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Anthropogenic impact on a protected area, Rio Doce Park

[Impacto antropogénico en un área protegida, el Parque Rio Doce]

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Abstract: This study aimed to assess the anthropogenic activities at Rio Doce Park, Minas Gerais, Brazil, from ethnopharmacological surveys in Timóteo and Marliéria, which are located around the park. Interviews were conducted with previously identified, key informants, 15 in Timóteo and 10 in Marliéria. Two respondents collected medicinal plants in the forest of the park (from a few trees) but kept the same vulnerability of the use of their barks. Among the 141 surveyed botanical terms, we identified 95 species of 44 different botanical families. On the basis of statistical analyses, the 12 most used species were selected by respondents considering their therapeutic purposes and also obtaining the purpose of the use and dosage, among others. The knowledge about the use of medicinal plants has been maintained through generations but away from the formal health system and a sustainable management plan to encourage the preservation of the park.

Keywords: conservation, ethnobotany, exploitation, medicinal plants

Resumen: Este estudio tuvo como objetivo evaluar las actividades humanas en Rio Doce Park, MG, desde encuesta ethnopharmacological en las ciudades de Timoteo y Marliéria. Realizamos entrevistas semi-estructuradas con informantes clave identificados anteriormente, un total de 15 en Timoteo y 10 en Marliéria. Sólo dos encuestados informaron de recolección de plantas medicinales en el parque forestal. De los 141 términos botánicos citados, se identificaron 95 especies y 44 familias de plantas. Basado en el análisis estadístico, 12 especies fueron seleccionadas más utilizados por los encuestados y sus efectos terapéuticos, también la obtención de la finalidad del uso y la dosis, entre otros. Se encontró que se perpetúan los conocimientos combate el uso de plantas medicinales, pero desconectado del sistema formal de salud y un plan de manejo sostenible para promover la conservación del parque.

Palabras clave: conservación, etnobotánica, explotación, plantas medicinales

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INTRODUCTION

Biodiversity resources are essential for the economic, social, and cultural development of human societies (Fonseca-Kruel & Peizoto, 2004). According to Moreira *et al*. (2002), "the use of natural resources is an ancient practice, of which man is the protagonist, overcoming all obstacles of the evolutionary process and coming to the present day, being applied to the whole world population". However, disorderly urban sprawl, accompanied by abrupt changes in the landscape, are having the effect of both the loss of referential relationship of humans with the place and the consequent impoverishment of their culture and identity because of the direct damage via environmental impacts (Buck & Marin, 2005).

Humans have always been dependent on plants for their survival, using them for various needs, causing vegetation and evolutionary changes in plants (Albuquerque, 2005). For Diegues *et al*. (1998, 2000), nature is treated by modern man as objects of knowledge, domestication, and various uses as well as inspiration for rituals in traditional societies.

For the appreciation of green areas, such as the Rio Doce Park (PERD), it is necessary to involve the population, particularly those located around conservation areas, according to Albuquerque & Andrade (2002), the knowledge recovered from the population (traditional knowledge) is a powerful tool of which conservationists can take advantage in planning and maintenance of these areas. This is a source of very useful information in planning a participatory development of conservation unities and sustainability (Hanazaki, 2002). This local knowledge and information can contribute to complement scientific knowledge about natural resource management (Berkes *et al*., 1998). Diegues (1988) suggests the incorporation of traditional local knowledge in developing and implementing management plans of preservation areas.

As a strategy for research into medicinal plants, there is an ethnopharmacological approach, which seeks to combine information acquired from users of medicinal flora (traditional communities and experts), with chemical and pharmacological studies (Elisabetsky, 2003). Ethnopharmacology is at the intersection of ethnography and medical biology of therapeutic action; in other words, it is a transdisciplinary exploration covering the social and biological sciences (Etkin & Elisabetsky, 2005).

Researchers seek methodological tools to understand how people affect plants. To Hurrell & Albuquerque (2012), ethnobotany and ecology complement each other and thus reinforces the need for closer ties between both sciences. Thus, ecology can help understand how human behavior can be modulated from an ecological perspective. The advance of current ethnobotanical studies has been incorporating methods and techniques that are increasingly quantitative and less qualitative, allowing the collection of information on the management of tropical forests, with interesting discoveries (Prance, 1991).

Over the years, ethnobotany began incorporating quantitative approaches, such data can be used as justification for the conservation of plant species and popular knowledge, mainly by providing information about the species and/or used more for many families' purposes (Vendruscolo & Mentz, 2006). According to Prance *et al*. (1987), it is a strong tool to integrate ethnobotanical studies of biological and ecological information, going beyond simple lists of species and uses because the qualitative and quantitative approaches are complementary.

This study aims to conduct an ethnopharmacological survey in municipalities located on the west side of the PERD. In addition to identifying the main knowledgeable of the use of medicinal flora, we recorded the species of plants used by respondents and information about their medical use, plant parts used, and method of preparation, among others and the selection of the main plants and its use and relevance for these populations. Furthermore, we described the relationship of the surrounding populations of PERD with local biodiversity.

MATERIALS AND METHODS

The study was conducted in the municipalities of Marliéria and Timóteo, located west at the interface with the PERD, in Southwest Minas Gerais (MG), Brazil. The PERD is home to the largest rainforest in the state and has 36,970 hectares, being the first state conservation unit created in Minas Gerais (Figure 1). It is part of the submontane semideciduous seasonal

forest (IEF, 2011). The population of Marliéria consists of 4,012 inhabitants and Timóteo 81,243, according to IBGE (2011).

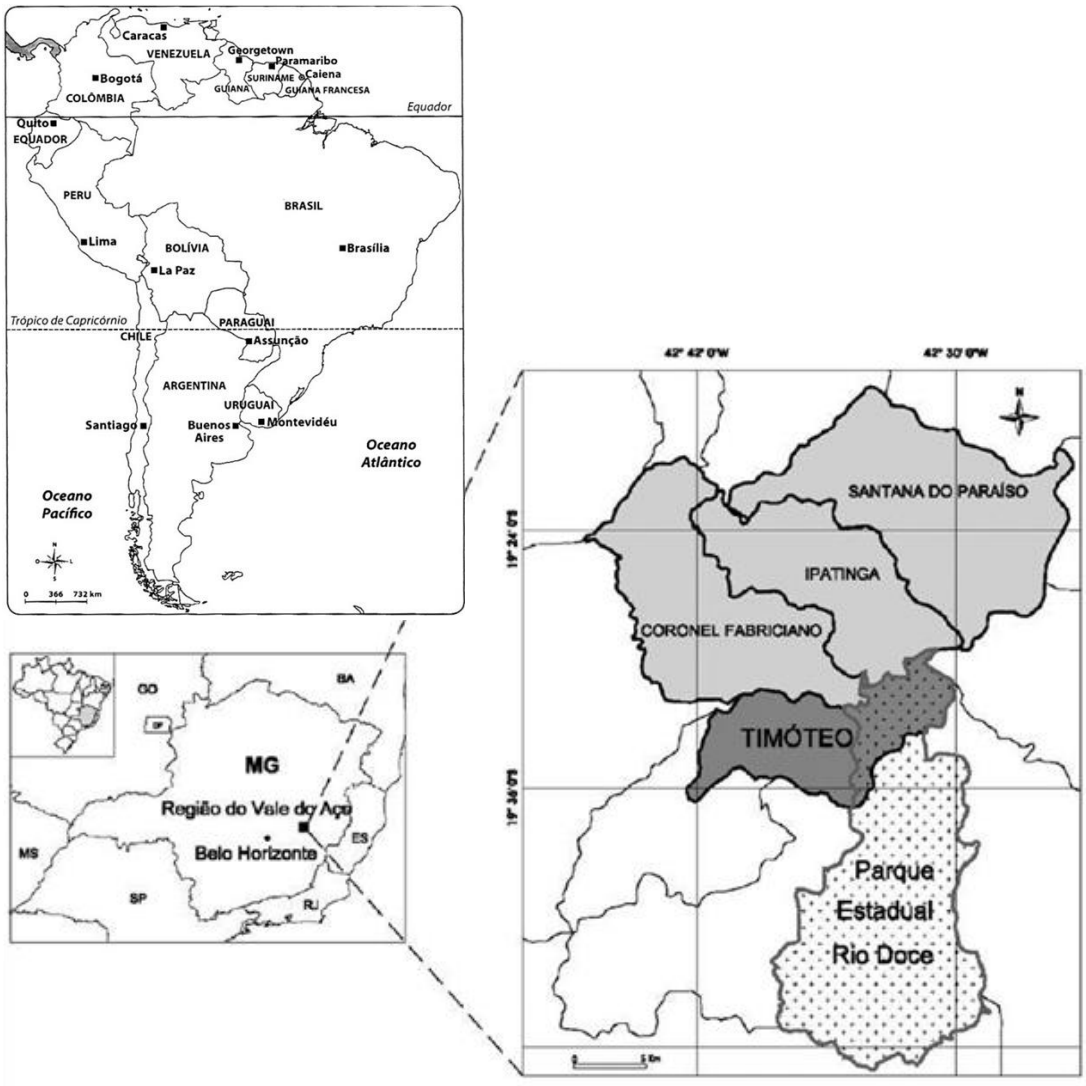

Figure 1
Google Earth image of the PERD region encompassing the municipalities of Timóteo and Marliéria

During July and August 2011, data were collected through an ethnopharmacological application of 25 semi-structured questionnaires that followed the model of Alexíades (1996) and were adapted by Albuquerque & Andrade (2002), open and closed questions alternated, along with key informants, regarding the use of medicinal plants. The indication of these key informants was performed by Snowball, proposed by Becker (1993), in which people in the community indicated other knowledge of other medicinal plants. In the first part of the questionnaire, personal data were collected. In the second part, we collected data on medicinal plants (information about the medical use, plant parts used, method of preparation, and other information). At the end of every interview, informants (as well as those

responsible for the project) were asked to sign a consent form that clarified the objectives.

The botanical materials were collected and prepared as herbarium specimens and listed at the Leopoldo Krieger Herbarium (CESJ). When it was not possible to collect fertile plant material, the Check-List method proposed by Alexíades (1996) and Albuquerque & Lucena (2004) was applied, photographs were presented to respondents, contained in Lorenzi & Matos (2008), for confirmation of the species.

Statistical analyses was performed in order to identify the importance of plants to the population through the Use Value (UV) index, proposed by Phillips & Gentry (1993), and the Percentage Calculation of Agreement related to the Main Uses (AMU) for the species in question, proposed by Friedmam *et al*. (1986) and modified by Amorozo & Gély (1988). The index of UV estimates the versatility of plants for its ways of use, and the Percentage Calculation of AMU estimates the agreement on the main use of the plant (Amorozo & Gely, 1988).

To calculate the value in use of one species to an informant (UVIS), the UVIS formula = ΣUis/nis was used, where Uis is the number of uses mentioned by the informant for the species and nis is the number of interviews with the informant. However, this nis value was always one for all our species because only one interview was conducted with each informant. Therefore, the UVIS value is equal to the Uis. To calculate the UV of each species (UVs), the UVs formula = ΣUVIS/n was used, where UVIS was equivalent to using value from one species to an informant and "n" is the total number of interviewed informants. The value of n corresponds to a value of ns reported by Phillips & Gentry (1993).

The cAMU are obtained from the Agreement Percentage calculation related to the Main Uses - CUP - (most cited) for the species in question, proposed by Amorozo & Gély (1988). The number of respondents who cited the main use times 100, divided by the number of respondents who cited the species results in CUP, represented in the formula CUP = number of informants who cited primary use × 100/number of informants who cited use of the species. Due to differences in the number of respondents who cited uses for each species, it is necessary to use a correction factor (CF) obtained by dividing the number of respondents who cited uses for the species by the number of respondents who cited main species, with more such uses (HR = number of informants who cited the species/number of informants who cited the most cited species). Therefore, multiply by CUP FC to get the cAMU.

RESULTS AND DISCUSSION

Sixty informants were cited by the population, of whom 25 were interviewed. The others were not found, either deceased or unwilling to participate. For the types of drugs most used by respondents, 37% used herbal remedies and chemicals, 31% used only herbal, 29% used only homeopathic, and only 3% used all of them. These data confirm the reliability and the relative high rate (70%) of use of plants by respondents. In addition, this corroborates the study by Estomba *et al*. (2006) carried out in a community in Patagonia, where it was also observed that knowledge about medicinal plants is still alive despite the modern influences of larger cities.

Among the respondents, only 12 have home vegetable gardens; the others get the medicinal plants elsewhere, such as in the Timóteo Natural Life Institute (5), by neighbors who own a vegetable garden (2), or buying at the market (3). The exchange of plants among neighbors and friends was also observed by Estomba *et al*. (2006). Only three respondents reported using resources from the park area, although the number is considered low, the vulnerability of trees from which these people make use of the shell must be considered. This act can damage the tree and lead to its death, compromising the floristic diversity site. It was impossible to collect the species used by these respondents specifically within the park area due to protection rules.

Botanical terms (141) were chosen relating to 95 species of medicinal plants. Table 1 reports the most widely used botanical families and, within these medicinal plants used, the collection site and which are acquired by the population.

Table 1
Medicinal plants used by the population at the PERD surroundings, MG, Brazil

Family	Number of citations	Scientific name	Popular name	Voucher number	Habit	Collection site
Lamiaceae	19	*Mentha spicata* L. (Europe)	Hortelã	58288	Herbaceous	HG
	15	*Plectranthus barbatus* Andrews (New Guinea)	Boldo comum	58391	Herbaceous	HG
	13	*Ocimum gratissimum* L. (Orient)	Alfavaca	58313	Herbaceous	HG
	7	*Mentha pulegium* L. (Europe, Asia, Arabia)	Poejo		Herbaceous	HG
	5	*Rosmarinus officinalis* L. (Mediterranean Region)	Alecrim	58303	Herbaceous	HG
	5	*Mentha arvensis* L. (Japan)	Vick		Herbaceous	HG
	4	*Mentha cf. piperita* L (Europe)	Elevante		Herbaceous	HG
	3	*Leonotis nepetifoilia* L. R. Br. (Africa, India)	Cordão de frade	62378	Herbaceous	HG
	3	*Leonurus sibiricus* L. (China)	Macaé	62381	Herbaceous	HG
	3	*Ocimum selloi Benth.* (Brazil)	Erva doce, alfavaca de cheiro	58312	Herbaceous	HG
	2	*Melissa officinalis* L. (Southern Europe)	Melissa	58292	Herbaceous	HG
	1	*Plectranthus ornatus* Codd. (South Africa)	Boldo do chile		Herbaceous	HG
	1	*Ocimum tenuiflorum* L (Asia)	Majericão branco	58294	Herbaceous	HG
	1	*Ocimum basilicum*. var. *purpurascens* Benth (Orient)	Manjericão roxo		Herbaceous	HG
	1	*Plectranthus amboinicus* (Lour.) Spreng (South Africa)	Hortelã pimenta		Herbaceous	HG
Asteraceae	14	*Solidago chilensis* Meyen (South America)	Arnica	58376	Herbaceous	HG
		Mikania glomerata				

	13	Spreng. (Brazil)	Guaco	58311	Herbaceous	HG
	12	*Chamomilla recutita* (L.) Rauschert (Europe)	Camomila	58284	Herbaceous	HG
	9	*Artemisia absinthium* L (Europe, Asia, Africa)	Losna	58308	Herbaceous	HG
	3	*Achyrocline satureioides* (Lam)DC (Brazil)	Marcelinha	58310	Herbaceous	HG
	2	*Cynara cardunculus* L (Mediterranean Region)	Alcachofra		Herbaceous	Market
	2	*Arctium minus* (Hill) Bernh. (United States)	Bardana		Herbaceous	Market
	2	*Calendula officinalis* L (Europe and India)	Calêndula		Herbaceous	IV
	1	*Vernonanthura phosphorica* (Vell.) H.Rob. (Brazil)	Assa peixe	58369	Herbaceous	HG
	1	*Acmella uliginosa* (Sw.) Cass. (Tropical America)	Jambu		Herbaceous	IV
	1	*Achillea millefolium* L (Africa, India)	Mil folhas	58298	Herbaceous	IV
	1	*Acmella ciliata* (Kunth) Cass. (Africa)	Necroton	58380	Herbaceous	HG
	1	*Bidens pilosa* L. (Tropical America)	Picão	58371	Herbaceous	HG
	1	*Taraxacum officinale* F. H. Wigg. (Great Britain)	Taraxacum, dente de leão		Herbaceous	IV
	1	*Sonchus oleraceus* (L.) L. (Brasil)	Serralha		Herbaceous	HG
	1	*Baccharis trimera* (Less.) DC. (Brazil)	Carqueja	58287		HG
Rutaceae	6	*Citrus x aurantium* L. (Asia)	Laranja			HG
	4	*Citrus limon* (L.) Burm. F. (Asia)	Limão			HG
	3	*Ruta graveolens* L. (Southern Europe)	Arruda	58314		HG
		Stryphodendron adstrigens				

Fabaceae	**2**	**(Mart.) Cariello (Brazil)**	**Barbatimão**		**Arboreal**	**Market**
	2	***Senna occidentalis* (L.) Link (America)**	**Fedegoso**	**62798**	**Arboreal**	**HG**
	1	***Abrus precatorius* L. (Indonesia)**	**Jequiri**		**Arboreal**	**Market**
	1	***Erythrina mulungu* Mart. Ex Benth. (South America)**	**Mulungú**		**Arboreal**	**IV**
Amaranthaceae	**4**	***Alternanthera brasiliana* (L.) O. Kunt. (Brazil)**	**Estomalina**		**Herbaceous**	**HG**
	3	***Chenopodium ambrosioides* L. (Tropical America)**	**Erva de santa maria**	**58286**	**Herbaceous**	**HG**
	1	***Hebanthe eriantha* (Poir.) (South America)**	**Jaborandi**	**58386**	**Herbaceous**	**HG**
Poaceae	**1**	***Cymbopogon winterianus* Jowitt ex Bor (India)**	**Citronela**		**Herbaceous**	**HG**
	1	***Coix lacryma-jobi* L. (Asia)**	**Conta de lágrima**	**58305**	**Herbaceous**	**HG**
	1	***Cymbopogon citratus* (DC) Stapf. (Asia)**	**Capim cidreira**		**Herbaceous**	**HG**
Crassulaceae	**2**	***Sedum dendroideum* Moc. (Mexico)**	**Bálsamo**		**Herbaceous**	**HG**
	2	***Kalanchoe brasiliensis* Cambess. (Brazil)**	**Saião**		**Herbaceous**	**HG**
	1	***Bryophyllum pinnatum* (Lam.) Oken (South Africa)**	**Folha da fortuna**		**Herbaceous**	**HG**
Verbenaceae	**13**	***Lippia alba* (Mill.) N.E. Br. (Brazil)**	**Erva cidreira**	**58301**	**Herbaceous**	**HG**
	2	***Lantana camara* L. (Central America and South)**	**Cambará, camará**	**58388**	**Herbaceous**	**HG**
Brassicaceae	**5**	***Brassica oleraceae* L. (Western Europe)**	**Couve**		**Herbaceous**	**Market**

	6	***Nasturtium officinale* R. Br. (Europe, Central Asia)**	**Agrião**		**Herbaceous**	**Market**
Apiaceae	**5**	***Foeniculum vulgare* Mill. (Europe)**	**Funcho**	**58282**	**Herbaceous**	**HG**
	2	***Petroselinum crispum* (Mill.) Fuss (Europe)**	**Salsa**		**Herbaceous**	**HG**
Lythraceae	**1**	***Cuphea carthagenensis* (Jacq.) J.F. Macbr. (South America)**	**Sete sangria**		**Herbaceous**	**IV**
	7	***Punica granatum L.* (Asia)**	**Romã**	**62810**	**Arboreal**	**HG**
Myrtaceae	**3**	***Eucalyptus citriodora* Hook (Australia)**	**Eucalipto**		**Arboreal**	**HG**
	2	***Psidium guajava L.* (South America)**	**Goiabeira**		**Arboreal**	**HG**
Rosaceae	**3**	***Rosa alba L.* (Mediterranean countries)**	**Rosa branca**	**58370**	**Herbaceous**	**HG**
	1	***Filipendula ulmaria* (L.) Maxim. (Europe, Wetern Asia)**	**Aspirina**		**Herbaceous**	**IV**
Zingiberaceae	**2**	***Zingiber officinale* Roscoe (India)**	**Gengibre**		**Herbaceous**	**Market**
	1	***Curcuma longa* L. (Asia)**	**Açafrão**		**Herbaceous**	**Market**
Cucurbitaceae	**2**	***Momordica charantia* L. (Asia, Africa)**	**Melão são Caetano**	**58306**	**Herbaceous**	**HG**
	1	***Bryonia alba* L. (Europe)**	**Briônia**		**Herbaceous**	**IV**
Vitaceae	**2**	***Cissus verticillata* (L.) Nicholson & C.E.Jarvis (Brazil)**	**Insulina**		**Herbaceous**	**HG**
	1	***Vitis vinifera* L. (Asia)**	**Uva**		**Herbaceous**	**Market**
Equisetaceae	**4**	***Equisetum hyemale* L. (Europe, America)**	**Cavalinha**	**58285**	**Herbaceous**	**HG**

	2	***Equisetum giganteum* L. (Brazil)**	**Cavalinha**	**58283**	**Herbaceous**	**HG**
Polygonaceae	**2**	***Muehlenbeckia platyclada* (F. Muell.) Meisn. (Asia)**	**Solitária**	**58302**	**Herbaceous**	**HG**
	1	***Polygonum hydropiperoides* Michx. (Europe)**	**Erva de bicho**		**Herbaceous**	**HG**
Plantaginaceae	**14**	***Plantago major* L. (Europe, Brazil)**	**Transagem**	**58291**	**Herbaceous**	**HG**
Costaceae	**9**	***Costus spicatus* (Jacq.) Sw. (Brazil)**	**Cana de macaco**	**58315**	**Herbaceous**	**HG**
Asphodelaceae	**6**	***Aloe arborescens* Mill. (Arabian Peninsula)**	**Babosa**	**62802**	**Herbaceous**	**HG IV**
Ginkgoaceae	**4**	***Ginkgo biloba* L. (China)**	**Ginkgo biloba**		**Arboreal**	**Market**
Malvaceae	**3**	***Gossypium hirsutum* L (India)**	**Algodão**	**58297**	**Arboreal**	**HG**
Alliaceae	**3**	***Allium sativum* L. (Europe)**	**Alho**		**Herbaceous**	**Market**
Liliaceae	**3**	***Allium cepa* L. (Asia)**	**Cebola**		**Herbaceous**	**Market**
Euphorbiaceae	**3**	***Jatropha curcas* L. (Central America)**	**Metiolate**		**Herbaceous**	**IV**
Portulacaceae	**3**	***Talinum paniculata* (Jacq.) Gaertn. (Brazil)**	**Ora pro nobre**		**Herbaceous**	**HG**
Phyllanthaceae	**3**	***Phyllanthus tenellus* Roxb. (Brazil)**	**Quebra pedra**	**58379**	**Herbaceous**	**HG**
Bixaceae	**3**	***Bixa orellana* L. (Tropical America)**	**Urucum, bicho urelana**	**62803**	**Arboreal**	**HG**
Balsaminaceae	**2**	***Impatiens sultani* Hook. f. (Africa)**	**Beijo branco**		**Herbaceous**	**HG**

Rubiaceae	**2**	***Coffea arabica* L. (Ethiopia)**	**Café**		**Herbaceous**	**Market**
Annonaceae	**2**	***Annona muricata* L. (Antilles)**	**Graviola**		**Arboreal**	**Market**
Bromeliaceae	**1**	***Ananas comosus* (L.) Merr. (Brazil)**	**Abacaxi**		**Herbaceous**	**Market**
Ranunculaceae	**1**	***Aconitum napellus* L. (Europe)**	**Aconitum**		**Herbaceous**	**IV**
Moraceae	**1**	***Morus alba* L. (India, China)**	**Amora**		**Arboreal**	**HG**
Aristolochiaceae	**1**	***Aristolochia cymbifera* Mart. & Zucc. (Brazil)**	**Aristolochia , cipó mil homens**		**Herbaceous**	**IV**
Solanaceae	**1**	***Atropa belladona* L. (Europe, Africa, Asia)**	**Beladona**		**Herbaceous**	**IV**
Salicaceae	**1**	***Casearia sylvestris* Sw (South America)**	**Bugre**		**Arboreal**	**IV**
Arecaceae	**1**	***Cocos nucifera* L. (Asia, South America)**	**Coco**		**Arboreal**	**Market**
Celastraceae	**1**	***Maytenus ilicifolia* Reissek (Brazil)**	**Espinheira santa**		**Arboreal**	**IV**
Phytolaccaceae	**1**	***Petiveria alliaceae* L. (Brazil)**	**Guiné**		**Herbaceous**	**HG**
Caricaceae	**1**	***Carica papaya* L. (Central America and Caribbean)**	**Mamão**		**Arboreal**	**HG**
Passifloraceae	**1**	***Passiflora edulis* Sims (Brazil)**	**Maracujá**		**Herbaceous**	**Market**
Polypodiaceae	**1**	***Phlebodium decumanum* (Willd.) J. Sm. (Brazil)**	**Samambaia**		**Herbaceous**	**HG**

***IV = Instituto Vida Natural de Timóteo (Timóteo Life Natural Institute)**

Plants purchased at the Timóteo Natural Life Institute and at markets were not collected because they are mostly herbal drugs. The most representative plant families were Asteraceae (16 species) and Lamiaceae (15 species), as in studies by Brito & Brito (1993), Maioli-Azevedo & Fonseca-Kruel (2007), and Eyssartier *et al*. (2009). It shows a large influence of European culture in the use of medicinal plants among respondents, which was also observed by Begossi *et al*. (2002), Rezende & Cocco (2002), Guarim Neto & Morais (2003), Souza & Felfili (2006), Pinto *et al*. (2006), Brasileiro *et al*. (2008), and Eichemberg *et al*. (2009).

Most of the plants used were grown in their home gardens, which corroborates the results found by Silva & Proença (2008), because higher species richness can be grown in home gardens than those obtained by exploitation. According to Eichemberg *et al*. (2009), these plants were introduced and adapted very well to domestic home gardens and are being incorporated into popular knowledge. The same author also states that wealth is due to the home gardens of respondents of rural origin who maintain their traditions. Duque-Brasil *et al*. (2011) and Oakley (2004) state that home gardens contribute to the improvement of local diversity due to the combination of native and exotic species, becoming an indispensable source to owners. The study by Eyssartier *et al*. (2009) revealed more exotic species than native. The author highlights the cosmopolitan habit of some exotic medicinal plants as being responsible for their successful introduction into new regions.

The most commonly used plants prescribed by respondents (more than 5% of quote) are presented in Table 2, which shows that these are not relevant to the park biome, being common in medicinal gardens. A comparison was made between the data reported by respondents and those indicated under the law recommended by the Board Resolution (RDC) number 10 of March 9th, regulated by the National Health Surveillance Agency (ANVISA, 2010), they are botanical identification, method of use, therapeutic purpose, and parts used.

It was observed that among these plants, two species (mint and chamomile) were different from the recommended RDC number 10 (ANVISA, 2010) but have the same common name and therapeutic purposes. As part of the plant used, six species had discordance between the quotes of informants and scientific statement. The type of route used by the informants was consistent with the legislation consulted, but only *Punica granatum* L. had a type via the most cited by informants (oral) than indicated in the literature (topic).

On how to use and usage of medicinal plants, we observed 59.31% disagreement of the information described by key informants with the literature (Table 2) with respect to legislation consulted, demonstrating that the population needs clarification and further information on the use of medicinal plants. According to Lorenzi & Matos (2008), proper utilization of the active principles of a plant requires a correct preparation; in other words, for each part of the plant to be used, the chemical class of active principle to be extracted and the disease being treated, there is a more appropriate form of preparation and use. If there is concern about the exploitation type required for each plant, it can lead to misuse, which affects the treatment outcome.

As to the purpose of use, there were also differences between citation of informants and indication of legislation. These values show the distance between the folk wisdom and scientific knowledge, it is necessary to validate scientific citations still unconfirmed by informants.

Table 2
"How to use for therapeutic purposes" and "parts used" of the main medicinal plants cited by informants confronted with the relevant legislation.
***Number of citations**
****Therapeutic purpose in descending order of citation**.

Cited term	Botanical identification	Manner of use described by informants	Described therapeutic purpose**
Hortelã (19)*	*Mentha crispa* L.	78.95% Infusion 21.05% Decoction	Influenza, hypertension, neck pain
Boldo comum (15)	*Plectranthus barbatus* Andrews	86.67% Maceration 6.66% Infusion 6.66% Decoction	Indigestion, hangover
Arnica (14)	*Solidago chilensis* Meyen	100% Store in a container with alcohol	Bruises, bumps, ear infection
Transagem (14)	*Plantago major* L.	71.43% Infusion 28.57% Decoction	Antibiotic, strep throat, flu, antipyretic, smoking
Erva cidreira (13)	*Lippia alba* (Mill.) N.E. Br.	84.61% Infusion 15.39% Decoction	Soothing, hormone replacement
Guaco (13)	*Mikania glomerata* Spreng.	76.92% Syrup 15.38% Infusion 7.7% Decoction	Flu, expectorant, bronchitis, asthma, antipyretic
Alfavaca (13)	*Ocimum gratissimum* L.	76.92% Infusion 23.08% Decoction	Flu, colds, sore throat, hypertension, urinary tract infection
Camomila (12)	*Chamomilla recutita* (L.) Rauschert. sin. *Matricaria recutita* L.	83.33% Infusion 16.67% Decoction	Soothing, headache
Cana de macaco (9)	*Costus spicatus* (Jacq.) Sw.	66.67% Infusion 33.33% Decoction	Cystitis, urinary tract infection, kidney stone
Losna (9)	*Artemisia absinthium* L.	77.78% Maceration 11.11% Infusion 11.11% Decoction	Liver problems, headaches, stomach problems, stomach ache
Poejo (7)	*Mentha pulegium* L.	57.14% Infusion 28.57% Decoction 14.29% Syrup	Flu, expectorant, stomach problems
Romã (7)	*Punica granatum* L.	71.43% Decoction 28.57% Maceration	Throat infection

Part used	Species used part and the manner of use RDC Nº 10	Therapeutic purpose RDC Nº 10	ΣUVis	UVs	AMU (%)/FC	AMUc (%)
	Mentha spicata Leaves and flowering	Colic, flatulence				

100% Leaves	**luminaries Infusion**	**(gas), liver problems**	**26**	**1.04**	**100 / 1**	**100**
100% Leaves	***Plectranthus barbatus* Leaves Infusion**	**Dyspepsia (digestive disorders) and hypotension (low blood pressure)**	**22**	**0.88**	**100 / 0.8**	**80**
100% Leaves	***Arnica montana* Leaves Infusion**	**Trauma, bruises, sprains, swelling due to fractures and sprains. Hematomas**	**17**	**0.68**	**100 / 0.73**	**73**
84% Leaves 12.5% Seeds 3.5% Inflorescences	***Plantago major* Leaves Infusion**	**Inflammation of the mouth and pharynx**	**20**	**0.8**	**85.7 / 0.73**	**62.56**
100% Leaves	**Lippia alba Air parts Infusion**	**Mild cases of anxiety and insomnia, as mild tranquilizer. Abdominal cramps, stomach upset, flatulence (gas), as a digestive and expectorant**	**15**	**0.6**	**100 / 0.8**	**80**
100% Leaves	***Mikania glomerata* Leaves Infusion**	**Colds and flu, allergic and infectious bronchitis, expectorant**	**24**	**0.96**	**77 / 0.68**	**52.36**
88% Leaves 12% Seeds			**19**	**0.76**	**92 / 0.68**	**62,56**
78% Inflorescences 22% Leaves	***Matricaria recutita* Leaves Infusion**	**Intestinal cramps. Mild cases of anxiety as mild tranquilizer**	**19**	**0.76**	**91.66 / 0.63**	**57.74**
100% Leaves and stalk			**11**	**0.44**	**66.66 / 0.47**	**31.33**
100% Leaves			**12**	**0.48**	**75 / 0.47**	**35.25**
83% Leaves 17% Whole	***Mentha pulegium* Air parts**	**Respiratory expectorant. Appetite stimulant, digestive disturbances, gastrointestinal spasms, gallstones**				

plant	**Infusion**	**and cholecystitis**	**8**	**0.32**	**50 / 0.42**	**21**
100% Fruit bark	***Punica granatum* Pericarp (fruit bark) Decoction**	**Inflammation and infection of the lining of the mouth and pharynx as anti-inflammatory**	**8**	**0.32**	**100 / 0.42**	**42**

To evaluate the importance of the listed plants, an estimated value for each use was calculated. The most important species were *Mentha spicata* L (1.04), *Mikania glomerata* Spreng (0.96), and *Plectranthus barbatus* Andrews (0.88) (Table 2). As in Phillips & Gentry (1993), the UV Calculation criterion shows that the larger the number of uses for a particular species mentioned, the higher its importance to the community.

The Corrected Concordance as to the Main Uses for each species (AMUc) is also shown in Table 2. According to Friedmam *et al*. (1986) and modified by Amorozo & Gély (1988), the higher the percentage value of AMUc, the greater the number of informants who mentioned the main use for the species, in other words, there is greater concordance of the population in the indication of this use. The species with the highest AMUc were *Mentha crispa* L. (100%) used for flu, *Mikania glomerata* Spreng (80%) also for flu, and *Lippia alba* (Mill.) N.E. Br. (80%) as a tranquilizer. Notably, the *Mikania glomerata* Spreng did not show an important use as an expectorant (Lorenzi & Matos, 2008). *Mentha crispa* L. (cited by informants) differs from *Mentha piperita* (indicated by the ANVISA) however, it was considered the same species because the similarity between species generated much doubt regarding the botanical identification. There was also disagreement on botanical nomenclature of *Arnica* and the species *Solidago chilensis Meyen* cited by informants, *Arnica montana* L. is recommended in the ANVISA.

In this survey, the exploitation of particular features of the medicinal flora was not drastic. It was possible to record the traditional knowledge of the use of medicinal plants by the communities surrounding the park and identify people who possess the knowledge of medicinal plants, as well as list the main plants and their knowledge and their use for therapeutic purposes.

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