      | [84]                                | BA    |
|                 |                   | Copaifera lucens Dwyer                 | Copaifera lucens Dwyer                | N      | [69]                                | BA    |
| Courama         | Crassulaceae      | Malvaviscus arboreus Cav.              | Malvaviscus arboreus Cav.             | E      | [81]                                | RN    |
|                 |                   | Kalanchoe brasiliensis Cambess.         | Kalanchoe crenata (Andrews) Haw.      | E      | [53, 55, 56, 65]                    | PE, CE |
|                 |                   | Kalanchoe blossfeldiana Poelln.        | Kalanchoe blossfeldiana Poelln.       | E      | [94]                                | PE    |
|                 |                   | Bryophyllum pinnatum (Lam.) Oken       | Bryophyllum cayicum Salisb.            | E      | [1, 65, 72, 84, 99]                  | PE, PB, RN, BA |
| Cordão de São Francisco | Lamiaceae | Leuotis nepetofila (L.) R. Br. | Leuotis nepetofila (L.) R. Br. | E | [9, 57, 60, 67, 68, 71] | PB, CE, PI, MA, BA |
|                 |                   | Leucas martiniensis (Jacq.) R. Br.     | Leucas martiniensis (Jacq.) R. Br.    | E | [77] | PB |
| Embaúba         | Urticaceae        | Cecropia palmata Willd.                | Cecropia palmata Willd.               | N      | [86]                                | PB    |
|                 |                   | Cecropia pachystachya Trécul           | Cecropia pachystachya Trécul          | N      | [61, 67, 82, 85]                    | PB, MA, BA |
|                 |                   | Cecropia peltata L.                    | Cecropia peltata L.                   | N      | [74]                                | PI    |
| Imbiriba        | Annonaceae        | Guatteria australis A. St.-Hil.        | Guatteria australis A. St.-Hil.       | N      | [9]                                 | CE    |
|                 |                   | Eschweiler ovata (Cambess.) Miers      | Eschweiler ovata (Cambess.) Miers      | N      | [56, 85, 86, 89]                    | PE, PB |
| Vernacular name    | Family         | Scientific name in the original source       | Valid scientific name                  | Origin | Literature | State   |
|-------------------|----------------|----------------------------------------------|----------------------------------------|--------|------------|---------|
| Espinheira santa  | Fabaceae       | Zollernia ilicifolia (Brongn.) Vogel         | Zollernia ilicifolia (Brongn.) Vogel   | N      | [53]       | PE      |
|                   | Celastraceae   | Maytenus ilicifolia Mart. ex Reissek         | Maytenus ilicifolia Mart. ex Reissek   | N      | [68, 72, 79]| PB, MA, BA|
| Gengibre          | Zingiberaceae  | Zingiber officinale Roscoe                   | Zingiber officinale Roscoe             | E      | [53, 57, 66, 68, 72, 84, 93, 94] | PE, PB, PI, MA, BA |
|                   |                |                                              |                                        |        |            |         |
| Graviola          | Annonaceae     | Annona muricata L.                           | Annona muricata L.                     | E      | [3, 9, 11, 56, 63, 69, 75, 83, 93, 94, 99] | PE, PB, CE, RN, BA |
|                   |                | Rollinia sericea (R. E. Fr.) R. E. Fr.      | Annona neoericica H. Rainer            | N      | [67]       | BA      |
|                   |                | Annona cherimola Mill.                       | Annona cherimola Mill.                | E      | [84]       | BA      |
| Jaboticaba        | Myrtaceae      | Myrciaria cauliflora (Mart.) O. Berg         | Plinia cauliflora (Mart.) Kausel      | N      | [52, 63, 69, 76] | PE, BA |
| Juá               | Rhamnaceae     | Ziziphus joaizeiro Mart.                     | Ziziphus joaizeiro Mart.              | N      | [3, 9, 56, 57, 59, 60, 62–64, 67, 68, 70–72, 74–76, 78, 80, 81, 85, 86, 88, 89, 92, 93, 95] | PE, PB, SE, CE, PI, MA, RN, BA |
|                   |                | Ziziphus cotinifolia Reissek                 | Ziziphus cotinifolia Reissek           | N      | [77, 88]   | PB      |
| Louro             | Lauraceae      | Laurus nobilis L.                            | Laurus nobilis L.                      | E      | [81, 84, 93] | PE, RN, BA |
|                   |                | Ocotea glomerata (Nees) Mez                  | Ocotea glomerata (Nees) Mez            | N      | [56]       | PE      |
|                   |                | Ocimum gratissimum L.                        | Ocimum gratissimum L.                  | E      | [52, 63, 76, 94] | PE      |
|                   |                | Ocotea ducel Vattimo                         | Ocotea ducel Vattimo                   | N      | [89]       | PB      |
|                   |                | Laurus azorica (Seub.) Franco                | Laurus azorica (Seub.) Franco          | E      | [100]      | PB      |
| Erva doce         | Apiaceae       | Pimpinella anisum L.                         | Pimpinella anisum L.                   | E      | [1, 3, 11, 52, 56, 63, 68, 76, 78, 79, 81, 83, 92, 93, 100] | PE, PB, CE, MA, RN, BA |
|                   |                | Foeniculum vulgare Mill.                     | Foeniculum vulgare Mill.               | E      | [53, 67, 69, 84, 94] | PE, BA |
| Endro             | Apiaceae       | Foeniculum vulgare Mill.                     | Foeniculum vulgare Mill.               | E      | [1, 3, 11, 52, 63, 78] | PE, PB, CE |
|                   |                | Anethum graveolens L.                        | Anethum graveolens L.                  | E      | [53, 54, 57, 72, 93, 100] | PE, PB, PI |
| Alecrim           | Lamiaceae      | Rosmarinus officinalis L.                    | Rosmarinus officinalis L.              | E      | [3, 11, 52, 53, 56, 63, 65, 68, 69, 72, 75, 76, 78, 79, 84, 92, 93, 99, 100] | PE, PB, CE, MA, RN, BA |
|                   | Fabaceae       | Calliandra depauperata Benth.                | Calliandra depauperata Benth.          | N      | [60]       | CE      |
|                   | Verbenaceae    | Lippia thyoides Mart. and Schauer            | Lippia thyoides Mart. and Schauer      | N      | [80]       | BA      |
| Vernacular name | Family          | Scientific name in the original source | Valid scientific name          | Origin | Literature                                                                 | State |
|-----------------|-----------------|----------------------------------------|---------------------------------|--------|---------------------------------------------------------------------------|-------|
| Abacate         | Lauraceae       | *Persea americana* Mill.               | *Persea americana* Mill.        | E      | [11, 63, 66, 67, 67–69, 76, 78, 79, 83, 84, 89, 94, 99]                    | PE, PB, CE, MA, RN, BA |
| Alfazema        | Lamiaceae       | *Lavandula spica* Cav.                 | *Lavandula spica* Cav.          | E      | [1, 93]                                                                   | PE    |
|                 |                 | *Hyptis suaveolens* (L.) Poit.         | *Hyptis suaveolens* (L.) Poit.  | N      | [60]                                                                      | CE    |
|                 |                 | *Lavandula officinalis* Chaix          | *Lavandula officinalis* Chaix   | E      | [99]                                                                      | RN    |
|                 | Verbenaceae     | *Hyptis pectinata* (L.) Poit.          | *Hyptis pectinata* (L.) Poit.   | N      | [52]                                                                      | PE    |
|                 |                 | *Aloysia lycioides* Cham.              | *Aloysia lycioides* Cham.       | N      | [69]                                                                      | BA    |
| Alumã           | Asteraceae      | *Vernonia condensata* Baker            | *Gymnanthemum amygdalinum* (Delile) Sch.Bip. ex Walp. | N      | [67, 79, 83, 84, 101]                                                   | SE, BA |
| Babosa          | Xanthorrhoeaceae| *Aloe vera* (L.) Burm. f.               | *Aloe vera* (L.) Burm. f.       | E      | [1, 3, 9, 11, 52, 53, 55–57, 66–69, 76, 78, 79, 81–92, 94, 99, 101]     | PE, PB, SE, CE, PI, MA, RN, BA |
|                 |                 | *Aloe barbadensis* Mill.               |                                 |        |                                                                           |       |
|                 |                 | *Aloe socotrina* Schult. and Schult. f.| *Aloe socotrina* Schult. and Schult. f. | E      | [1, 3, 52, 53, 63, 76, 81, 99, 100]                                      | BA    |
| Boldo           | Monimiaceae     | *Peumus boldus* Molina                 | *Peumus boldus* Molina          | E      | [57, 66, 69, 79]                                                          | PI, MA, BA |
|                 | Lamiaceae       | *Plectranthus barbatus* Andrews        | *Plectranthus barbatus* Andrews | E      | [79]                                                                      | BA    |
|                 |                 | *Coleus barbatus* (Andrews) Benth.     |                                 |        |                                                                           |       |
|                 |                 | *Plectranthus neochilus* Schltr.       | *Plectranthus neochilus* Schltr. | E      | [67, 83]                                                                  | BA    |
| Cabacinha       | Cucurbitaceae   | *Luffa operculata* (L.) Cogn.          | *Luffa operculata* (L.) Cogn.   | E      | [1, 3, 52, 53, 59, 62, 66, 68, 76, 77, 84, 88, 93]                       | PE, PB, MA, RN, BA |
| Camomila        | Asteraceae      | *Matricaria chamomila* L.              | *Matricaria chamomila* L.       | E      | [3, 9, 11, 52, 53, 55–69, 76–81, 84, 93]                                 | PE, PB, CE, MA, RN, BA |
|                 |                 | *Coreopsis grandiflora* Hogg ex Sweet  | *Coreopsis grandiflora* Hogg ex Sweet | E      | [94]                                                                      | PE    |
| Cana de macaco  | Costaceae       | *Costus spiratus* (Jacq.) Sw.          | *Costus spiratus* (Jacq.) Sw.   | N      | [1, 78]                                                                   | PE, CE |
|                 |                 | *Costus spiralis* (Jacq.) Roscoe       | *Costus spiralis* (Jacq.) Roscoe | N      | [67, 94]                                                                  | PE, BA |
|                 |                 | *Costus arcticus* L.                   | *Costus arcticus* L.            | N      | [93]                                                                      | PE    |
| Canapum         | Solanaceae      | *Physalis angulata* L.                 | *Physalis angulata* L.          | E      | [57, 66, 68, 74]                                                         | PI, MA |
|                 | Passifloraceae  | *Passiflora foetida* L.                | *Passiflora foetida* L.         | N      | [70, 77]                                                                  | PB    |
| Caninana        | Rubiaceae       | *Chiococca alba* (L.) Hitchc.          | *Chiococca alba* (L.) Hitchc.   | N      | [9, 82, 89]                                                               | PB, CE, BA |
|                 | Polygalaceae    | *Polygalapaniculata* L.                | *Polygala paniculata* L.        | N      | [78]                                                                      | CE    |
| Capim santo     | Poaceae         | *Cymbopogon citratus* (DC.) Stapf      | *Cymbopogon citratus* (DC.) Stapf | E      | [1, 3, 9, 11, 52, 53, 55, 56, 63, 67, 69, 72, 75, 76, 78, 79, 83, 93, 94, 99–101] | PE, PB, SE, CE, RN, BA |
| Carambola       | Oxalidaceae     | *Averrhoa carambola* L.                | *Averrhoa carambola* L.         | E      | [1, 11, 56, 57, 66, 79, 93, 94, 99]                                       | PE, PI, MA, RN, BA |
| Vernacular name | Family        | Scientific name in the original source | Valid scientific name | Origin | Literature | State |
|----------------|--------------|----------------------------------------|-----------------------|--------|------------|-------|
| Carrapateira   | Euphorbiaceae | *Ricinus communis* L.                  | *Ricinus communis* L. | E      | [11, 56, 63, 71, 89, 93] | PE, PB |
| Cebola branca  | Liliaceae    | *Allium cepa* L.                       | *Allium cepa* L.      | E      | [3, 9, 92] | PB, CE |
|                |              | *Allium ascalonicum* L.                | *Allium ascalonicum* L.| E      | [53, 55, 69, 76] | PE, CE, BA |
| Chambá         | Acanthaceae  | *Justicia pectoralis* Jacq.            | *Justicia pectoralis* Jacq. | N      | [53, 56, 65, 94] | PE |
| Colônia        | Zingiberaceae| *Alpinia speciosa* (Blume) D. Dietr.   | *Alpinia speciosa* (Blume) D. Dietr. | E      | [9, 53, 65, 76, 78, 84, 93, 94, 100] | PE, PB, CE, BA |
| Confrei        | Boraginaceae | *Symphytum officinale* L.              | *Symphytum officinale* L. | E      | [53, 67, 69, 83, 84, 93, 94] | PE, BA |
| Cravo branco   | Caryophyllaceae| *Dianthus caryophyllus* L.            | *Dianthus caryophyllus* L. | E      | [1, 11, 52, 53, 63, 65] | PE |
|                |              | *Tagetes erecta* L.                    | *Tagetes erecta* L.   | E      | [67, 72, 76, 93] | PE, PB |
| Erva mora      | Solanaceae   | *Solanum americanum* Mill.             | *Solanum americanum* Mill. | E      | [1, 11, 52, 53, 56, 57, 60, 76, 88] | PE, PB, CE, PI |
| Espinho de cigano | Asteraceae | *Acanthospermum hispidum* DC.         | *Acanthospermum hispidum* DC. | E      | [1, 3, 11, 52, 56, 63, 72, 75, 76, 88, 94, 100] | PE, PB |
| Eucalipto      | Myrtaceae    | *Eucalyptus globulus* Labill.          | *Eucalyptus globulus* Labill. | E      | [9, 57, 63, 67, 69, 71, 72, 79, 81, 84, 92] | PE, PB, CE, PI, RN, BA |
|                |              | *Eucalyptus citriodora* Hook.          | *Eucalyptus citriodora* Hook. | E      | [11, 55, 56, 94] | PE, CE |
| Pinha          | Annonaceae   | *Annona squamosa* L.                   | *Annona squamosa* L.  | E      | [11, 56, 63, 75, 76, 84, 93, 99] | PE, RN, BA |
|                |              | *Annona coriacea* Mart.                | *Annona coriacea* Mart. | N      | [98] | CE |
|                |              | *Annona tomentosa* R. E. Fr.           | *Annona tomentosa* R. E. Fr. | N      | [98] | CE |
| Mamoeiro       | Caricaceae   | *Carica papaya* L.                     | *Carica papaya* L.     | E      | [3, 55, 68, 83, 92, 94] | PE, PB, CE, MA, BA |
| Gergelim       | Pedaliaceae  | *Sesamum orientale* L.                 | *Sesamum orientale* L. | E      | [3, 9, 11, 53, 67, 81, 92] | PE, PB, CE, RN |
| Girassol       | Asteraceae   | *Helianthus annuus* L.                 | *Helianthus annuus* L. | E      | [9, 11, 53, 56, 63, 68, 69, 72, 92, 93] | PE, PB, CE, MA, BA |
|                |              | *Tithonia diversifolia* (HemsI.) A. Gray | *Tithonia diversifolia* (HemsI.) A. Gray | E      | [76] | PE |
| Imbira         | Annonaceae   | *Xylopia frutescens* Aubl.             | *Xylopia frutescens* Aubl. | N      | [53, 86] | PE, PB |
|                |              | *Xylopia laevigata* (Mart.) R. E. Fr.  | *Xylopia laevigata* (Mart.) R. E. Fr. | N      | [89] | PB |
| Vernacular name | Family  | Scientific name in the original source | Valid scientific name | Origin | Literature | State |
|----------------|---------|----------------------------------------|------------------------|--------|------------|-------|
| Ipe            | Bignoniaceae | *Tabebuia aurea* (Silva Manso) Benth. and Hook. f. ex S. Moore | *Tabebuia aurea* (Silva Manso) Benth. and Hook. f. ex S. Moore | N      | [82]       | BA    |
|                |         | *Tabebuia avellaneae* Lorentz ex Griseb. | *Handroanthus impetiginosus* (Mart. ex DC.) Mattos | N      | [82]       | BA    |
|                |         | *Tabebuia chrysotricha* (Mart. ex A. DC.) Standl. | *Handroanthus chrysotrichus* (Mart. ex DC.) Mattos | N      | [82]       | BA    |
|                |         | *Tabebuia roseo-alba* (Ridl.) Sandwith | *Tabebuia roseoalba* (Ridl.) Sandwith | N      | [82]       | BA    |
| Pau d'arco roxo| Bignoniaceae | *Tabebuia avellaneae* Lorentz ex Griseb. | *Handroanthus impetiginosus* (Mart. ex DC.) Mattos | N      | [3, 9, 11, 54, 56, 60, 65, 69, 70, 74, 85, 89, 100] | PE, PB, SE, CE, PI, BA |
|                |         | *Tabebuia impetiginosa* (Mart. ex DC.) Standl. | *Handroanthus ochraceus* (Cham.) Mattos | N      | [93]       | PE    |
|                |         | *Tabebuia serratifolia* (Vahl) G. Nicholson | *Handroanthus serratifolius* (A.H.Gentry) S. Grose | N      | [74, 86]   | PB, PI |
|                |         | *Tabebuia spongiosa* Rizzini | *Handroanthus spongiosus* (Rizzini) S.Grose | N      | [74]       | PI    |
|                |         | *Tabebuia aurea* (Silva Manso) Benth. and Hook. f. ex S. Moore | *Tabebuia aurea* (Silva Manso) Benth. and Hook. f. ex S. Moore | N      | [63, 92]   | PE, CE |
| Pau d'arco     | Bignoniaceae | *Tabebuia avellaneae* Lorentz ex Griseb. | *Handroanthus impetiginosus* (Mart. ex DC.) Mattos | N      | [53, 62, 80] | PE, RN, BA |
|                |         | *Tabebuia impetiginosa* (Mart. ex DC.) Standl. | *Handroanthus ochraceus* (Cham.) Mattos | N      | [93]       | PE    |
|                |         | *Tabebuia spongiosa* Rizzini | *Handroanthus spongiosus* (Rizzini) S.Grose | N      | [74]       | PI    |
|                |         | *Tabebuia aurea* (Silva Manso) Benth. and Hook. f. ex S. Moore | *Tabebuia aurea* (Silva Manso) Benth. and Hook. f. ex S. Moore | N      | [63, 92]   | PE, CE |
| Pepaconha      | Violaceae | *Hybanthus ipecacuanha* (L.) Baill. | *Hybanthus ipecacuanha* (L.) Baill. | N      | [9, 53, 55, 56, 59, 71, 75, 77, 88, 90, 93, 94] | PE, PB, CE, RN |
|                |         | *Hybanthus calceolaria* (L.) Oken | *Hybanthus calceolaria* (L.) Oken | N      | [1, 11, 81] | PE, RN |
|                |         | *Psychotria ipecacuanha* (Brot.) Stokes | *Psychotria ipecacuanha* (Brot.) Stokes | N      | [9, 54, 93] | PE, PB, CE |
|                |         | *Cephalis ipecacuanha* (Brot.) A. Rich. | *Cephalis ipecacuanha* (Brot.) A. Rich. | N      | [1, 65]    | PE    |
|                | Rubiaceae | *Artemisia absinthium* L. | *Artemisia absinthium* L. | E      | [9, 54, 93] | PE, PB, CE |
|                |         | *Artemisia vulgaris* L. | *Artemisia vulgaris* L. | E      | [9, 54, 93] | PE, PB, CE |
| Lossa          | Asteraceae | *Aeollanthus suaveolens* Mart. ex Spreng. | *Aeollanthus suaveolens* Mart. ex Spreng. | E      | [53, 56, 63, 65, 76, 84] | PE, PB, BA |
| Macassa        | Lamiaceae | *Hymenaea courbaril* L. | *Hymenaea courbaril* L. | N      | [9, 53, 55, 61, 63, 66, 68, 71, 75, 76, 80, 85–87, 89, 92, 93, 100] | PE, PB, CE, PI, MA, BA |
|                |         | *Hymenaea martiana* Hayne | *Hymenaea martiana* Hayne | N      | [56]       | PE    |
|                |         | *Hymenaea stigonocarpa* Mart. ex Hayne | *Hymenaea stigonocarpa* Mart. ex Hayne | N      | [69, 98]   | CE, BA |
| Jatôba         | Fabaceae | *Hymenaea aurea* Y. T. Lee and Langenh. | *Hymenaea aurea* Y. T. Lee and Langenh. | N      | [74]       | PI    |
| Vernacular name | Family      | Scientific name in the original source | Valid scientific name | Origin | Literature | State     |
|----------------|-------------|----------------------------------------|-----------------------|--------|------------|-----------|
| Jerimum        | Cucurbitaceae | *Cucurbita pepo* L.                    | *Cucurbita pepo* L.   | E      | [11, 56, 68, 76, 93, 100] | PE, PR, MA |
|                |             | *Cucurbita argyrosperma* (Willd.) Osbeck | *Cucurbita argyrosperma* (Willd.) Osbeck | E      | [78]       |           |
| Hortelã miuda | Lamiaceae   | *Coleus forskohlii* (Willd.) Briq.     | *Coleus forskohlii* (Willd.) Briq. | E      | [67]       | PE        |
|                |             | *Mentha piperita* L.                   | *Mentha piperita* L.  | E      | [3]        | PB        |
|                |             | *Mentha viridis* (L.) L.               | *Mentha spicata* L.   | E      | [69]       | BA        |
| Hortelã grauda| Lamiaceae   | *Plectranthus amboinicus* (Lour.) Spreng | *Plectranthus amboinicus* (Lour.) Spreng | E      | [3, 53, 56, 69] | PE, PB, BA |
| Limão          | Rutaceae    | *Citrus aurantiifolia* (Christm.) Swingle | *Citrus aurantium* L. | E      | [9]        | CE        |
|                |             | *Citrus limonia* (L.) Osbeck           | *Citrus medica* L.    | E      | [56, 66, 69, 78, 79, 81, 84, 92, 99] | PE, CE, MA, RN, BA |
| Macela         | Arecaceae   | *Egletes viscosa* (L.) Less.           | *Egletes viscosa* (L.) Less. | E      | [1, 3, 9, 11, 53, 59, 67, 72, 75, 78, 84, 88, 101] | PE, PB, SE, CE, RN, BA |
|                | Asteraceae  | *Achyrocline satureoides* (Lam.) DC.   | *Achyrocline satureoides* (Lam.) DC. | N      | [81, 99]   | BA        |
|                | Lamiaceae   | *Hyptis martiusii* Benth.              | *Hyptis martiusii* Benth. | N      | [80]       | BA        |
| Malicia        | Fabaceae    | *Mimosa invisa* Mart. ex Colla Schrankia leptoarpa DC. | *Mimosa invisa* Mart. ex Colla Schrankia leptoarpa DC. | N      | [56]       | PE        |
|                |             | *Mimosa candollei* R. Grether          | *Mimosa candollei* R. Grether | N      | [56]       | PE        |
|                |             | *Mimosa misera* Benth.                 | *Mimosa misera* Benth. | N      | [90]       | RN        |
|                |             | *Mimosa somnians* Humb. and Bonpl. ex Willd. | *Mimosa somnians* Humb. and Bonpl. ex Willd. | N      | [85]       | PB        |
|                |             | *Mimosa pudica* L.                     | *Mimosa pudica* L.    | N      | [78]       | CE        |
| Malva          | Sterculiaceae | *Piriqueta racemosa* (Jacq.) Sweet Melochia tomentosa L. | *Piriqueta racemosa* (Jacq.) Sweet Melochia tomentosa L. | N      | [95]       | SE        |
|                |             | *Waltheria indica* L.                  | *Waltheria indica* L.  | N      | [75]       | PE        |
|                |             | *Waltheria americana* L.               | *Waltheria americana* L. | N      | [78]       | CE        |
|                | Lamiaceae   | *Piriqueta guianensis* N. E. Br. Plectranthus barbatus Andrews | *Piriqueta guianensis* N. E. Br. Plectranthus barbatus Andrews | E      | [55]       | CE        |
|                | Malvaceae   | *Malva sylvestris* L.                  | *Malva sylvestris* L. | E      | [81, 99]   | RN        |
|                |             | *Sida linifolia* Cav.                  | *Sida linifolia* Cav. | N      | [89]       | PB        |
| Manga espada  | Anacardiaceae | *Mangifera indica* L.                  | *Mangifera indica* L. | E      | [52, 69, 76] | PE        |
| Capitâoçoelho | Gonophreniaceae | *Gomphrena demissa* Mart.             | *Gomphrena demissa* Mart. | N      | [54, 59, 62, 71, 77] | PB, RN     |
| Malva rosa    | Sterculiaceae | *Melochia tomentosa* L.                | *Melochia tomentosa* L. | N      | [3]        | PB        |
|                | Geraniaceae | *Geranium erodifolium* L.              | *Geranium erodifolium* L. | E      | [53]       | PE        |
|                | Malvaceae   | *Alcea rosea* L.                       | *Althaea rosea* L. Cav. | E      | [100]      | PB        |
|                |             | *Urena lobata* L.                      | *Urena lobata* L.     | N      | [1, 11, 93] | PE        |
| Malva branca  | Sterculiaceae | *Waltheria rotundifolia* Schrank Sida cordifolia L. | *Waltheria rotundifolia* Schrank Sida cordifolia L. | N      | [3, 57, 60, 67, 69, 88] | PE, PB, CE, PI, BA |
|                | Malvaceae   | *Sida galheirensis* Ulbr.              | *Sida galheirensis* Ulbr. | N      | [77]       | PB        |
| Vernacular name | Family                  | Scientific name in the original source | Valid scientific name | Origin | Literature | State |
|----------------|-------------------------|----------------------------------------|-----------------------|--------|------------|-------|
| Manjerião      | Lamiaceae               | Ocimum basilicum L.                    | Ocimum basilicum L.   | E      | [3, 53, 55, 65, 67, 69, 72, 76, 78, 79, 81, 94, 101] | PE, PB, SE, CE, RN, BA |
|                |                         | Ocimum americanum L.                   | Ocimum americanum L.  | E      | [57, 78, 83, 93]          | PE, CE, PI, BA |
|                |                         | Ocimum minimum L.                      | Ocimum minimum L.     | E      | [68]        | MA    |
|                |                         | Ocimum sanctum L.                      | Ocimum tenelliflorum L.| E      | [84]        | BA    |
| Mastruz        | Chenopodiaceae          | Chenopodium ambrosioides L.            | Chenopodium ambrosioides L. | E      | [1, 3, 9, 11, 52, 53, 55–57, 59, 61–63, 66–69, 72, 75, 76–81, 83, 92–94, 100] | PE, PB, CE, PI, MA, RN, BA |
| Melão de São Caetano | Cucurbitaceae       | Momordica charantia L.                  | Momordica charantia L. | E      | [53, 55–57, 60, 66, 72, 75, 76, 79, 83–85, 90, 92, 94, 99] | PE, PB, CE, PI, MA, RN, BA |
| Mufumbo        | Combretaceae            | Combretum fruticosum (Loefl.) Stuntz    | Combretum fruticosum (Loefl.) Stuntz | N      | [57, 70] | PB, PI |
|                |                        | Combretum leprosum Mart.               | Combretum leprosum Mart. | N      | [62, 71, 90] | PB, RN |
|                |                        | Combretum mellifluum Eichler           | Combretum mellifluum Eichler | N      | [61]      | MA    |
| Mutamba        | Sterculiaceae           | Guazuma ulmifolia Lam.                 | Guazuma ulmifolia Lam. | N      | [1, 11, 54, 56, 66, 69, 82, 85, 86, 94] | PE, PB, MA, BA |
|                | Ulmaceae                | Trema micrantha (L.) Blume             | Trema micrantha (L.) Blume | N      | [74]       | PI    |
| Pereiro        | Apocynaceae             | Aspidosperma parvifolium A. DC.        | Aspidosperma parvifolium A. DC. | N      | [3, 52, 53, 58, 59, 62, 63, 70, 73–77, 80, 88, 95] | PE, PB, SE, PI, RN, BA |
|                | Tiliaceae               | Luehea ochrophylla Mart.               | Luehea ochrophylla Mart. | N      | [94]       | PE    |
| Pega pinti     | Nyctaginaceae           | Boerhavia diffusa L.                   | Boerhavia diffusa L.   | E      | [1, 3, 9, 11, 52, 53, 57, 59, 61, 63, 75, 76, 79, 90, 93–95] | PE, PB, SE, CE, PI, MA, RN |
| Pitanga        | Myrtaceae               | Eugenia uniflora L.                    | Eugenia uniflora L.    | N      | [11, 52, 56, 63, 67, 69, 75, 76, 78, 79, 83, 93, 94] | PE, CE, BA |
|                |                        | Eugenia pitanga (O. Berg) Kiaersk.     | Eugenia pluriflora DC. | N      | [84]       | BA    |
| Pinhão roxo    | Euphorbiaceae           | Jatropha gossypifolia L.                | Jatropha gossypifolia L. | N      | [56, 57, 69, 71, 75, 76, 78, 99] | PE, PR, CE, PI, RN, BA |
| Poejo          | Lamiaceae               | Mentha pulegium L.                     | Mentha pulegium L.     | E      | [53, 67, 83, 93] | PE, BA |
| Quebra faca    | Euphorbiaceae           | Croton conduplicatus Kunth             | Croton conduplicatus Kunth | N      | [9]       | CE    |
|                |                        | Croton rhamnifolius Wild.              | Croton rhamnifolius Kunth | N      | [53]      | PE    |
|                |                        | Croton rhamnifolius Baill.             | Croton rhamnifolius Baill. | N      | [60]      | CE    |
| Vernacular name | Family     | Scientific name in the original source                  | Valid scientific name                  | Origin | Literature | State   |
|----------------|------------|--------------------------------------------------------|----------------------------------------|--------|------------|---------|
| Quiabo         | Malvaceae  | *Hibiscus esculentus* L. *Abelmoschus esculentus* (L.) Moench | *Abelmoschus esculentus* (L.) Moench | E      | [53, 55, 66, 67, 76, 78, 84] | PE, CE, MA, BA |
|                |            | *Coutarea hexandra* (Jacq.) K. Schum. *Cinchona calisaya* Wedd. | *Coutarea hexandra* (Jacq.) K. Schum. *Cinchona officinalis* L. | N      | [9, 53, 58, 69, 71, 76, 86, 94] | PE, PB, SE, CE, BA |
|                |            | *Quassia amara* L. *Chiococca brachiata* Ruiz and Pav. | *Quassia amara* L. *Chiococca alba* (L.) Hitchc. | N      | [66]       | MA      |
|                |            |                                                        |                                        | N      | [68]       | MA      |
|                |            |                                                        |                                        | N      | [80]       | BA      |
| Quina          | Rubiaceae  |                                                         |                                        | N      | [9, 53, 58, 69, 71, 76, 86, 94] | PE, PB, SE, CE, BA |
| Simaroubaceae  |           |                                                        |                                        | N      | [80]       | BA      |
| Rubiaceae      |            |                                                        |                                        | N      | [66]       | MA      |
| Romã           | Punicaceae | *Punica granatum* L.                                   | *Punica granatum* L.                  | E      | [3, 9, 53–55, 57, 61, 63, 65, 68, 69, 72, 76, 78, 79, 81, 83, 93, 99, 100] | PE, PB, CE, PI, MA, RN, BA |
| Saimão         | Crassulaceae| *Kalanchoe brasilensis* Cambess.                        | *Kalanchoe brasilensis* Cambess.      | E      | [3, 53, 72] | PE, PB  |
| Salsa          | Convolvulaceae| *Ipomoea asarifolia* (Desr.) Roem. and Schult. | *Ipomoea asarifolia* (Desr.) Roem. and Schult. | N      | [11, 56, 57, 59, 60, 65, 78, 85, 89] | PE, PB, CE, PI, RN |
|                | Apliaceae  | *Petroselinum crispum* (Mill.) Fuss *Petroselinum sativum* Hoffm. | *Petroselinum crispum* (Mill.) Fuss *Petroselinum sativum* Hoffm. | E      | [67]       | BA      |
|                |            |                                                        |                                        | E      | [84]       | BA      |
| Sambucaitá     | Lamiaceae  | *Hyptis pectinata* (L.) Poit. *Hyptis suaveolens* (L.) Poit. *Hyptis mutabilis* (Rich.) Briq. | *Hyptis pectinata* (L.) Poit. *Hyptis suaveolens* (L.) Poit. *Hyptis mutabilis* (Rich.) Briq. | N      | [58, 80, 93] | PE, SE, BA |
| Sena           | Fabaceae   | *Senna acutiloba* Link *Senna corymbosa* (Lam.) H. S. Irwin and Barneby | *Senna alexandrina* Mill *Senna corymbosa* (Lam.) H. S. Irwin and Barneby | N      | [53]       | PE      |
|                |            | *Senna martiana* (Benth.) H. S. Irwin and Barneby *Tephrosia purpurea* (L.) Pers. | *Senna martiana* (Benth.) H. S. Irwin and Barneby *Tephrosia purpurea* (L.) Pers. | N      | [94]       | PE      |
|                |            |                                                        |                                        | N      | [69]       | BA      |
| Sucupira       | Fabaceae   | *Bowdichia virgilioides* Kunth *Bowdichia nitida* Spruce ex Benth. | *Bowdichia virgilioides* Kunth *Bowdichia nitida* Spruce ex Benth. | N      | [1, 11, 56, 76, 86, 89, 98] | PE, PB, CE |
|                |            |                                                        |                                        | N      | [68]       | MA      |
| Tamarino       | Fabaceae   | *Tamarindus indica* L.                                  | *Tamarindus indica* L.                | E      | [9, 11, 56, 57, 61, 63, 72, 83, 84, 92, 93] | PE, PB, CE, PI, MA, BA |
| Guiné          | Phylolaccae | *Pétiveria alliacea* L. *Pétiveria tetrandra* B. A. Gomes | *Pétiveria alliacea* L. *Pétiveria tetrandra* B. A. Gomes | N      | [53, 72, 84] | PE, PB, BA |
|                |            |                                                        |                                        | N      | [79]       | BA      |
| Uruçum         | Bixaceae   | *Bixa orellana* L.                                     | *Bixa orellana* L.                    | N      | [9, 53, 55, 61, 66, 69, 78, 81, 83, 84, 92] | PE, CE, MA, RN, BA |
| Tiririca       | Cyperaceae | *Cyperus ligularis* L. *Cyperus surinamensis* Rotth. *Fimbristylis dichotoma* (L.) Vahl *Fimbristylis litoralis* Gaudich. | *Cyperus ligularis* L. *Cyperus surinamensis* Rotth. *Fimbristylis dichotoma* (L.) Vahl *Fimbristylis litoralis* Gaudich. | N      | [95]       | SE      |
|                |            |                                                        |                                        | N      | [95]       | SE      |
|                |            |                                                        |                                        | N      | [95]       | SE      |
| Vernacular name | Family       | Scientific name in the original source | Valid scientific name | Origin | Literature | State |
|-----------------|--------------|----------------------------------------|-----------------------|--------|------------|-------|
| **Junco**       | Cyperaceae   | *Eleocharis interstincta* (Vahl) Roem. and Schult. | *Eleocharis interstincta* (Vahl) Roem. and Schult. | N      | [56]       | PE    |
|                 |              | *Eleocharis elegans* (Kunth) Roem. and Schult. | *Eleocharis elegans* (Kunth) Roem. and Schult. | N      | [60]       | CE    |
|                 |              | *Cyperus articulatus* L. | *Cyperus articulatus* L. | N      | [59]       | RN    |
|                 |              | *Cyperus esculentus* L. | *Cyperus esculentus* L. | N      | [54]       | PB    |
| **Tomate**      | Solanaceae   | *Lycopersicon esculentum* Mill., *Physalis ixocarpa* Brotn. ex Hornem. | *Solanum lycopersicum* L. | E      | [56, 57, 67, 93, 99] | PE, PI, RN |
| **Trapiá**      | Capparidaceae | *Crataeva tapia* L. | *Crataeva tapia* L. | E      | [53, 57, 66, 70, 73, 75] | PE, PB, PI, MA |
| **Urtiga branca** | Euphorbiaceae | *Cnidoscolus urens* (L.) Arthur | *Cnidoscolus urens* (L.) Arthur | N      | [1, 11, 53, 56, 59, 71] | PE, PB, RN |
|                 |              | *Cnidoscolus phylacanthus* (Mull. Arg.) Pax and L. Hoffm. | *Cnidoscolus phylacanthus* (Mull. Arg.) Pax and L. Hoffm. | N      | [76]       | PE    |
|                 |              | *Cnidoscolus infestus* Pax and K. Hoffm. | *Cnidoscolus infestus* Pax and K. Hoffm. | N      | [77]       | PB    |
|                 |              | *Lamium album* L. | *Lamium album* L. | E      | [100]      | PB    |
|                 |              | *Aosa rupestris* (Gardner) Weigend | *Aosa rupestris* (Gardner) Weigend | N      | [77]       | PB    |
|                 |              | *Urtica urens* L. | *Urtica urens* L. | E      | [54]       | PB    |
| **Jurema branca** | Fabaceae     | *Piptadenia stipulacea* (Benth.) Ducke | *Piptadenia stipulacea* (Benth.) Ducke | N      | [3, 11, 60, 90] | PE, PB, CE, RN |
|                 |              | *Senegaia piuhiensis* (Benth.) Seigler and Ebinger | *Senegaia piuhiensis* (Benth.) Seigler and Ebinger | N      | [58]       | SE    |
|                 |              | *Calliandra spinosa* Ducke | *Calliandra spinosa* Ducke | N      | [90]       | RN    |
|                 |              | *Mimosa ophthalmocebra* Mart. ex Benth. | *Mimosa ophthalmocebra* Mart. ex Benth. | N      | [85]       | PB    |
|                 |              | *Mimosa tenuiflora* (Willd.) Poir. | *Mimosa tenuiflora* (Willd.) Poir. | N      | [95]       | SE    |
|                 |              | *Acacia farnesiana* (L.) Willd. | *Vachellia farnesiana* (L.) Wight and Arn. | N      | [63, 73]   | PE    |
| **Jurema preta** | Fabaceae     | *Mimosa tenuiflora* (Willd.) Poir. | *Mimosa tenuiflora* (Willd.) Poir. | N      | [1, 3, 9, 11, 52, 53, 58–60, 63, 70–73, 75, 79–81, 85, 93, 95] | PE, PB, SE, CE, RN, BA |
|                 |              | *Mimosa acutistipula* (Mart.) Benth. | *Mimosa acutistipula* (Mart.) Benth. | N      | [54]       | PB    |
| **Jurubeba branca** | Solanaceae  | *Solanum rhytidoandrum* Sendtn. | *Solanum rhytidoandrum* Sendtn. | N      | [58, 77, 88] | PB, SE |
|                 |              | *Solanum polytrichum* Moric. | *Solanum polytrichum* Moric. | N      | [82]       | BA    |
|                 |              | *Solanum stipulaceum* Roem. and Schult. | *Solanum stipulaceum* Roem. and Schult. | N      | [60]       | CE    |
|                 |              | *Solanum albido Dunal* | *Solanum albido Dunal* | E      | [55]       | CE    |
| **Imburana de cheiro** | Fabaceae  | *Amburana cearensis* (Allemão) A. C. Sm. | *Amburana cearensis* (Allemão) A. C. Sm. | N      | [1, 52, 57, 60, 63, 67, 72, 76, 77, 92] | PE, PB, CE, PI |
|                 |              | *Myracrodruon urundeva* Allemão | *Myracrodruon urundeva* Allemão | N      | [53]       | PE    |

PE: Pernambuco, PB: Paraíba, SE: Sergipe, CE: Ceará, RN: Rio Grande do Norte, BA: Bahia, MA: Maranhão, PI: Piauí.
important tool because it might point to the possible patterns of substitution of homonym ethnospecies in a given area. In the case of northeast Brazil, 75% of the plants traded in regional public markets exhibit correspondence with more than one plant species.

As most (74%) such species are representative of the native flora, we might infer that the regional markets are largely supplied by natural stocks. Because the demand for medicinal plants is continuously increasing [2], the gradual exhaustion or scarcity of resources might make the substitution of homonym ethnospecies unavoidable and increasingly more frequent, particularly in the large cities where 70% of the population resides [34] and where access to medicinal plants is primarily mediated by commerce.

Precisely for that reason, it is safe to assert that semantic plurality is manifested most frequently at the public markets of large cities, which are privileged spaces where significant amounts of people, products, and knowledge circulate on a daily basis. Thus, such markets afford an extremely favorable scenario for comparative ethnobotanical studies at a regional level.

In recent years, ethnobotanical research in regional public markets has provided an important platform for conservation studies and biological prospecting. However, the limitations to species identification represent the major hindrance to the growth of research in such locations [6] as well as to the assessment of hidden diversity and events of homonym ethnospecies substitution, as most of the plants are sold in parts or pieces that are sometimes completely uncharacteristic.

For that reason, homonym ethnospecies go easily unnoticed when commercial medicinal species are cataloged, the more so the more remarkable the morphological similarities are. In this regard, 61.3% of the hidden diversity of the medicinal plants of the northeast region is conspecific, that is, exhibits type I underdifferentiation, which denotes phylogenetic proximity and consequently morphological similarity [102]. This similarity makes the understanding of the ethnobotanical data collected at public markets even more difficult.

To prevent this situation, the criteria adopted for the identification of species by some studies conducted in regional public markets are based on the vernacular nomenclature, sometimes as a complementary identifier [12, 103] and other times as the primary criterion [6]. In places where the catalog of medicinal plants and the data relative to their biodiversity are comprehensive, common names might possibly be used quite safely. However, this is definitely not the case in Brazil, where the repertoire of medicinal plants in these marketing spaces is largely a hidden diversity.

Additionally, due to the explicit difficulty of recognizing and identifying the plant species in public markets and the progressive increase in the substitution of homonym ethnospecies, the vulnerability of consumers tends to become more serious, and possible risks related to safety and efficacy might be potentiated when one species is indistinctly replaced with another. This phenomenon occurs because most of the Brazilian medicinal plant species have not yet been subjected to appropriate studies that would establish their use in a scientifically safe manner, so to speak, that is, describing their side effects, contraindications, toxicity, and effective therapeutic action.

Because the only plant material available for species identification is that sold at the markets, whereas the harvesting sites are usually inaccessible due to their distance or the unavailability or mistrust of the harvesters—as a large part of harvesting is indiscriminate—the resolution of this impasse necessarily demands more specialized taxonomic procedures, such as micrography and molecular taxonomy.

In this regard, several techniques have been widely applied to the resolution of this type of taxonomic problem [14, 15, 104–106], to support scientific research and as a tool for the surveillance and control of commercial plant and animal products. Barcoding is one of the most promising among such techniques and has already been applied to the identification of plant species in public markets [107]. This technique consists of the identification of species based on the differentiation of genetic sequences in specific DNA regions [108].

The use of molecular taxonomy might in time become a very important and practical tool for cataloging the hidden diversity in public markets and thus contribute to a better understanding of the biodiversity flow in a given area and, consequently, the frequency with which homonym ethnospecies are being interchangeably used in public markets. A reliable cataloging of this biodiversity affords multiple possibilities for further biological and cultural studies and must be considered as crucial for the advancement of ethnobotanical research.

4.2. Implications for Conservation. From the perspective of conservation at the regional level, one should not ignore the hidden diversity of medicinal plants, as this diversity represents the possible variations in the range of species that are effectively used relative to the multiplicity of homonym ethnospecies and the biological diversity of a given area. On such grounds, one might infer that the larger the number of homonym ethnospecies, the higher the odds that the pressure of use is, or might eventually become, distributed among more than one plant population, as in our study where a significant number of native homonym ethnospecies (74%) was found.

When, conversely, the frequency of use predominantly affects one species, the risks are patently greater for the species affected but also for others with the same vernacular name, as due to substitution, those others might become subjected to an intense and fast extractivist pressure that compromises their resilience, particularly in the case of the most vulnerable populations, leading to their collapse.

The species *Myracrodruon urundeuva* provides a good example of the possible impact of the extractivist pressure on more than one plant population. In this case, another species, *Schinus terebinthifolius*, which is also native and belongs to the same family, is currently traded under the same generic name (“*aroeira*”—Brazilian peppertree) in the city of Recife [1]. Therefore, these species are interchangeably used, even though they belong to different genera, as the used parts do not allow for a clear differentiation.

It is possible that such homonym ethnospecies are being overlapped in an unconscious and undocumented manner at
the points of sale, especially in the case of populations that are no longer easily found in their natural reservoirs and that precisely for that reason are subjected to substitution processes. For example, the case of “espinheira santa” (Maytenus ilicifolia), which following its long-term indiscriminate harvesting became a threatened species [109] and is associated with several substitute species that currently occupy the same semantic-therapeutic niche [110].

This type of approach must be taken into account upon establishing conservation priorities and efficient management strategies, as accurate knowledge of the hidden diversity of medicinal plants and the possibilities for efficient exchanges among homonym ethnospecies might favor a more balanced distribution of the extractivist pressure, thus minimizing its impact, avoiding the collapse of populations and promoting greater resilience.

The applicability of hidden substitutions of species to biological conservation is thus in keeping with explicative models related to the utilitarian redundancy hypothesis [52], according to which a larger number of species within one utilitarian category leads to greater mutual support and protection of the associated species as well as increased resilience.

Thus, we might assert that the phenomenon of the hidden diversity of medicinal plants gives support to utilitarian redundancy as an explanatory model for the pressure of use, as the overlapping species are subsumed under one and the same identity and consequently the same therapeutic indications, as their corresponding practical value is culturally well established.

Because, based on the strength of tradition, the homonym ethnospecies are functional analogs, the remaining task is to distinguish each one of them and establish the level at which the preference for and/or access to each particular species occurs and then to define the degree of utilitarian redundancy, which is also hidden, so to speak. For that purpose, once again the elaboration of a taxonomically reliable record of this biodiversity is required.

Within that context, the assessment of hidden and redundant biodiversity becomes an important predictive ecological tool, as a function of the perfect semantic-therapeutic juxtaposition of the homonym ethnospecies at the regional level. Public policies for the conservation, regulation, control, and use of medicinal plants in Brazil should not ignore the regional level and its implicit cultural and biological richness [111–113]. From this perspective, comparative ethnobotany will become an indispensable tool in decision making and actions aimed at the sustainable use of biodiversity.

4.3. Implications for Bioprospecting. Several studies [114–116] have found similar biochemical compositions in related species, which might point to similar uses within the range of applications already well established by tradition. The biochemical constitutions of species in the same family quite commonly include the same pattern of secondary components [114]. Nevertheless, the therapeutic efficacy and the risks associated with the use of the vast majority of species acknowledged as medicinal by the population have not yet been assessed [117]. With regard to the medicinal species whose safety and efficacy have been demonstrated, ethnobotanical studies that include their hidden diversity might contribute to the identification of more efficacious species as well as of those more promptly available for consumption.

Therefore, the identification of homonym species with similar uses might not only reduce the pressure of use on the natural reservoirs but also allow for easier and more encompassing access for a larger number of people. In this regard, it is worth stressing that to be efficient, public policies addressing access to medicinal plants must take into consideration the natural distribution of the species, when it is spontaneous, and the limits of its ecophysiological tolerance, in the case of cultivated species. The identification of homonym species might represent an alternative in both cases.

Recently, the Brazilian government published a list of 71 medicinal plant species recommended for use by the Unified Health System (Sistema Único de Saúde—SUS) [118]. As a function of the continental size of Brazil and its environmental diversity, the distributions of some of these medicinal species are not homogeneous across all regions. Species typical of the south and southeast regions are hardly found in the north and northeast regions, and vice versa. Therefore, in both cases, there are homonym ethnospecies occupying the same semantic-therapeutic niche of many species in the corresponding region.

The case of Uncaria tomentosa is exemplary. This plant, native to Amazonia (north region), is commonly known as “unha de gato” (cat’s claw) and acknowledged for its remarkable anti-inflammatory activity. Although it was included in the SUS list, access to this plant is extremely restricted in other Brazilian regions, which, however, will not prevent the emergence of other types of “cat’s claw.” There are at least six different species known as “cat’s claw” in the northeast region alone, five of which are native and one subspontaneous, corresponding to four different families, thus denoting the generality of the common name and the particularity of the biological expression.

According to Albuquerque and Hanazaki [119] one of the basic rules in biological prospecting is to identify the criteria used by people to select plants for medicinal use. According to those authors, the process underlying such selection might point to more efficacious strategies and shortcuts for the identification of key species relevant to bioprospecting.

A preliminary assessment of the distributions of the ethnospecies in the present study indicated that several species, including exotic ones established centuries ago, have corresponding homonym ethnospecies from the local flora. This is the case for cinnamon, watercress, elder tree, artichoke, clove basil, plum, and rosemary, among others (see Table 1). Such correspondences were also found when medicinal plant species were compared with the names of drugs (generic and trademarks names) with widely acknowledged therapeutic effects, such as Meracilina, penicillin, Novalgina, aspirin, Terramycin, and ampicillin, among others [9, 11, 24, 93, 120, 121]. In such cases, the species is named after its corresponding drug name, thus representing a flagrant instance of classification based on analogical use.
Similarly, based on the wide variety and distribution of homonym ethnospecies, we might infer that the development of knowledge at the local level seeks to subsume the available biodiversity under the already established and culturally consolidated semantic-therapeutic patterns. For that reason, when key species with high cultural relevance are absent, the communities tend to opt for species substitutions [52].

As a function of the existence of semantic-therapeutic niches and the impossibility of filling them with traditionally acknowledged species, an analogy-based local process appears to be triggered. According to the available data, several mechanisms of cultural selection are operative in this analogy-based local process, whereby the most fitting pieces of local knowledge become prevalent and amplified across the community, pointing to the locally accessible species, which thus come to be used as corresponding (homonym) ethnospecies. This hypothesis is corroborated by the high frequency of homonym ethnospecies representing the native flora (73%).

Comparative ethnobotanical studies of different regions might eventually elucidate the possible role of vernacular names as models for the manifestation of the expression of local biodiversity or the measure and circumstances under which a peculiar regional classification system tends to prevail at the expense of allochthonous and/or general systems. In addition, the identification of the level of semantic similarity of species at the local level might contribute to a better understanding of the process of construction of local/regional knowledge and make the planning of the use, prospection, and conservation of these resources more efficient [122].

5. Conclusions

Regardless of being a frequent process, affecting either some or the full set of species of a given region, the substitution of homonym ethnospecies denotes a novel consumption option for a well-established cultural practice involving limited products within a commercial niche consolidated by tradition. For that reason, even where the level, frequency, and circumstances under which such substitutions occur might not be identified in the near future, some relevant questions have already been raised. Such questions, which might contribute to optimizing the use of medicinal plants in a safe and more sustainable manner, include the following.

(1) How might the homonym species be alternately used for the same therapeutic action and how efficacious are they?
(2) For which homonym ethnospecies might divergent uses, absence, or differences in the level of therapeutic efficacy be currently listed?
(3) What are the health risks to people who, either travelling or at their original place of residence, indiscriminately consume different species subsumed under the same common name?
(4) What tools might be created to support consumers and researchers in the understanding and interpretation of the semantic plurality associated with medicinal plants?
(5) Which bioprospecting actions and management plans have taken the hidden diversity of species at the regional level into consideration?

The fact that a significant percentage of the common names of plants in the Brazilian northeast region exhibits correspondences to multiple species is irrevocably established. A more thorough understanding of the dynamics and dimensions of such semantic-biological variability and the corresponding implications requires the integration of several areas of knowledge, including taxonomy, biochemistry, population ecology, phytosociology, linguistics, and anthropology.

The proportion of species found by ethnospecies (2.78) was significant, although we recognize that a more comprehensive coverage of markets and fairs in the nine northeastern states could lead to an increase of this proportion or even the emergence of new ethnospecies not listed in this survey. To what concerns the low number of respondents committed to the study, in all the six markets visited, it should be clarified that the purpose of the field survey was to catalogue ethnospecies currently marketed in order to support the identification of the corresponding species through the literature search.

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