The use of medicinal plants by the population from the Protected Landscape of “Serra de Montejunto”, Portugal

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Abstract

Background: Traditional medicine has an important role in local communities, who use plants in the treatment of various diseases. The research of traditional uses of medicinal plants allows us to document and analyze ethnopharmacological practices. This paper reports on an ethnobotanical survey that was conducted in the Protected Landscape of the “Serra de Montejunto”, a Portuguese area in the west of the Iberian Peninsula, where these studies were nonexistent.

Methods: The information was obtained through semi-structured ethnobotanical interviews with 78 informants, who were selected from several zones from the study area to have a representative of the entire landscape, during 2014. Local medicinal uses of plants were identified and grouped into 10 categories through data analysis, in quantitative indices such as the relative frequency citation (RFC), the cultural importance index (CI), and the informant consensus factor (FC). These were used to evaluate the importance of medicinal plants to the locals.

Results: In the fieldwork, we found 105 taxa used as medicinal plants which belong to 46 families, where Rosaceae, Asteraceae, Fabaceae, and Lamiaceae are the ones with more diversity. The plants were grouped into 10 categories, where the digestive category is the most cited, with 54 taxa, and the ophthalmological category is the less cited, with only one taxon. Leaves and aerial parts are the components most used. Infusion is the most reported form of preparation, along with the oral administration. Most plants referred in this study are still in use today; only 17 are no longer used at the present time because habits have changed. A catalog of medicinal plants was also drawn up.

Conclusion: This work enabled us to explore once more our experiences and memories as well as the ancestral use of plants with the goal of expanding ethnopharmacological knowledge. The absence of ethnobotanical studies in this region led us to gather information about useful plants and their applications and benefits. This research helps in the conservation effort of the collective knowledge of medicinal plants for future generations. However, a detailed analysis by body system is still required.

Keywords: Ethnobotany, Medicinal plants, Ethnopharmacology, Protected Landscape of “Serra de Montejunto”, Portugal

Background

Plants have been used since ancient times by humans. Several purposes have been served by them such as food, spices, medicine, ritual components. The knowledge of plants and their benefits have been accumulated and passed on through the generations, through writing or memory. While some knowledge has been lost other has endured to present days and is still in use.

The scientific discipline dedicated to the relationship between man and the use of plants is called ethnobotany [1]. The American botanist John W. Harshberger coined the term “ethnobotany” in 1985 to describe studies of “plants used by primitive and aboriginal people” and in his 1896 publication, The purposes of ethno-botany, [2], he suggested “ethnobotany” be a field which elucidates the “cultural position of the tribes who used the plants for food, shelter or clothing,” generally accepted as a
starting point for this field as an academic discipline [3]. Therefore, ethnobotany deals directly with the interrelationship between people and plants, including all forms of perception and appropriation of plant resources [4].

The human being has always tried to find in the plants that nature so lavishly offers sustenance as well as healing for various diseases that afflicted the course of its existence [5].

Plants have always been the primary source of treatment humanity used for disease and injury. Initially, they were used empirically, selected and tested. The knowledge of their effects and toxicity was then passed on. Through this process and collective memory, many plants are still used in the traditional way. The use of plants in therapy remains, worldwide, an important means of combating diseases. Medicinal herbal products in developing countries account for 80% of drugs used [6]. The same authors state that since 2002 the World Health Organization has launched its first global strategy on traditional medicine.

Several studies on the use and effects of medicinal plants have been conducted throughout the world with a marked increase in the Iberian Peninsula. In Portugal research on ethnobotanical projects was initiated by the Portuguese Institute for Nature Conservation and Forestry. The 2000’s study commissioned was titled: “Aromatic and/or Medicinal Plants in the National Network of Protected Areas”. In that study, the Protected Landscape of “Serra de Montejunto” was not featured. This article however focuses solely on that region.

While Portugal is a Mediterranean region due to its edaphoclimatic conditions, the country has a high phytodiversity and inherent resources with a high potential for medical purposes [6]. For some authors, the plants from the Mediterranean region have real medicinal potential [7]. With this work, we intended to verify that in the region studied, there is a great biodiversity and a documented use of medicinal plants.

**Methods**

**Study area**
The Portuguese Protected Area of “Serra de Montejunto” was created in 1999 [8] due to the national importance of its natural vegetation. It is located in the western part of the Iberian Peninsula (Portugal), comprised of 4897.39 ha and stretches over 15 km with a northeast (NE)–southwest (SW) orientation; is limited by the Cadaval municipality (East) and the Alenquer municipality (West); and is in the Lisbon District (Fig. 1). It is part of the Dividing Portuguese Sector integrated into the inner Mediterranean Region [9, 10], and in a biogeographic context, it is a Mediterranean bioclimate, with a mesomediterranean thermotype and subhumid to humid ombrotpe, according to the Rivas-Martinez Worldwide Bioclimatic Classification [11] and the Monteiro-Henriques maps [12].

This territory contains important biophysical characteristics resulting from its unique geography, in that the studied area, a large anticline of calcareous origin whose summit reaches an altitude of 666 m enjoys a privileged geographic location, between the coast and the Tagus Valley, encompassing the Montejunto and the Estrela mountainous, acting as a barrier to the oceanic influence, separating the rainiest part of the country from the driest. The Protected Landscape of the Montejunto Mountain, marked by millennia of anthropic action, still holds some vestiges of the primeval vegetation, which testify to the potential of the region’s plant life within the scope of the Arisaro Simorrhini-Quercetum Bròteroi oak forest. Concerned to the flora of Mediterranean influence, more than 750 taxa have been identified, divided by 91 botanical families, of which the *Asteraceae*, *Fabaceae*, *Poaceae*, and *Lamiaceae* families have more than a third of the floristic variety [13].

This is the specific area this work was conducted in and refers to as it explores the use of medicinal plants by the locals.

**Data collection**
The fieldwork was carried out in 2014, between March and December. Working with 78 informants, we obtained data about 105 medicinal taxa, belonging to 46 botanical families and a corresponding total of 2808 use-reports. The information obtained in the interviews was about wild or cultivated plants, which were obtained by the interviewees themselves or by their family, and purchased plants were never considered. Local medicinal uses were identified and grouped into 10 categories: circulatory, dermatological, digestive, neurological, ophthalmological, reproductive, respiratory, skeleton and muscles, urinary, and other uses.

In gathering the data for the project, we used semi-structured ethnobotanical interviews [1, 14] that, while informal, were acquiesced by the participants through oral agreement. The people interviewed, in their local language (Portuguese language), were either current or former residents of the area, selected because of their knowledge on the subject. Most were recommended by other locals when the topic came into question.

To complement the interviews and aid in the identification of the plants, the informants were presented with photograph portfolios and a herbarium created by the authors or invited to a field walk. Some were interviewed a second time in order to expand on the already compiled information.

This knowledge of ethnomedicinal plant uses was transmitted through oral traditions (parents or other relatives). Many of informants referred that this knowledge was also been complemented by personal experience (45) and the youngest informants reported other
sources, such as books (22), television, radio, or internet (20).

Of the total 78 interviewees, 55 were women. That represents 70% of the sample. The age of the sample varied from 19 to 94 years, averaging at 68 years old. Around 50% of this group was already retired. While four had higher education, the majority was not scientific literate, either not having gone to school or not having more than primary education (Table 1).

**Botanical identification**

All medicinal plants reported were identified using the following literature: Coutinho [15], Franco [16, 17], Franco and Rocha-Afonso [18–20], and Castroviejo et al. [21–36]. To compare the existing Portuguese local names, we used Rocha [37], Fernandes and Carvalho [38], and Arias [39], and the scientific names of plant species were confirmed in accordance with the International Index of Plant Name (http://www.ipni.org) and the Plant List database (http://www.theplantlist.org).

Voucher specimens were prepared and deposited in the Herbarium “João de Carvalho e Vasconcelos” of the “Instituto Superior de Agronomia” (LISI), University of Lisbon.

Most of these medicinal plants are part of the floristic inventory of the Protected Landscape of “Serra de Montejunto” [13].

**Ethnobotanical data analysis**

This study was conducted in order to obtain data about the medicinal plants used in the region, their local Portuguese names, their medicinal uses and applications, preparation, administration, condition (fresh or dried), if it is actually used (yes or no), and parts of the plant used.

The information obtained during the interviews, recorded in Table 2, was statistically analyzed. The reported plants were grouped into 10 categories, based on the body systems, each of which is divided into several subcategories, in accordance with the information gathered from the informants.

To establish a deeper pharmacological knowledge of this region, the data was also assessed using quantitative analysis, namely ethnobotanical richness (R), relative frequency

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**Table 1 Demographic details of 78 informants**

| Category          | Subcategory | Frequency |
|-------------------|-------------|----------|
| Gender            | Male        | 23 (30%) |
|                   | Female      | 55 (70%) |
| Age               | 50 or less  | 12 (15.4%) |
|                   | 51–60       | 8 (10.2%) |
|                   | 61–70       | 24 (30.8%) |
|                   | 71–80       | 21 (26.9%) |
|                   | 81 or more  | 13 (16.7%) |
| Education level   | Illiterate  | 21 (26.9%) |
|                   | Primary     | 29 (37.2%) |
|                   | Middle      | 15 (19.2%) |
|                   | Secondary   | 9 (11.6%) |
|                   | University  | 4 (5.1%) |
citation (RFC), cultural importance index (CI), and informant consensus factor \( F_{IC} \).

The quantitative data obtained allowed for solid comparisons with other similar studies.

**Ethnobotanical richness**
The ethnobotanical richness \( (R) \) is the number of useful medicinal species [40]. The result obtained will be compared with that of other equivalent studies carried out in Portugal [41–43].

**Relative frequency citation**
The relative frequency citation (RFC) is given by RFC = FC/\( N \), where FC is the total number of informants that referred to the *taxon* and \( N \) is the total number of informants. This index reveals the importance of each species [44].

**Cultural importance index**
The cultural index \( (CI) \) is given by CI = UR/\( N \), where UR (use-reports) is the use recorded for every *taxon* and \( N \) is the total number of informants. This index was used to estimate the cultural significance of each species, in other words, to verify, in quantitative terms, to what extent each species is present in the local culture and in the memory of the inhabitants in the study [45].

**Informant consensus factor**
The informant consensus factor \( F_{IC} \), testing homogeneity on the informant’s knowledge, is given by the ratio between the number of use-reports \( (n_{ur}) \) minus the number of *taxa* used \( (n_{u}) \) and the number of use-reports minus one, that is, \( F_{IC} = (n_{ur} - n_{u})/(n_{ur} - 1) \). A high value in this index (near to 1) indicates that there exist well-defined selection criteria for the species regarding a specific illness category on behalf of the informants and/or that they are in full agreement in using that species for a specific use, while a low index (near to 0) indicates the choice of the species was random and that there is no consensus among the informants on the medicinal use of the species [46]. The result will be compared with others known to Portugal [41, 43].

**Results and discussion**
**Diversity of medicinal plants and plant parts used**
In Table 2, we list the plants cited by a minimum of three different informants using the criteria of Le Grand and Wondergem and Johns et al., cited in Bonet et al., [47], organized in alphabetical order by the corresponding botanical families [46]. This table also contains other data such as categories and subcategories used, as well as methods of preparation and administration and voucher numbers.

The 10 botanical families with more *taxa* were *Rosaceae* (12 species), followed by *Asteraceae*, *Fabaceae* and *Lamiaceae* (eight species each), *Solanaceae* (seven), *Apiaceae* and *Poaceae* (four species each), *Brassicaceae*, and *Cucurbitaceae* and *Malvaceae* (three species each). The remaining 36 botanical families were represented by only one or two species. The most represented families coincide with those of other ethnobotanical studies in the Mediterranean area with this same methodology [41–43, 47–54].

These families predominate in local folk medicine, probably because they are widely represented in the local flora [47].

The 11 botanical families with more mentions were *Malvaceae* (504), *Lamiaceae* (220), *Rosaceae* (163), *Poaceae* (161), *Rutaceae* (151), *Asteraceae* (134), *Equisetaceae* (128), *Apiaceae* (100), *Amaryllidaceae* (97), *Oleaceae*, and *Solanaceae* (86 each). Note that botanical families with more *taxa*, mentioned above, are not necessarily the most cited.

As shown in Fig. 2, the plant parts used for medicinal proposes were in decreasing order: leaves, aerial part, flower, fruit, sap, seeds, lemon skin, root, silk, fruit pempduncles, bulb, latex, and onion skin. The section “other” integrated the parts that were mentioned less than 1% (also in decreasing order: tuber, orange skin, young shoots, juice, resin, olive oil, pericarp, stem, corn kernel, mesocarp, petals, and seed coat).

The leaves, with the highest percentage of use, were also the parts most cited in other similar ethnobotanical works [42, 43, 47–49, 52, 54]. According to Bonet et al. [47], the easy accessibility of the leaves is the reason why they were used most of the times for medicinal purposes.

In most cases, the plant parts were used singularly and sometimes as a combination of two or more parts. For example, the aerial part and flower of *Chamaemelum nobile* (L.) All. were both used for diuretic purposes, or the aerial part, flower, and leaves of *Borago officinalis* L. were used to lower fevers.

**Preparation and administration mode of medicinal plants**
The preparation of medicinal plants is done in several ways, such as alcohol maceration, cooking, direct application, direct ingestion, infusion, ointment, poultice, smoke, syrup, and vapors. The most commonly used preparations were infusions (70% approximately), direct applications (10% approximately), and vapors (with 7% approximately). The remaining applications have about 13% of predominance (see Fig. 3). The prime method of preparation was the infusion, which corroborates Bonet et al. [47].

It is also important to point out that in most cases, it is very difficult to separate the procedures of decoction and infusion [47], whereby we considered, in this paper, the second method, which is the main method of preparation for oral and external administration.

Also, we can see that water is the vehicle for almost all oral and external preparations and it was used in the
| Botanical family, scientific name | Local portuguese names | FC⁴ RFC⁵ | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | UR⁶ UR⁷ CF | Voucher number |
|----------------------------------|------------------------|---------|-------------|-------------|-------------|---------------|-----------|-----------|-----------|----------|----------------|
| **Amaranthaceae**                |                        |         |             |             |             |               |           |           |           |          |                |
| *Gomphrena globosa* L.           | Perpétuas-roxas         | 4 005   | Respiratory—hoarseness | Flower     | Infusion    | Oral          | Dried     | No        | 4         | 0 05     | LISI 406/2019  |
| **Amaryllidaceae**               |                        |         |             |             |             |               |           |           |           |          |                |
| *Allium cepa* L.                 | Cebola                 | 42 054  | Respiratory—bronchitis, cough, hoarseness, throat | Onion skin | Infusion, syrup (sugar maceration, some with lemon or orange skin, vapor) | Oral | Fresh or dried | Yes or no  | 44 51   | 0 65 | LISI 357/2019  |
|                                  |                        |         | Urinary—diuretic, urinary tract | Bulb       | Direct ingestion | Oral | Fresh     | Yes       | 3       |      |                |
|                                  |                        |         | Dermatological—furuncles          | Bulb       | Direct application | External | Fresh | Yes       | 2       |      |                |
|                                  |                        |         | Other—earache                      | Bulb       | Direct application | External | Fresh | Yes       | 2       |      |                |
| **Allium sativum** L.            | Alho, alho-comum       | 34 044  | Digestive—constipation             | Bulb       | Direct ingestion | Oral | Fresh or no | Yes or no | 8       |      |                |
|                                  |                        |         | Circulatory—blood pressure, blood purifier, cholesterol | Bulb       | Direct ingestion | Oral | Fresh or no | Yes or no | 8       |      |                |
|                                  |                        |         | Dermatological—cuts, furuncles, herpes, infection skin, insect bites, pimples, shingles, wounds, wounds on lips | Bulb | Direct application (some frying in olive oil or with oil from wheat) | External | Fresh | Yes or no | 27      |      |                |
|                                  |                        |         | Skeleton and muscles—rheumatism    | Bulb       | Alcohol maceration (some with black bryony), direct ingestion | External, oral | Fresh | Yes or no | 7       |      |                |
|                                  |                        |         | Other—earache                      | Bulb       | Direct application (frying in olive oil) | External | Fresh | Yes       | 2       |      |                |
| **Apiaceae** (Umbrelliferae)     |                        |         |             |             |             |               |           |           |           |          |                |
| *Coriandrum sativum* L.          | Coentros, coentro, coriandro | 4 005   | Urinary—diuretic                  | Aerial part | Direct ingestion | Oral | Fresh | Yes       | 4       | 0 05 | LISI 377/2019  |
| *Daucus carota* subsp. sativus (Hoffm.) Schübl. & G.Martens | Cenoura | 71 091 | Digestive—liver | Leaves | Infusion | Oral | Fresh | Yes       | 2       | 72 0 92 | LISI 408/2019  |
|                                  |                        |         | Respiratory—cold, cough           | Root | Syrup (sugar maceration, some with juice of lemon or blue chalk sticks) | Oral | Fresh | Yes or no | 70      |      |                |
| *Foeniculum vulgare* Mill.       | Funcha, fiôlho         | 7 009   | Digestive—digestion, intestines   | Aerial part, fruit, seeds | Infusion | Oral | Fresh or dried | Yes or no | 5       | 7 09 | LISI 69/2019   |
| *Petroselinum crispum* (Mill.)   | Salsa                  | 10 013  | Digestive—digestion, disinfectant of the digestive system, stomach | Aerial part | Infusion | Oral | Fresh or dried | Yes       | 6       | 17 0 22 | LISI 378/2019  |
**Table 2** Plants with medicinal uses reported by at least three informants (Continued)

| Botanical family, scientific name | Local portuguese names | FC<sup>a</sup> | RFC<sup>b</sup> | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | UR<sup>c</sup> | UR<sup>d</sup> | CF | Voucher number |
|----------------------------------|------------------------|------------|-------------|-------------|-------------|-------------|---------------|-----------|------------|-----------|---------------|---------------|----|----------------|
| **Asteraceae (Compositae)**      |                        |            |             |             |             |             |               |           |            |           |               |               |    |                |
| *Arctium minus* Bernh.           | Bardana, bardana--ordinária, pegamasso--menor | 3 004       | 6 0.08      | Digestive—liver, Circulatory—blood purifier | Root | Infusion | Oral | Fresh | Yes | 6 0.08 | LISI 379/2019 |
| *Chamaemelum nobilis* (L.) All.  | Macela, marcela, cabecinha-de-marcela, cabecinha-de-macela | 19 024      | 25 0.32     | Digestive—appetite, belly ache, digestion, parasites, stomach Urinary—diuretic Neurological—tranquillizer | Aerial part, flower Cooking (with bran), infusion Infusion Infusion | Oral or dried | Yes or no | 17 | 25 0.32 | LISI 70/2019 |
| *Lactuca sativa* L.              | Alface, alface-hortense | 4 005       | 4 0.05      | Neurological—tranquillizer | Leaves | Infusion | Oral | Fresh | Yes | 4 0.05 | LISI 359/2019 |
| *Leucanthemum sylvaticum* (Brot.) Nyman | Margarida-branca, bem-quer, margarida--maior | 3 004       | 3 0.04      | Circulatory—blood pressure | Aerial part | Infusion | Oral | Fresh or dried | Yes | 3 0.04 | LISI 71/2019 |
| *Matricaria recutita* L.         | Camomila, margãa, margacinha, matricária | 36 046      | 40 0.51     | Digestive—digestion, stomach Neurological—tranquillizer | Aerial part, flower Infusion Infusion | Oral | Fresh or dried | Yes | 8 0.51 | LISI 405/2019 |
| *Senecio serpens* G.D.Rowley     | Bálsamo | 40 051      | 42 0.54     | Respiratory—cough Dermatological—cicatrizing, insect bites, wounds | Leaves | Syrup (sugar maceration, some with carrot) Direct application, ointment (with olive oil and elderberry) | Oral | Fresh | Yes | 5 0.54 | LISI 360/2019 |
| *Silybum marianum* (L.) Gaertn.  | Cardo-leiteiro, cardo-mariano, cardo-de-santa-maria | 4 005       | 4 0.05      | Circulatory—blood purifier | Aerial part | Infusion | Oral | Dried | Yes | 4 0.05 | LISI 356/2019 |
| *Taraxacum officinale* F.H.Wigg. | Dente-de-leão, taráxaco | 7 009       | 10 0.13     | Digestive—intestines, liver Urinary—diuretic | Leaves, sap | Infusion Infusion | Oral | Fresh or no | Yes | 6 0.13 | LISI 120/2019 |
| **Boraginaceae**                 |                        |            |             |             |             |             |               |           |            |           |               |               |    |                |
| *Borago officinalis* L.          | Borragem, ervada-borragem, borago, chupa--mel | 10 013      | 11 0.14     | Respiratory—cold Dermatological—burns, infection skin, wounds | Aerial part | Infusion Direct application (some heated in the candle) | Oral | Fresh or dried | Yes | 2 0.14 | LISI 72/2019 |

<sup>a</sup> FC: Folk Concurrence; <sup>b</sup> RFC: Relative Folk Concurrence; <sup>c</sup> UR: Unique Reference; <sup>d</sup> UR: Unique Reference
| Botanical family, scientific name | Local portuguese names | Botanical family, scientific name | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | URc | URd | CF | Voucher number |
|-----------------------------------|------------------------|-----------------------------------|-------------|-------------|-------------|---------------|-----------|-----------|-----|-----|-----|----------------|
| **Brassicaceae ( Cruciferae)**    |                        |                                    |             |             |             |               |           |           |     |     |     |                 |
| **Brassica napus L.**             | Nabo, nabiça, colza     | 4 005                             | Respiratory—bronchitis, catarh, cough, whooping cough | Root        | Syrup       | Oral          | Fresh or dried | No 8 8 0.10 | LISI 361/2019 |
| **Brassica oleracea L.**          | Couve                  | 4 005                             | Digestive—stomach, ulcers | Leaves      | Direct ingestion (juice from leaves) | Oral          | Fresh No 4 4 0.05 | LISI 362/2019 |
| **Capsella bursa-pastoris (L.) Medik.** | Bolsa-de-pastor, erva-do-bom-pastor | 12 0.15                            | Digestive—intestines, stomach, blader, diuretic, kidney stone, urinary infection | Aerial part, fruit | Infusion | Oral          | Fresh or dried | No 4 20 0.26 | LISI 73/2019  |
| **Cactaceae**                     |                        |                                    |             |             |             |               |           |           |     |     |     |                 |
| **Opuntia maxima Mill.**          | Figueira-da-india, cato-dos-figos-da-india, figueira-da-barbária | 3 004                             | Respiratory—bronchitis, cough | Fruit, latex, leaves | Syrup       | Oral          | Fresh No 3 3 0.04 | LISI 380/2019 |
| **Caprifoliaceae**                |                        |                                    |             |             |             |               |           |           |     |     |     |                 |
| **Sambucus nigra L.**             | Sabugueiro, sabugo, sabugueiro-negro, sabugueiro-preto | 16 0.21                            | Respiratory—fluenza, urinary-bladder, diuretic, dermatological—furuncles, hair, infection skin, wounds | Flower, leaves | Infusion | Oral          | Fresh Yes 2 17 0.22 | LISI 74/2019  |
| **Caryophyllaceae**               |                        |                                    |             |             |             |               |           |           |     |     |     |                 |
| **Paronychia argentea Lam.**       | Ena-prata, ena-dos-unheiros, ena-dos-linheiros, paroniquia | 11 0.14                            | Digestive—stomach | Aerial part | Infusion    | Oral          | Yes or no | 8 11 0.14 | LISI 75/2019  |
| **Ostaceae**                      |                        |                                    |             |             |             |               |           |           |     |     |     |                 |
| **Tuberaria lignosa (Sweet) Samp.** | Erva-da-desinfeção, erva-da-infeção, alcar, enadas-túberas | 16 0.21                            | Dermatological—wounds | Aerial part, leaves | Infusion    | External      | Yes or no | Yes or no | 16 16 0.21 | LISI 76/2019  |
| **Cucurbitaceae**                 |                        |                                    |             |             |             |               |           |           |     |     |     |                 |
| **Citrus lanatus**                | Melancia, melanciêtra | 4 005                             | Urinary—diuretic | Fruit      | Direct ingestion | Oral          | Fresh Yes 4 4 0.05 | LISI 412/ |
| Botanical family, scientific name | Local portuguese names | FC | RFC | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | UR | UR² | Voucher number |
|----------------------------------|------------------------|----|-----|-------------|--------------|-------------|---------------|-----------|------------|-----|------|-----------------|
| Cucurbitaceae                     | Abóbora, aboboreira    | 5  | 0.06| Digestive—parasites, stomach | Fruit, seeds | Cooking (fruit pulp), direct ingestion | Oral | Fresh or dried | Yes | 3 | 5 | 0.06 | LISI 363/2019 |
| Euphorbiaceae                    | Pepino-de-são-gregório, pepineiro-de-são—gregório, pepineiro-bravo | 6   | 0.08| Respiratory—sinusitis | Fruit | Direct application | External | Fresh | No | 6 | 6 | 0.08 | LISI 78/2019 |
| Cupressaceae                      | Zimbro                 | 4  | 0.05| Urinary—diuretic | Fruit | Infusion | Oral | Dried | Yes | 4 | 4 | 0.05 | LISI 77/2019 |
| Dioscoreaceae                    | Bódanha, baganha, norca-prieta, uva-de-cão, arrebenta-boi | 43 | 0.55| Skeleton and muscles—rheumatism | Fruit | Alcohol maceration (some with garlic) | External | Fresh | Yes or no | 43 | 43 | 0.55 | LISI 79/2019 |
| Equisetaceae                     | Pinheirinha, cavalinha, cavalinha-dos—campos, erva-cavalinha, rabo-de-cavalo | 40 | 0.51| Digestive—intestines, liver | Aerial part | Infusion | Oral | Fresh or dried | Yes | 5 | 64 | 0.82 | LISI 80/2019 |
|  |  |  |  | Urinary—bladder, diuretic, kidneys, urinary infection, urinary tract | Aerial part | Infusion | External, oral | Fresh or dried | Yes | 36 | 8 | |
|  |  |  |  | Circulatory—blood pressure, blood purifier, cholesterol, diabetes, uric acid | Aerial part | Infusion | Oral | Fresh or dried | Yes | 8 | 3 | |
|  |  |  |  | Skeleton and muscles—mineralizing | Aerial part | Infusion | Oral | Fresh or dried | Yes | 12 | 3 | |
|  |  |  |  | Reproductive—gynecological infection, prostate | Aerial part | Infusion | External, oral | Fresh or dried | Yes | 36 | 8 | |
|  |  |  |  | Circulatory—blood pressure, blood purifier, cholesterol, diabetes, uric acid | Aerial part | Infusion | Oral | Fresh or dried | Yes | 8 | 3 | |
| Botanical family, scientific name | Local portuguese names | FC<sup>C</sup> | RFC<sup>E</sup> | Popular use | Part(s) used | Preparation | Administration | Condition Actual use | UR<sup>1</sup> | UR<sup>2</sup> | CF<sup>A</sup> | Voucher number |
|----------------------------------|------------------------|-------------|---------------|-------------|-------------|-------------|---------------|-------------------|---------------|------------|---------|----------------|
| **Ericaceae**                    |                        |             |               |             |             |             |               |                   |               |            |        |                |
| Arbutus unedo L.                 | Medronheiro, ervedeiro, érvodo | 4 | 0.05 | Circulatory—cholesterol | Aerial part | Infusion | Oral | Fresh or dried | Yes | 4 | 4 | 0.05 | LISI 82/2019 |
| Calluna vulgaris (L.) Hull.       | Torga, urze, queiroga    | 5 | 0.06 | Circulatory—gout | Leaves | Infusion | Oral | Fresh | No | 5 | 5 | 0.06 | LISI 83/2019 |
| **Euphorbiaceae**                |                        |             |               |             |             |             |               |                   |               |            |        |                |
| Euphorbia characias L.           | Leite-latigueira, malateira-maior, trovisco-macho | 23 | 0.29 | Dermatological—warts | Latex | Direct application | External | Fresh | Yes | 23 | 23 | 0.29 | LISI 84/2019 |
| **Fabaceae** (Leguminosae)       |                        |             |               |             |             |             |               |                   |               |            |        |                |
| Cytisus grandiflorus (Brot.) DC. | Giesta, giesta-das-sebes, giesteira-das-sebes | 5 | 0.06 | Digestive—liver | Flower | Infusion | Oral | Fresh or dried | No | 3 | 8 | 0.10 | LISI 85/2019 |
|                                  | Urinary—kidneys         |             |               |             |             |             |               |                   |               |            |        |                |
|                                  | Circulatory—heart       |             |               |             |             |             |               |                   |               |            |        |                |
| Lupinus albus L.                 | Tremoceiro, tremoceiro-branco, tremoço, tre-moço-branco | 5 | 0.06 | Circulatory—cholesterol, diabetes | Seeds | Cooking, direct ingestion (water seeds maceration) | Oral | Dried | Yes or no | 5 | 5 | 0.06 | LISI 382/2019 |
| Phaseolus vulgaris L.            | Feijoeiro, feijoeiro-vulgar, feijão | 3 | 0.04 | Circulatory—diabetes | Pericarp | Infusion | Oral | Dried | Yes | 3 | 3 | 0.04 | LISI 383/2019 |
| Pterospermum tridentatum (L.) Willk. | Carqueja, carqueja, carquejeira | 30 | 0.38 | Digestive—diarrhea, liver, stomach | Aerial part, flower | Infusion | Oral | Fresh or dried | Yes or no | 7 | 44 | 0.56 | LISI 86/2019 |
|                                  | Respiratory—asthma, cold |             |               |             |             |             |               |                   |               |            |        |                |
|                                  | Urinary—bladder, diuretic, kidneys |             |               |             |             |             |               |                   |               |            |        |                |
|                                  | Circulatory—blood pressure, blood purifier, cholesterol, diabetes, heart |             |               |             |             |             |               |                   |               |            |        |                |
|                                  | Neurological—tranquillizer |             |               |             |             |             |               |                   |               |            |        |                |
|                                  | Reproductive—prostate   |             |               |             |             |             |               |                   |               |            |        |                |
| Ulex airensis Esp.Santo, Cubas, Lousã, CPardo & J.C.Costa | Tojo | 3 | 0.04 | Digestive—liver | Flower | Infusion | Oral | Dried | Yes | 3 | 3 | 0.04 | LISI 87/2019 |
| Botanical family, scientific name | Local portuguese names | FC | RFC | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | UR | UR2 | CF | Voucher number |
|----------------------------------|------------------------|----|-----|-------------|-------------|-------------|---------------|-----------|-----------|-----|-----|----|----------------|
| Ulex jussiaei Webb               | Tojo, tojo-durázio     | 3  | 0.04| Digestive—liver | Flower      | Infusion    | Oral          | Fresh or dried | No         | 3   | 3   | 0.04 | LSI 88/2019    |
| Ulex minor var. lusitanicus (Webb) | Tojo, tojo-molar, tojo-branco, tojo-gatanhomenor | 3  | 0.04| Digestive—liver | Flower      | Infusion    | Oral          | Fresh or dried | No         | 3   | 3   | 0.04 | LSI 89/2019    |
| Vicia faba L.                   | Faveira, fava          | 4  | 0.05| Urinary—kidneys | Flower      | Infusion    | Oral          | Dried      | Yes        | 2   | 10  | 0.13 | LSI 364/2019   |
|                                 |                        |    |     | Circulatory—gout | Flower      | Infusion    | Oral          | Dried      | Yes        | 2   | 25  | 0.19 | LSI 90/2019    |
|                                 |                        |    |     | Dermatological—to stop bleeding, wounds | Seed coat | Direct application | External | Dried      | No         | 4   |    |     |                |
|                                 |                        |    |     | Skeleton and muscles—rheumatism | Flower | Infusion | Oral | Dried | Yes        | 2   |    |     |                |
| Fagaceae                        |                        |    |     |                        |            |             |               |            |            |     |     |     |                |
| Quercus coccifera L.            | Carrasco, carrasqueiro | 22 | 0.28| Digestive—diarrhea | Leaves | Infusion | Oral          | Fresh or dried | Yes or no | 18  | 25  | 0.32 | LSI 90/2019    |
|                                 |                        |    |     | Circulatory—blood purifier, cholesterol, diabetes | Leaves | Infusion | Oral          | Fresh or dried | Yes         | 7   |    |     |                |
| Gentianaceae                    |                        |    |     |                        |            |             |               |            |            |     |     |     |                |
| Gentaurium erythraea Rafn       | Fel-da-terra, centáurea-comum | 14 | 0.18| Digestive—appetite, liver, parasites | Aerial part | Infusion | Oral          | Fresh or dried | No         | 6   | 15  | 0.19 | LSI 91/2019    |
|                                 |                        |    |     | Circulatory—diabetes | Aerial part | Infusion | Oral          | Fresh or dried | Yes or no   | 9   |    |     |                |
| Geraniaceae                     |                        |    |     |                        |            |             |               |            |            |     |     |     |                |
| Geranium purpureum Vill.        | Ena-de-são-roberto, erva-roberta | 39 | 0.50| Digestive—digestion, gall bladder, intestines, liver, stomach | Aerial part | Infusion | Oral          | Fresh or dried | Yes or no   | 39  | 58  | 0.74 | LSI 92/2019    |
|                                 |                        |    |     | Urinary—bladder, diuretic | Aerial part | Infusion | Oral          | Fresh or dried | Yes or no   | 8   |    |     |                |
|                                 |                        |    |     | Circulatory—cholesterol, diabetes | Aerial part | Infusion | Oral          | Fresh or dried | Yes         | 8   |    |     |                |
|                                 |                        |    |     | Other—anti-cancerous | Aerial part | Infusion | Oral          | Fresh or dried | Yes or no   | 3   |    |     |                |
| Hypericaceae                    |                        |    |     |                        |            |             |               |            |            |     |     |     |                |
| Hypericum perforatum L.         | Hipericão, pelícia, plicão, milfurada, erva—de-sãojoão, hipicão-do-gerês, pírcão | 58 | 0.74| Digestive—digestion, hemorrhoids, liver, stomach, ulcers | Aerial part, flower, leaves | Infusion | Oral | Fresh or dried | Yes or no   | 70  | 76  | 0.97 | LSI 93/2019    |
| Botanical family, scientific name | Local portuguese names | FC | RFC | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | URc | URd | CIe | Voucher number |
|----------------------------------|------------------------|----|-----|-------------|--------------|-------------|---------------|-----------|-----------|------|------|-----|----------------|
| Circulatory—blood pressure       | Aerial part            | Infusion | Oral | Fresh or dried | Yes | 3 |
| Juglandaceae                     |                        |      |      |              |     |     |
| Juglans regia L.                 | Nogueira, noguera-comum, noguera—europeia, noz | 28 0.36 | Digestive—toothache | Leaves | Infusion | To rinse one’s mouth | Fresh or dried | Yes | 3 | 38 0.49 | LISI 384/2019 |
|                                  |                        |      |      |              |     |     |
| Urinary—kidneys, urinary infection |                         |      |      |              |     |     |
| Circulatory—chilblains, cholesterol, diabetes, heart |                         |      |      |              |     |     |
| Dermatological—hair loss, impetigo skin, wounds |                         |      |      |              |     |     |
| Reproductive—gynecological infection, prostate |                         |      |      |              |     |     |
| Lamiaceae (Labiatae)             |                        |      |      |              |     |     |
| Melissa officinalis L.           | Ena-cidreira, melissa, limonete, chá-de-frança, citronela | 71 0.91 | Digestive—colic, digestion, intestines, stomach | Aerial part, leaves | Infusion | Oral | Fresh or dried | Yes | 63 | 101 1.29 | LISI 131/2019 |
|                                  |                        |      |      |              |     |     |
| Urinary—diuretic, kidneys        |                        |      |      |              |     |     |
| Neurological—headache, tranquilizer |                         |      |      |              |     |     |
| Mentha pulegium L.               | Poejo, poêjo, poejos, hortelã-pimenta-mansa | 5 0.06 | Respiratory—cough | Aerial part | Infusion | Oral | Fresh or dried | Yes | 5 | 5 0.06 | LISI 94/2019 |
| Mentha spicata L.                | Hortelã, hortelã-comum, hortelã-verde-dos-açores | 31 0.40 | Digestive—digestion, intestines, parasites, stomach | Aerial part, leaves | Infusion | Oral | Fresh or dried | Yes | 29 | 38 0.49 | LISI 366/2019 |
|                                  |                        |      |      |              |     |     |
| Respiratory—influenza            |                        |      |      |              |     |     |
| Neurological—tranquilizer        |                        |      |      |              |     |     |
| Mentha x piperita L.             | Hortelã-pimenta, hortelã-apimentada, hortelã | 35 0.45 | Digestive—digestion, flatulence, intestines, parasites, stomach | Aerial part, leaves | Infusion | Oral | Fresh or dried | Yes | 40 | 45 0.58 | LISI 365/2019 |
|                                  |                        |      |      |              |     |     |
| Urinary—diuretic                 |                        |      |      |              |     |     |
| Origanum virens Hoffmanns. & Link | Orégão, orégão-comum, orégas, orégos, ourégio | 5 0.06 | Neurological—tranquilizer | Aerial part | Infusion | Oral | Fresh or dried | Yes | 5 | 5 0.06 | LISI 95/2019 |
| Prunella vulgaris L.              | Erva-fémea, prunela, brunela, consolda–menor | 3 0.04 | Dermatological—wounds | Leaves | Infusion | External | Fresh | No | 3 | 3 0.04 | LISI 96/2019 |
| Rosmarinus officinalis L.         | Alecrim, alecrim-da-terra, alecrinzeiro | 15 0.19 | Digestive—digestion, liver | Aerial part | Infusion | Oral | Fresh | Yes | 3 | 18 0.23 | LISI 97/2019 |
| Botanical family, scientific name | Local portuguese names | FCᵃ | RFCᵇ | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | URᶜ | URᵈ | CF | Voucher number |
|--------------------------------|------------------------|-----|------|-------------|-------------|-------------|---------------|-----------|-----------|------|------|----|----------------|
| **Respiratory—bronchitis**     | Thymus sylvestris      | Tomilho, sal-da-terra, serpaño-do-monte | 3 004 | 0.04 | Aerial part | Infusion | Oral | Fresh or dried | Yes | 2 |
| **Circulatory—cholesterol, to stimulate the circulation** | Linum usitatissimum L. | Linho, linho-comum, sementes-de-linhaça | 14 0.18 | Digestive—constipation | Seeds | Direct ingestion | Oral | Dried | Yes | 3 22 0.28 | LISI 99/2019 |
| **Neurological—tranquilizer** | Malvaceae              | Malvas, mala, malva-bastarda, lavatera, lavatera-silvestre | 73 094 | Digestive—constipation, digestion, enteritis, hemorrhoids, infection of the mouth, intestines, oral hygiene, stomach | Aerial part, leaves | Infusion | Oral | Fresh or dried | Yes or no | 36 168 2.15 | LISI 385/2019 |
| **Dermatological—to strengthen the hair** | Linaceae | Linho, linho-comum, sementes-de-linhaça | 14 0.18 | Respiratory—asthma, cold, cough | Aerial part | Infusion | Oral | Fresh or dried | Yes | 5 0.06 | LISI 98/2019 |
| **Dermatological—furuncles** | Linum usitatissimum L. | Linho, linho-comum, sementes-de-linhaça | 14 0.18 | Dermatological—furuncles | Seeds | Poultice | External | Dried | No | 2 |
| **Other—mumps** | Linum usitatissimum L. | Linho, linho-comum, sementes-de-linhaça | 14 0.18 | Other—mumps | Seeds | Cooking | External | Dried | No | 4 |
| **Reproductive—gynecological infection, intimate hygiene** | Linum usitatissimum L. | Linho, linho-comum, sementes-de-linhaça | 14 0.18 | Reproductive—gynecological infection, intimate hygiene | Aerial part, leaves | Infusion (some with leaves of walnut tree, or orange tree), vapors | External, oral | Irrigation | Yes or no | 39 |
| **Respiratory—throat** | Malvaceae              | Malvas, mala, malva-de-espanha | 73 094 | Respiratory—throat | Leaves | Infusion | Gargle | Fresh | Yes or no | 5 |
| **Urinary—urinary infection** | Malvaceae              | Malvas, mala, malva-de-espanha | 73 094 | Urinary—urinary infection | Aerial part, leaves, seeds | Infusion (some with leaves of walnut tree), vapors | External, oral | Dried | Yes or no | 50 |
| **Dermatological—infection skin, wounds** | Malvaceae              | Malvas, mala, malva-de-espanha | 73 094 | Dermatological—infection skin, wounds | Aerial part, leaves | Infusion (some with leaves of walnut tree, or orange tree), vapors | External, oral, irrigation | Yes or no | 38 |
| **Other** | Malvaceae              | Malvas, mala, malva-de-espanha | 73 094 | Other | Aerial part, leaves | Infusion | Enema, external, oral, to rinse one's mouth | Fresh or dried | Yes or no | 36 |

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ᵃ FC: Family Code
ᵇ RFC: Régional Familial Code
ᶜ UR: Universidade de Coimbra
ᵈ UR: Universidade de Lisboa
ᵉ Voucher number: LISI 98/2019, LISI 99/2019, LISI 385/2019, LISI 100/2019.
| Botanical family, scientific name | Local portuguese names | FC<sup>a</sup> | RFC<sup>b</sup> | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | UR<sup>c</sup> | UR<sup>d</sup> | CF<sup>e</sup> | Voucher number |
|----------------------------------|------------------------|--------------|--------------|-------------|-------------|-------------|---------------|-----------|-----------|-----------|-----------|-----------|----------------|
| **Respiratory—throat**           |                        |              |              |             | Leaves      | Infusion     | Gargle        | Fresh     | Yes or no |           |           |           |                |
| **Urinary—urinary infection**    |                        |              |              |             | Aerial part, leaves, seeds | Infusion (some with leaves of walnut tree, vapors) | External, oral | Fresh or dried | Yes or no |           |           |           |                |
| **Dermatological—infection skin, wounds** |                |              |              |             | Aerial part, leaves | Infusion (some with leaves of walnut tree) | External | Fresh or dried | Yes or no |           |           |           |                |
| **Reproductive—gynecological infection, intimate hygiene** | |              |              |             | Aerial part, leaves, seeds | Infusion (some with leaves of walnut tree or orange tree), vapors | Enema, external, irrigation | Fresh or dried | Yes or no |           |           |           |                |
| Malva sylvestris L. Malvas, malva, malva—silvestre, malva—selvagem | | 73 094 |             | Digestive—constipation, digestion, enteritis, hemorrhoids, infection of the mouth, intestines, oral hygiene, stomach | Aerial part, leaves | Infusion | Enema, external, oral, to rinse one’s mouth | Fresh or dried | Yes or no | 36 168 2.15 | LISI 404/2019 |
| **Respiratory—throat**           |                        |              |              |             | Leaves      | Infusion     | Gargle        | Fresh     | Yes or no |           |           |           |                |
| **Urinary—urinary infection**    |                        |              |              |             | Aerial part, leaves, seeds | Infusion (some with leaves of walnut tree, vapors) | External, oral | Fresh or dried | Yes or no |           |           |           |                |
| **Dermatological—infection skin, wounds** |                |              |              |             | Aerial part, leaves | Infusion (some with leaves of walnut tree) | External | Fresh or dried | Yes or no |           |           |           |                |
| **Reproductive—gynecological infection, intimate hygiene** | |              |              |             | Aerial part, leaves, seeds | Infusion (some with leaves of walnut tree or orange tree), vapors | Enema, external, irrigation | Fresh or dried | Yes or no |           |           |           |                |
| Moraceae                         |                        |              |              |             |             |             |               |           |           |           |           |           |                |
| Ficus carica L. Figueira, figueira-comum, bebereira | | 21 027 | Respiratory—cold, cough | Fruit | Syrup (with dried apple and raisins) | Oral | Dried | No | 4 | 24 0.31 | LISI 381/2019 |
| Myrtaceae                         |                        |              |              |             |             |             |               |           |           |           |           |           |                |
| Eucalyptus globulus Labill. Eucalipto, eucalipto-comum | | 66 085 | Respiratory—breathing difficulties, bronchitis, cold, cough, throat | Flower, leaves, young shoots | Infusion, syrup, vapors | Inhalation, oral | Fresh | Yes or no | 75 77 0.99 | LISI 101/2019 |
| Myrtus communis L. Murta, murteira, murtinho, mirto | | 4 005 | Dermatological—rash | Leaves | Direct application (powder from crushed leaves) | External | Dried | No | 4 | 4 0.05 | LISI 102/2019 |

<sup>a</sup> FC: Forest Conservation
<sup>b</sup> RFC: Rural Forecasting Center
<sup>c</sup> UR<sub>i</sub>: Usage rate i
<sup>d</sup> UR<sub>d</sub>: Usage description
<sup>e</sup> CF: Confidence factor
| Botanical family, scientific name | Local portuguese names | FC$^a$ | RFC$^b$ | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | UR$^c$ | UR$^d$ | CF | Voucher number |
|----------------------------------|------------------------|-------|-------|-------------|-------------|-------------|---------------|-----------|-----------|-------|-------|----|----------------|
| Fraxinus angustifolia Vahl       | Freixo, freixo-comum, freixo-de-folhas-estreitas | 18    | 0.23  | Digestive—constipation Urinary—diuretic | Leaves | Infusion | Oral | Dried | Yes | 2     | 32  | 0.41 | LISI 103/2019 |
|                                 |                        |       |       | Circulatory—blood pressure, blood purifier, cholesterol, gout, heart, uric acid | Leaves | Infusion | Oral | Fresh or dried | Yes or no | 17 |
|                                 |                        |       |       | Skeleton and muscles—mineralizing, osteoporosis, rheumatism | Leaves | Infusion | Oral | Fresh or dried | Yes | 9 |
| Olea europaea var. europaea      | Oliveira               | 46    | 0.59  | Circulatory—blood pressure, cholesterol, heart | Leaves | Infusion | Oral | Fresh or dried | Yes or no | 48  | 54  | 0.69 | LISI 368/2019 |
|                                 |                        |       |       | Dermatological—furuncles, shingles, wounds | Olive oil | Direct application (frying garlic in olive oil or with oil from wheat), ointment (with blue chalk sticks and elderberry) | External | Fresh | Yes or no | 4 |
|                                 |                        |       |       | Other—earache | Olive oil | Direct application (frying garlic in olive oil) | External | Fresh | Yes | 2 |
| Oxalidaceae                      |                        |       |       |            |            |            |               |          |          |       |       |    |                |
| Oxalis pescaprae L.              | Erva-praga, erva-pata, erva-azeda-amarela, erva-canária, trevo-azedo | 3     | 0.04  | Digestive—parasites | Stem | Direct ingestion | Oral | Fresh | No | 3     | 3   | 0.04 | LISI 369/2019 |
| Papaveraceae                     |                        |       |       |            |            |            |               |          |          |       |       |    |                |
| Chelidonium majus L.             | Celidónia, erva-do- betadine, erva-andorinha, erva-das-verrugas | 30    | 0.38  | Circulatory—chilblains Dermatological—cuts, wounds | Sap | Direct application | External | Fresh | Yes | 3     | 3   | 0.44 | LISI 104/2019 |
|                                 |                        |       |       |            | Sap | Direct application | External | Fresh | Yes or no | 31 |
| Fumaria officinalis L.           | Cãezinhos, erva- molerinha, fumária | 3     | 0.04  | Digestive—liver | Aerial part | Infusion | Oral | Dried | No | 3     | 3   | 0.04 | LISI 105/2019 |
| Phyllanthaceae                   |                        |       |       |            |            |            |               |          |          |       |       |    |                |
| Phyllanthus niruri L.            | Quebra-pedra, quebra- pedras, filanto | 3     | 0.04  | Urinary—kidney stone | Aerial part | Infusion | Oral | Fresh or dried | Yes | 3     | 3   | 0.04 | LISI 402/2019 |
| Pinaceae                         |                        |       |       |            |            |            |               |          |          |       |       |    |                |
| Pinus pinaster Aiton             | Pinheiro-bravo, pinheiro-marítimo | 12    | 0.15  | Circulatory—diabetes | Leaves | Infusion | Oral | Fresh | Yes or no | 6     | 12   | 0.15 | LISI 106/2019 |
|                                 |                        |       |       | Dermatological—cicatrizing, wounds | Resin | Direct application | External | Fresh | No | 6     |        |      |                |
| Pinus pinea L.                   | Pinheiro-manso         | 13    | 0.17  | Respiratory—breathing difficulties, cough | Leaves, young shoots | Syrup (sugar maceration), vapors | Inhalation, oral | Fresh | Yes or no | 12   | 14   | 0.18 | LISI 107/2019 |
Table 2 Plants with medicinal uses reported by at least three informants (Continued)

| Botanical family, scientific name | Local portuguese names | FC | RFC | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | UR | UR2 | CF | Voucher number |
|----------------------------------|------------------------|----|-----|-------------|--------------|-------------|---------------|-----------|------------|-----|-----|----|----------------|
| **Plantaginaceae**               |                        |    |     |             |              |             |               |           |            |     |     |    |                |
| Plantago major L.                | Tanchagem, tanchagem-major, erva-das-sete-linhas | 3  | 0.04 | Digestive—hemorrhoids | Leaves | Infusion | Oral | Fresh | Yes | 2 | 6 | 0.08 | LISI 108/2019 |
| *Respiratory—cough*             |                        |    |     |             |              |             |               |           |            |     |     |    |                |
| *Urinary—urinary infection*     |                        |    |     |             |              |             |               |           |            |     |     |    |                |
| **Poaceae** (Gramineae)         |                        |    |     |             |              |             |               |           |            |     |     |    |                |
| Cymbopogon citratus (DC.) Stapf | Chá-príncipe, erva-príncipe, erva-limão | 31 | 0.40 | Digestive—digestion, colic, liver, stomach | Aerial part, leaves | Infusion | Oral | Fresh or dried | Yes or no | 25 | 46 | 0.59 | LISI 386/2019 |
| *Neurological—antidepressant, tranquilizer* | | | | | Aerial part, leaves | Infusion | Oral | Fresh or dried | Yes | 21 | | |
| Hordeum vulgare L.              | Cevada-santa, cevada | 3  | 0.04 | Digestive—belly ache, diarrhea | Seeds | Poultice (with flour) | External | Dried | No | 3 | 3 | 0.04 | LISI 399/2019 |
| Triticum aestivum L.            | Trigo, trigo-mole | 29 | 0.37 | Digestive—belly ache, diarrhea | Seeds | Cooking (flour or bran with chamomile) | External, oral | Dried | Yes or no | 10 | 34 | 0.44 | LISI 400/2019 |
| *Respiratory—bronchitis, cold, measles* | | | | | Seeds | Cooking (bran), poultice (with flour and bran) | External | Dried | No | 3 | | |
| *Dermatological—shingles*      |                        |    |     |             |              |             |               |           |            |     |     |    |                |
| Zea mays L.                     | Milho, milho-grosso | 64 | 0.82 | Urinary—bladder, diuretic, urinary infection, urinary tract | Silk | Infusion | External, oral | Fresh or dried | Yes or no | 71 | 78 | 1.00 | LISI 387/2019 |
| *Circulatory—blood pressure*   |                        |    |     |             |              |             |               |           |            |     |     |    |                |
| *Skeleton and muscles—rheumatism* | | | | | Corn | Poultice (with flour) | External | Dried | Yes | 2 | | |
| *Reproductive—gynecological infection, prostate* | | | | | Silk | Infusion | External, oral | Dried | Yes or no | 3 | | | |
| **Polygonaceae**                |                        |    |     |             |              |             |               |           |            |     |     |    |                |
| Rumex conglomeratus Murray      | Labaça-ordinária, labaça, alabaça, rega-da-horta | 5  | 0.06 | Digestive—diarrhea | Leaves | Infusion | Oral | Fresh | No | 3 | 5 | 0.06 | LISI 109/2019 |
| *Dermatological—psoriasis*     |                        |    |     |             |              |             |               |           |            |     |     |    |                |
| **Pteridaceae**                 |                        |    |     |             |              |             |               |           |            |     |     |    |                |
| Adiantum capillus-veneris L.    | Avenca, avenca-das-fontes, capilária | 6  | 0.08 | Urinary—bladder, diuretic, urinary tract | Aerial part | Infusion | Oral | Fresh or dried | Yes or no | 6 | 6 | 0.08 | LISI 110/2019 |
| **Rosaceae**                    |                        |    |     |             |              |             |               |           |            |     |     |    |                |
| Agrimonia eupatoria L.          | Agrimónia, eva-eupatória, erva-hepática | 4  | 0.05 | Digestive—digestion, liver, stomach | Aerial part | Infusion | Oral | Fresh or dried | Yes or no | 5 | 5 | 0.06 | LISI 111/2019 |
| Botanical family, scientific name | Local portuguese names | FC | RFC | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | UR<sup>c</sup> | UR<sup>d</sup> | CF | Voucher number |
|----------------------------------|------------------------|----|-----|-------------|-------------|-------------|---------------|------------|------------|-----------|------------|------|----------------|
| **Crataegus monogyna Jacq.**     | Pilriteiro, esperinho, priliteiro | 3  | 0.04 | Circulatory—blood pressure, to stimulate the circulation | Flower, fruit, leaves | Infusion | Oral | Fresh or dried | Yes | 5 | 5 | 0.06 | LSI 112/2019 |
| **Cydonia oblonga Mill.**        | Marmeleiro, gamboeiro | 6  | 0.08 | Digestive—diarrhea | Leaves | Infusion | Oral | Fresh or dried | Yes | 2 | 6 | 0.08 | LSI 388/2019 |
| **Eriobotrya japonica** (Thunb.) Lindl. | Nespereira, nespereira-do-japão, nêsperas | 22 | 0.28 | Circulatory—blood pressure, cholesterol, diabetes | Leaves | Infusion | Oral | Fresh or dried | Yes or no | 25 | 0.32 | LSI 389/2019 |
| **Fragaria vesca L.**            | Morangueiro, morango, morangueiro-bravo, morangueira-vulgar, fragária, ena-dos-morangos | 3  | 0.04 | Digestive—diarrhea | Leaves | Infusion | Oral | Fresh | Yes | 2 | 4 | 0.05 | LSI 390/2019 |
| **Malus domestica Borkh.**       | Macieira, maceira, maçãzeira | 3  | 0.04 | Respiratory—cold, cough | Fruit | Syrup (with dried figs and raisins) | Oral | Dried | No | 4 | 4 | 0.05 | LSI 410/2019 |
| **Prunus avium (L.) L.**         | Cerejeira, cerdeira, cerdeiro, cereja | 53 | 0.68 | Urinary—bladder, diuretic, kidneys, urinary infection, urinary tract | Fruit peduncles | Infusion | Oral | Fresh or dried | Yes or no | 57 | 0.73 | LSI 391/2019 |
| **Prunus cerasus L.**            | Ginjeira, ginjeiro, ginja | 3  | 0.04 | Urinary—bladder, kidneys, urinary tract | Fruit peduncles | Infusion | Oral | Fresh or dried | Yes or no | 5 | 0.06 | LSI 392/2019 |
| **Prunus domestica L.**          | Ameixeira, ameixieira, amexoeira | 6  | 0.08 | Digestive—constipation, intestines | Fruit | Direct ingestion | Oral | Fresh or dried | Yes | 6 | 0.08 | LSI 393/2019 |
| **Pyrus communis L.**            | Pereira, pereira-mansa, pereira-comum | 4  | 0.05 | Digestive—digestion, gall bladder | Leaves | Infusion | Oral | Dried | Yes | 6 | 0.08 | LSI 394/2019 |
| **Rosa canina L.**               | Roseiras, roseira, rosas | 36 | 0.46 | Ophthalmological—eyes, inflammations | Flower, petals | Infusion | External | Fresh | Yes or no | 36 | 0.46 | LSI 113/2019 |
| **Rubus ulmifolius Schott**      | Silva, silvas, amorassilvestres | 4  | 0.05 | Circulatory—diabetes | Leaves | Infusion | Oral | Fresh | Yes | 4 | 4 | 0.05 | LSI 114/2019 |
| **Rubiaceae**                    |                          |    |     |              |            |            |               |            |            |           |        |      |                |
| **Galium aparine L.**            | Pegamaço, amor-de-hortelão | 5  | 0.06 | Digestive—hepatitis, liver | Aerial part | Infusion | Oral | Fresh or dried | Yes or no | 5 | 0.06 | LSI 115/2019 |
| **Rutaceae**                     |                          |    |     |              |            |            |               |            |            |           |        |      |                |
| **Citrus limon (L.) Osbeck**     | Limoeira, limão | 75 | 0.96 | Digestive—digestion | Leaves, lemon skin | Infusion | Oral | Fresh | Yes | 15 | 100 | 1.28 | LSI 370/2019 |

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| Botanical family, scientific name | Local portuguese names | FC | RFC | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | URc | URd | CF | Voucher number |
|----------------------------------|------------------------|----|-----|-------------|-------------|-------------|---------------|------------|-----------|------|------|----|----------------|
| **Solanaceae**                   |                        |    |     |             |             |             |               |            |           |      |      |    |                 |
| *Atropa belladonna* L.           | Beladona, ena-mourafuniosa, ena-midrática | 4  | 005 | Skeleton and muscles — rheumatism | Fruit | Alcohol maceration | External | Fresh | No | 4 | 0.05 | LISI 401/2019 |
| *Capsicum frutescens* L.         | Piripiri, malagueita, pimenteiro-de-caiena | 4  | 005 | Digestive — hemorrhoids | Fruit | Direct ingestion | Oral | Fresh or dried | Yes or no | 4 | 0.05 | LISI 372/2019 |
| *Hyoscyamus albus* L.            | Meimendro, mimendro, meimendro-branco | 25 | 032 | Digestive — toothache | Seeds | Cooking, direct application (crushed leaves), smoke (burned seeds), vapors (boiled seeds) | External | Fresh or dried | No | 16 | 28 | 0.36 | LISI 403/2019 |
| **Other**                        |                        |    |     |             |             |             |               |            |           |      |      |    |                 |
| *Lycopersicon esculentum* Mill.  | Tomateiro, tomate | 4  | 005 | Urinary — diuretic | Fruit | Direct ingestion | Oral | Fresh | Yes | 4 | 0.05 | LISI 373/2019 |
| Botanical family, scientific name | Local portuguese names | FC \(^a\)  | RFC \(^b\) | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | UR \(^c\)  | UR \(^d\) | CF | Voucher number |
|----------------------------------|------------------------|--------|--------|--------------|--------------|-------------|----------------|----------|-----------|---------|---------|-----|----------------|
| Physalis peruviana L.            | Fisális, alquequeire-amarelo, tomatinho-de-capuz | 11 0.14 | Digestive—stomach | Fruit | Direct ingestion | Oral | Fresh | Yes | 4 16 | 0.21  | LISI 374/2019 |
|                                  |                        |        | Circulatory—blood purifier, cholesterol, diabetes, uric acid | Fruit | Direct ingestion | Oral | Fresh | Yes | 10 |
|                                  |                        |        | Other—aphrodisiac | Fruit | Direct ingestion | Oral | Fresh | Yes | 2 |
| Solanum melongena L.             | Beringela              | 4 005  | Circulatory—cholesterol | Fruit | Direct ingestion (water maceration of fruit) | Oral | Fresh | Yes | 4 4 | 0.05  | LISI 375/2019 |
| Solanum tuberosum L.             | Batateira, semilheira, batata | 26 0.33 | Digestive—stomach | Tuber | Direct ingestion (juice) | Oral | Fresh | Yes | 2 26 | 0.33  | LISI 411/2019 |
|                                  |                        |        | Neurological—headache | Tuber | Direct application | External | Fresh | Yes or no | 15 |
|                                  |                        |        | Dermatological—insect bites | Tuber | Direct application | External | Fresh | Yes or no | 9 |
| Tiliaceae                        |                        |        |                        | | | | | | | | | | |
| Tilia cordata Mill.              | Tilia, tília-de-folhas-pequenas | 64 0.82 | Digestive—digestion | Aerial part | Infusion | Oral | Fresh or dried | Yes | 2 69 | 0.88  | LISI 395/2019 |
|                                  |                        |        | Circulatory—circulation, heart | Aerial part, leaves | Infusion | Oral | Fresh or dried | Yes | 4 |
|                                  |                        |        | Neurological—tranquillizer | Aerial part, flower, leaves | Infusion | Oral | Fresh or dried | Yes or no | 63 |
| Urticaceae                       |                        |        |                        | | | | | | | | | | |
| Parietaria judaica L.            | Alfavaca-de-cobra, alfavaca, parietária, ervas-paredes, erva-dos-muros | 34 0.44 | Digestive—hemorrhoids, infection of the mouth, intestines | Aerial part, leaves | Direct application (some crushed leaves and/or juice), infusion, vapors | External, oral, to rinse one's mouth | Fresh or dried | Yes or no | 11 61 | 0.78  | LISI 116/2019 |
|                                  |                        |        | Urinary—kidneys, urinary infection | Aerial part, leaves | Infusion, vapors | External, oral | Fresh or dried | Yes or no | 24 |
|                                  |                        |        | Neurological—skin, wounds | Aerial part, leaves | Infusion | External | Fresh | Yes or no | 12 |
|                                  |                        |        | Reproductive—gynecological infection, prostate | Aerial part, leaves | Infusion, vapors | External, oral | Fresh or dried | Yes or no | 14 |
| Urtica dioica L.                 | Urtiga-de-cauda, urtigas, urtiga | 14 0.18 | Urinary—diuretic | Aerial part | Cooking, infusion | Oral | Fresh | Yes | 3 24 | 0.31  | LISI 409/2019 |
|                                  |                        |        | Circulatory—anemia, blood, blood purifier, circulation, diabetes, gout | Aerial part | Cooking, direct application, direct ingestion (juice), infusion | External, oral | Fresh | Yes or no | 12 |
|                                  |                        |        | Skeleton and muscles—rheumatism | Aerial part | Cooking, direct application | External, oral | Fresh | Yes or no | 7 |
|                                  |                        |        | Other—anti-inflammatory | Aerial part | Cooking | Oral | Fresh | Yes | 2 |
| Valerianaceae                    |                        |        |                        | | | | | | | | | | |
| Valeriana                        | Valeriana, valeriana-das- | 3 0.04  | Neurological—tranquillizer | Aerial part, | Infusion | Oral | Fresh | No | 3 3 | 0.04  | LISI 407/ |
| Botanical family, scientific name | Local portuguese names | FC | RFC | Popular use | Part(s) used | Preparation | Administration | Condition | Actual use | URc | URd | CIe | Voucher number |
|----------------------------------|------------------------|----|-----|-------------|--------------|-------------|---------------|-----------|-----------|-----|-----|-----|----------------|
| Verbenaceae                       |                        |    |     |             |              |             |               |           |           |     |     |     |                |
| Aloysia citrodora Paláu           | Lúcia-lima, bela-luísa, doce-lima, limonete | 61 | 0.78 | Digestive—digestion, spasms, stomach Neurological—tranquilizer | Aerial part, leaves | Infusion | Oral | Fresh or dried | No | 31 | 75 | 0.96 LISI 376/2019 |
| Vitaceae                          |                        |    |     |             |              |             |               |           |           |     |     |     |                |
| Vitis vinifera subsp. sylvestris (C.C.Gmel.) Hegi | Videira, videira-europeia, vinha, parreira, cepa | 3  | 0.04 | Respiratory—cold, cough | Fruit | Syrup (with dried apple and dried figs) | Oral | Dried | No | 4 | 4 | 0.05 LISI 127/2019 |
| Xanthorrhoeaceae                  |                        |    |     |             |              |             |               |           |           |     |     |     |                |
| Aloe vera (L.) Burm.f.            | Aloé-vera, aloé, aloé-dos-barbados, babosa | 35 | 0.45 | Dermatological—burns, cicatrizing, insect bites, pimples, skin allergy, wounds Skeleton and muscles—rheumatism Other—anti-cancerous | Sap | Direct application | External | Fresh | Yes or no | 35 | 45 | 0.58 LISI 396/2019 |

The number of informants that referred the taxon
RFC=FC/N, where N is the total number of informants
Use-reports of the taxon by illness category
CI=UR/N
Fig. 2 The plant parts used

Fig. 3 The preparation of medicinal plants
preparation of area or used to wash some parts of the body.

It should be noted that poultices were applied fundamentally over a piece of tissue.

Syrup, obtained mainly by sugar maceration, and alcohol maceration, was mostly used for rheumatism (with *Allium sativum* L., *Tamus communis* L., and *Atropa belladonna* L.) or for respiratory purposes like the treatment of bronchitis with patches (with *Rosmarinus officinalis* L.).

The smoke preparation, with only *Hyoscyamus albus* L., was applied for earache and toothache.

Almost all of the taxa are used alone as very few mixes have been identified. For example, in the production of poultices, flour was used, and in the preparation of ointments, olive oil and elderberry were used.

The Fig. 4 shows that the two main administration processes were oral (in 61% of cases, approximately) and external administration (in 33% of cases, approximately). In other situations were used inhalation, to rinse one’s mouth, gargle, irrigation and enema.

To conclude the general analysis of Table 2, it should be noted that only 13 taxa were used in a dried condition as the others were used in fresh and in fresh or dried. A few taxa, 19, were only used in the past, meaning they are no longer used by the populace even though the memory lingers as they were indeed mentioned in the interviews. The average number of plants referred per informant was approximately 26.68. The average number of use-reports referred per informant was equal to 36. The average number of use-reports referred per taxon is approximately equal to 26.74; the average number of different local Portuguese names per taxon was approximately equal to 2.9. Twenty plants were cited by 50% or more of interviewees.

Local Portuguese plant names

Informants used 304 local names to refer to the 105 medicinal taxa cataloged. These names were checked against Portuguese publications that claim to contain all previously published common plant names [37–39]. We found several undocumented local names; for example, “bódanha”, “erva-da-infeção” and “erva-do-betadine”. It is also important to note that some local Portuguese names allude to their uses such as “quebra-pedra” (kidney stone of urinary category)—*Phyllanthus niruri* L.—or “erva-hepática” (liver of digestive category)—*Agrimonia eupatoria* L..

Table 2 has 315 vernacular names because some of them are repeated because different plants can have the same popular name (“pinheirinha”, “cavalinha”, “rabo-de-cavalo”, “tojo”, “hortelã”, “malva”, “malvas” and “limonete”).

![Fig. 4 The administration processes](image-url)
Diseases treated by medicinal plants
The reported plants were grouped into 10 categories, based on the body systems, each of which is divided into several subcategories, based on the information gathered. Sometimes, the interviewees do not mention specific diseases or conditions; instead, they mention some organs (for example, liver or heart) or some processes (for example, cicatrizing or mineralizing). Figure 5 presents these 10 categories, with 54 taxa being included in the digestive category, 37 in circulatory category, 34 in urinary category, 28 in dermatological category, 27 in respiratory category, 15 in neurological category, 12 in reproductive category, 11 in the skeleton and muscle category, one in ophthalmological category, and 13 in other category (medicinal plants in contexts not covered in the previous categories). It is important to note that most plants are included in more than one category. The number of subcategories varied between two, in the ophthalmological category, and 22, in the dermatological category, a total of 95 subcategories. Several taxa appear in more than one category.

Digestive category
Fifty-four medicinal plants were reported for this group. The main species employed to treat digestive problems were Hypericum perforatum L., Melissa officinalis L., and Geranium purpureum Vill., with 70, 63, and 39 use-reports, respectively. In other works carried out in Portugal, these medicinal plants were also mentioned: Hypericum perforatum L. [41–43, 49, 54], Melissa officinalis L. [41–43, 49, 54], and Geranium purpureum Vill. [41, 42, 49].

Circulatory category
This is a prominent category of plant use, with 37 taxa and 14 subcategories used for purposes related to the circulatory system and blood. The species indicated with the highest number of use-reports were Olea europaea L. var. europaea (48), Eriobotrya japonica (Thunb.) Lindl. (25), and Pterospartum tridentatum (L.) Willk. (24). The first plant was referred in five studies [41–43, 49, 54] and the remaining in two [49, 54].

Urinary category
With 34 taxa, mainly used as an infusion, the most referred were Zea mays L. (71), also referred in other Portuguese studies [41–43, 49, 54]; Prunus avium (L.) L. (57), referred in three [42, 49, 54]; and the species belonging to the Malvaceae family (50 each) that were cited in two previous papers [42, 49]. It is curious to note that this is the only category for which fruit peduncles were used.

Dermatological category
The interviewees reported 28 plants to treat diseases related to this category. The administration method is fundamentally external. The taxa most cited were those belonging to the Malvaceae family (39 each), Senecio serpens G.D.Rowley (37), and Aloe vera (L.) Burm.f. (35). It has the largest number of subcategories (22) and the interviews reported that wounds can be treated by 19 different plants. Only the species of the Malvaceae family were referenced for similar purposes in Portugal [41, 42, 54].

Fig. 5 Number of the taxa for each illness category
Respiratory category
Twenty-seven medicinal plants were reported to be used in the treatment of respiratory problems, including Eucalyptus globulus Labill. (75), Citrus limon (L.) Osbeck (74), and Daucus carota subsp. sativus (Hoffm.) Schübl. & G. Martens (70). In other works carried out in Portugal, the first species was mentioned in four [41, 42, 49, 54], and the remainder in three, respectively [41, 42, 49] and [41, 42, 54].

Neurological category
Fifteen medicinal plants were considered beneficial in this category. The species with the highest number of use-reports were Tilia cordata Mill. (63), Aloysia citrodora Paláu (44), and Melissa officinalis L. (33). The same uses were referred in similar studies carried out in Portugal, namely [41, 42, 49, 54] for Tilia cordata Mill., [42, 49, 54] for Aloysia citrodora Paláu, and [42, 49, 54] for Melissa officinalis L...

Reproductive category
The informants reported 12 taxa, which belong to nine botanical families (Apiaceae, Cucurbitaceae, Equisetaceae, Fabaceae, Juglandaceae, Malvaceae, Poaceae, Rutaceae, and Urticaceae). The species of Malvaceae family, with 38 use-reports, Parietaria judaica L. (14) and species from Equisetaceae family (12) were the most cited. The first family, Malvaceae, was referred in three studies [41, 42, 49] and the last, Equisetaceae, in two [49, 54] such as Parietaria judaica L. [49, 54].

Skeleton and muscles
Eleven taxa were mentioned. Tamus communis L., Fraxinus angustifolia Vahl, and Allium sativum L. were the species with the highest number of use-reports, 43, nine and seven, respectively. It is interesting to note that Tamus communis L. is only found in this group. These species were mentioned in works carried out in Portugal for the same uses, namely Tamus communis L. [54], Fraxinus angustifolia Vahl [41, 42, 49, 54], and Allium sativum L. [42, 54].

Ophthalmological category
It was reported one taxon in this group, Rosa canina L., with 36 use-reports. Note that this taxon is not referred to in any other category and petals were mentioned as the part used only in this instance. Carvalho [54] has also cited this taxon in association with this category.

Other category
This category has seven subcategories used in contexts unrelated or not connected with the previous categories (anti-cancerous, anti-inflammatory, aphrodisiac, ear ache, fever, mumps, and to slim). However, 13 of the plants that were reported in this category here were also mentioned in others.

Approximately 22.2% (10) of the botanical families were reported in relation to only one specific affliction, and approximately 44.8% (47) of taxa were reported in only one category.

Quantitative assessment of ethnobotanical data
Characteristics such as homogeneity, importance, and cultural similarity were evaluated using quantitative indices which contributed to make solid comparisons with other independent Portuguese studies using the same methodology contrasting the results with previous works [41–43, 49, 54] as they relate to the traditional knowledge of medicinal plants used by the Montejunto population.

The ethnobotanical richness (R) is the number of taxa reported in each ethnobotanical study [40]. In this study, R is equal to 105. In similar studies carried out in Portugal, the values obtained were 88 [43], 104 [42], and 150 [41].

As we can see in Table 2, the relative frequency of citation of the reported species ranges from 0.05 to 0.96. In Fig. 6, we have the 15 botanical taxa with the highest RFC, which reveals the importance of these species. The Citrus limon (L.) Osbeck has the highest value because it was mentioned by 75 informants, followed by Lavatera cretica L., Malva hispanica L., Malva sylvestris L., Daucus carota subsp. sativus (Hoffm.) Schübl. & G. Martens, and Melissa officinalis L.

In Table 3 and Fig. 7, we present the data relating to the number of use-reports and the correspondent CI, for the botanical taxa with more use-reports. We can see that these 15 medicinal plants mentioned (14% of the total) correspond to approximately 50% of the total use-reports in Table 2. According to Table 2, CI ranges from 0.04, for taxa mentioned only by three informants and with only three use-reports (Leucanthemum sylvaticum (Brot.) Nyman, Opuntia maxima Mill., Phaseolus vulgaris L., Ulex airescens Esp.Santo, Cubas, Lousá, C.Pardo & J.C.Costa, Ulex jussiaei Webb, Ulex minor Roth, Prunella vulgaris L., Oxalis pes-caprae L., Fumaria officinalis L., Phyllanthus niruri L., Hordeum vulgare L. and Valeriana officinalis L.), to 2.15, for Lavatera cretica L., Malva hispanica L., and Malva sylvestris L. The low values of CI, according Tuttolomondo et al. [53], indicate that the local populations had little trust in some of the plants concerning the treatment of certain pathologies or as a strong indication of a gap or fading of traditional plant knowledge regarding their medicinal uses. Note that only three of the plants with CI equal to 0.04 are used nowadays (Leucanthemum sylvaticum (Brot.) Nyman, Phaseolus vulgaris L., and Phyllanthus niruri L.).
### Table 3: The botanical taxa with more use-reports

| Taxa                                      | UR  | FC  | Number of different subcategories | CI  | Illness categories (in decreasing order)                                      |
|-------------------------------------------|-----|-----|-----------------------------------|-----|--------------------------------------------------------------------------------|
| Lavatera cretica L.                       | 168 | 73  | 14                                | 2.15| Urinary, dermatological, reproductive, digestive, and respiratory             |
| Malva hispanica L.                        | 168 | 73  | 14                                | 2.15| Urinary, dermatological, reproductive, digestive, and respiratory             |
| Malva sylvestris L.                       | 168 | 73  | 14                                | 2.15| Urinary, dermatological, reproductive, digestive, and respiratory             |
| Melissa officinalis L.                    | 101 | 71  | 8                                 | 1.29| Digestive, neurological, and urinary                                          |
| Citrus limon (L.) Osbeck                  | 100 | 75  | 11                                | 1.28| Respiratory, digestive, circulatory, other, and neurological                  |
| Zea mays L.                               | 78  | 64  | 8                                 | 1.00| Urinary, reproductive, circulatory, skeleton, and muscles                    |
| Eucalyptus globulus Labill.               | 77  | 66  | 6                                 | 0.99| Respiratory and dermatological                                               |
| Hypericum perforatum L.                   | 76  | 58  | 8                                 | 0.97| Digestive, urinary, and circulatory                                           |
| Aloysia citrodora Palau                   | 75  | 61  | 4                                 | 0.96| Neurological and digestive                                                   |
| Daucus carota subsp. sativus (Hoffm.) Schübl. & G.Martens | 72  | 71  | 3                                 | 0.92| Respiratory and digestive                                                   |
| Tilia cordata Mill.                       | 69  | 64  | 4                                 | 0.88| Neurological, circulatory, and digestive                                      |
| Equisetum arvense L.                      | 64  | 40  | 15                                | 0.82| Urinary, reproductive, circulatory, digestive, skeleton, and muscles         |
| Equisetum telmateia Ehrh.                 | 64  | 40  | 15                                | 0.82| Urinary, reproductive, circulatory, digestive, skeleton, and muscles         |
| Parietaria judaica L.                     | 61  | 34  | 9                                 | 0.78| Urinary, reproductive, dermatological, and digestive                         |
| Geranium purpureum Vill.                  | 58  | 39  | 10                                | 0.74| Digestive, urinary, circulatory, and other                                   |

*The number of use-reports

The number of informants that referred the taxon

CI=UR/N

**Fig. 6** The botanical taxa with the highest RFC
The average $F_{IC}$ value for all categories is 0.90, higher than the value obtained in other Portuguese studies [41, 43], which are respectively 0.85 and 0.48. The high $F_{IC}$ values found in most of the medicinal categories reflect a high level of homogeneity in consensus among the users and indicate that natural remedies are still considered extremely effective.

In Table 4, we have presented some important data for each category, namely the number of taxa, the incidence, the number of use-reports, the $F_{IC}$, and the medicinal importance. Through the analysis of this table, we find that $F_{IC}$ varies from 0.69 for the category “other” to 1.00 for the ophthalmological category. Note that the value of 1.00 for the ophthalmological category is due to the fact that all informants indicated the same purpose for the taxon they mentioned.

Comparison with similar studies from the Mediterranean region

In the following, taking into account the quantitative data collected, during the interviews, we present solid comparisons with other similar studies using the same methodology. In this context, Table 5 shows some quantitative data on medicinal plants in 11 regions, including this study. The data collected from various regions of Portugal, Spain, and other Mediterranean countries [41, 43, 48, 51–53, 55–58] are presented by the year of publication.

The table shows that in terms of ethnobotanical richness, $R$, there are three studies with lower values than this study. However, this corresponds to the second best value for Portugal. The value obtained for $F_{IC}$, 0.90, is similar to the higher values recorded for the other

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**Table 4** Informant consensus factor ($F_{IC}$) and medicinal importance (MI) of medicinal plants

| Illness category | Number of taxa $(n)_a$ | Incidence $(\%)_b$ | Number of use-reports $(n)_c$ | Informant consensus factor ($F_{IC}$)$_d$ | Medicinal importance (MI)$_e$ |
|------------------|------------------------|-------------------|-------------------------------|--------------------------------------|--------------------------|
| Digestive        | 54                     | 51.43             | 659                           | 0.92                                 | 12.20                    |
| Circulatory      | 37                     | 35.24             | 278                           | 0.87                                 | 7.51                     |
| Urinary          | 34                     | 32.38             | 483                           | 0.93                                 | 14.21                    |
| Dermatological   | 28                     | 26.67             | 427                           | 0.94                                 | 15.25                    |
| Respiratory      | 27                     | 25.71             | 375                           | 0.93                                 | 13.89                    |
| Neurological     | 15                     | 14.29             | 254                           | 0.94                                 | 16.93                    |
| Reproductive     | 12                     | 11.43             | 169                           | 0.93                                 | 14.08                    |
| Skeleton and muscles | 11                | 10.48             | 87                            | 0.88                                 | 7.91                     |
| Ophthalmological | 1                      | 0.95              | 36                            | 1.00                                 | 36.00                    |
| Other            | 13                     | 12.38             | 40                            | 0.69                                 | 3.08                     |

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*a A taxon may be listed in several of the categories of medicinal usage

*b As percentage of records on the total of 105 records

$c F_{IC} = (n_u - n)/(n_u - 1)$

$d MI = n_u/n_t$
studies, which indicates a high degree of consensus among the informants.

**Medicinal plants reported by one or two informants**

The previous statistical study was based on the plants reported by three or more independent informants. However, it is also considered important to present the list of plants that were reported by only one or two informants (Table 6), because, although they may be less statistically significant, they may reflect the acculturation that has occurred in the last half-century in the industrialized western countries, such as those of Western Europe, where, at least partially, a modern culture is being adopted in detriment of the traditional one [59].

**Conclusion**

This work was a crystallization of the experience and a way to take another look at the ethnopharmacological knowledge unearthed and explored throughout the experience. The fieldwork also allowed the inventory of 105 taxa with medicinal properties used by the population from the Protected Landscape of “Serra de Montejunto” (Lisbon District, Portugal), where studies on the traditional uses of plants were nonexistent. The plants were distributed among 10 categories and 95 subcategories according to their uses where digestive category included the largest number of plant species.

The botanical families Rosaceae, Asteraceae, Fabaceae, and Lamiaceae were those with the greatest species representation, which can be explained by the predominance of these families in the Mediterranean flora and also because they include some common plants. Although the properties of these families are used in pharmacology, they were not necessarily the most cited.

The leaves and aerial part were most often used in the preparation of medicinal concoctions, followed by the flower and fruit. The infusion and direct application preparations were the most frequently used and oral administration largely predominated over another one. The plant was also most often used fresh.

Most plants referred in this study are still in use today. Only 17 are no longer used at the present time because habits have changed. For example, due to the availability of medicinal products in pharmacies, Atropa belladonna L., Ecballium elaterium (L.) A. Rich., Gomphrena globosa L., Hyoscyamus albus L., and Valeriana officinalis L. are no longer favored.

The informants reported 315 common names for the medicinal plants, 11 of which are repeated because different plants have the same local name. A more detailed analysis should be done relating to these two plants correlating with its use and the predominance of their mention by the interviewees.

As shown by our analysis of data collected, both through field research and interviews, the use of medicinal plants based on folk knowledge is still very much common in the region studied and still transmitted through the generations. Some of the younger generations living in rural areas turn to the plant knowledge of their ancestors instead of looking for a pharmacy. However, it is still possible for it to disappear from memory which is why these studies, where the memory is preserved and transmitted in writing, properly cataloged...
| Botanical family, scientific name | Local Portuguese names | FC | Popular use                  | Part(s) used | Preparation | Administration | Condition | Actual use | Voucher number |
|----------------------------------|------------------------|----|-----------------------------|--------------|-------------|----------------|-----------|------------|----------------|
| Apocynaceae                      | Vinca major L.         | 1  | Circulatory—diabetes       | Leaves       | Infusion    | Oral           | Fresh     | No         | LISI 117/2019  |
| Asparagaceae                     | Agave americana L.     | 1  | Respiratory—cough          | Leaves       | Syrup       | Oral           | Fresh     | No         | LISI 397/2019  |
| Asteraceae (Compositae)          | Urginea maritima (L.)  | 1  | Dermatological—wounds      | Stem         | Direct      | External       | Fresh     | No         | LISI 128/2019  |
| Helianthus annuus L.             | Girassol, helianto     | 2  | Circulatory—cholesterol    | Leaves       | Infusion    | Oral           | Fresh     | Yes        | LISI 398/2019  |
| Crassulaceae                     | Umbilicus rupestris    | 1  | Dermatological—callus      | Leaves       | Direct      | External       | Fresh     | No         | LISI 129/2019  |
| Fagaceae                         | Castanea sativa Mill.  | 1  | Respiratory—cough, throat  | Leaves       | Infusion    | Oral           | Fresh or dried | Yes        | LISI 118/2019  |
| Lamioceae (Labiatae)             | Salvia officinalis L.  | 2  | Digestive—digestion        | Leaves       | Infusion    | Oral           | Fresh or dried | Yes        | LISI 367/2019  |
| Lauraceae                        | Laurus nobilis L.      | 1  | Digestive — digestion      | Leaves       | Infusion    | Oral           | Fresh     | Yes        | LISI 119/2019  |
| Papaveraceae                     | Papaver rhoes L.       | 1  | Neurological—tranquillizer | Flower       | Infusion    | Oral           | Fresh     | Yes        | LISI 121/2019  |
| Passifloraceae                   | Passiflora caerulea L. | 1  | Neurological—tranquillizer | Leaves       | Infusion    | Oral           | Fresh     | Yes        | LISI 130/2019  |
| Plantaginaceae                   | Digitalis purpurea L.  | 2  | Circulatory—heart          | Leaves       | Infusion    | Oral           | Fresh     | No         | LISI 122/2019  |
| Rosaceae                         | Prunus spinosa L.      | 1  | Circulatory—heart          | Leaves       | Infusion    | Oral           | Fresh     | No         | LISI 123/2019  |
| Botanical family, scientific name | Local Portuguese names                      | FC | Popular use                  | Part(s) used | Preparation | Administration | Condition | Actual use | Voucher number |
|---------------------------------|--------------------------------------------|----|-----------------------------|--------------|-------------|----------------|-----------|------------|---------------|
| **Rutaceae**                    |                                            |    |                             |              |             |                |           |            |               |
| **Ruta chalepensis** L.**        | Arruda, arruda-dos-calcários, erva-das-bruxas, erva-da-graça | 2  | Digestive—appetite          | Aerial part  | Poultice    | External Fresh | Fresh     | No         | LISI 124/2019 |
|                                 |                                            |    | Respiratory—asthma          | Aerial part  | Smoke       | Inhalation     | Fresh     | No         |               |
| **Thymelaeaceae**               |                                            |    |                             |              |             |                |           |            |               |
| **Daphne gniidium** L.**         | Trovisco, trovisco-fêmea, trovisqueiro     | 2  | Dermatological—warts       | Latex        | Direct      | External Fresh | Fresh     | Yes        | LISI 126/2019 |
|                                 |                                            |    |                             | application  |             |                |           |            |               |
| **Tropaeolaceae**               |                                            |    |                             |              |             |                |           |            |               |
| **Tropaeolum majus** L.**        | Chagas, capuchinhas, mastruço-do-perú       | 2  | Other—antibiotic            | Flower,      | Infusion    | Oral           | Fresh     | Yes        | LISI 125/2019 |
|                                 |                                            |    |                             | leaves, seeds|             |                |           |            |               |

*The number of informants that referred the taxon*
and analyzed, are vital. They also may encourage others, younger and/or outsiders, to take an interest in the plants and their uses as well as in investigating the traditions and the possibilities. However, a detailed analysis of each category and the benefits associated with the plants mentioned is still needed.

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Authors’ contributions
The authors carried out the entire study; they designed the study, conducted the fieldwork, identified the plant species, did data analysis, and wrote the manuscript. All authors read, corrected, and approved the final manuscript.

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Availability of data and materials
The authors already included all data in the manuscript collected during the field surveys.

Ethics approval and consent to participate
Before conducting interviews, oral consent was received from informants regarding data collection and publication. No further ethics approval was required. Ethical guidelines of the International Society of Ethnobiology (http://www.ethnobiology.net/) were strictly followed.

Consent for publication
This manuscript does not contain any individual person’s data, and further consent for publication is not required.

Competing interests
The authors declare that they have no competing interests.

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