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## Research Paper

## Ethno-medicinal study of plants used for treatment of human ailments, with residents of the surrounding region of forest fragments of Paraná, Brazil

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## ABSTRACT

**Ethnopharmacological relevance:** This study aims to document the traditional knowledge on the use of medicinal plants in the neighborhood of the protected area “Parque Estadual da Cabeça do Cachorro”, a fragment of seasonal semideciduous forests. This vegetation is intensely fragmented and disturbed; despite its importance there are few records of the traditional knowledge of medicinal species.

**Material and methods:** Twenty-four residents in the neighborhood of the protected area “Parque Estadual da Cabeça do Cachorro” were interviewed. The residents were questioned about preparation techniques, recommended doses, ways of administration and healing properties of various parts of the plants and were invited to walk through the park to collect *in situ* some species of plants. The recognized medicinal species were identified and traditional knowledge was systematized. Quantitative indices (Informant Consensus Factor – FIC and Use Value – UV) were calculated.

**Results:** 115 species of medicinal plants belonging to 54 botanical families were cited. Asteraceae ( $n=14$ ), Fabaceae ( $n=11$ ), Myrtaceae ( $n=6$ ), Bignoniaceae, Solanaceae and Verbenaceae ( $n=5$ ) were the most species-rich. The highest use values were calculated for *Achyrocline satureioides*, *Aristolochia triangularis* and *Bauhinia forficata* (0.63). Moreover, the informants consensus about usages of medicinal plants ranges from 0.024 to 0.663, which shows high level of agreements among the informants for gastrointestinal and respiratory system diseases. Furthermore, for the first time, new traditional medicinal uses of Asteraceae (*Chromolaena pedunculosa* Hook. & Arn.), Commelinaceae (*Tradescantia fluminensis* Vell.) and Polypodiaceae (*Microgramma vacciniifolia* Langsd. & Fisch.) species were reported.

**Conclusions:** Present study revealed that the residents of the surrounding region of forest fragments of Paraná are rich in ethno-medicinal knowledge and rely on plant-based remedies for common health problems. As in many parts of Brazil knowledge of the past is combined with new knowledge that has recently been incorporated emphasizing the cultural changes that this area is experiencing. Despite the use of different species of plants are crucial to their way of life, there is concern that these rich popular knowledge may disappear in the future as a result of a possible modernization of this area.

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## 1. Introduction

Ethnopharmacological studies have been used in different contexts. These studies may involve the registration of traditional

use of plants and the understanding of the dynamics of traditional knowledge. Local knowledge of medicinal plants has been a source of research to prove the effects of plants and develop new therapeutic resources. Another approach aims to use traditional practices in formal health systems (Baptista et al., 2013). On the second half of the twentieth century there was a gradual decrease in the importance of the use of medicinal plants in Brazilian formal health care. This situation is modified nowadays with a growing interest in the use of medicinal plants. The Brazilian government

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has encouraged the use of medicinal plants and herbal medicines as a strategy to improve the use of the Brazilian biodiversity and public access to herbal medicines (Brasil, 2006).

Another context is related to the preservation of biodiversity, several authors address the potential relevance of the information in this context (Heinrich et al., 2009). The conservation of ethnobotanical knowledge as part of living cultural knowledge and practice between communities and the environment is essential for biodiversity conservation (Maroyi, 2011). Researches on the local knowledge also confirm the value of these cultures and self-sufficiency of local communities, as well as the importance of biodiversity to the sustainability of these populations (Di Stasi et al., 2002).

Traditional knowledge related to medicinal plants is the basis of folk medicine in Brazil, which is derived from a mixture of Brazilian indigenous cultures and European and African influences from the colonization period (Cartaxo et al., 2010). Several ethnobotanical studies have been developed in Brazil to record the local knowledge of communities associated with different biomes (Coelho de Souza et al., 2004). The presence of different biomes (tropical rainforest “Amazon”; tropical scrub forest “Caatinga”; tropical grassland and savannah “Cerrado”; tropical deciduous forest “Mata Atlântica”; flooded grassland “Pantanal” and subtropical prairies or grasslands “pampas”) characterize Brazil as the country with one of the greatest biodiversity on the planet.

The tropical deciduous forest “Atlantic Forest or Mata Atlântica” is among the major Brazilian biomes and the most disfigured by human occupation. The Atlantic Forest includes about 7.5–9.0% of remaining primary vegetation (Souza and Batista, 2004). Original vegetation of western Paraná State is semideciduous forest, in which a portion of the trees defoliates during the dry season (Souza and Batista, 2004). The seasonal semideciduous forests constituted about 90% of the original vegetation of the western Paraná State and currently remain as small forest fragments. The soil quality provided the expansion of agriculture which determined the near disappearance of seasonal semideciduous forests in Paraná (Roderjan et al., 2002). This constitutes the phytoecological unit most drastically disturbed.

This region is severely fragmented, and the landscape consists mostly of intensive agriculture with some forest remnants that cover only about 4–5% of total area. The western region of Paraná State received greater human occupation during the first half of the 20th century with the implementation of agriculture which resulted in intense deforestation. Currently there are few areas of original vegetation and protected areas that do not form a continuum, resulting in small forest fragments. The protected areas (national and regional parks) are the most representative regional forest fragments. Human occupation occurred with migration originating from other countries and other Brazilian regions, which contributed to the rich cultural and traditional knowledge. In this region the deforestation preceded the scientific research on the traditional knowledge associated with the native species.

In this study, we documented the traditional knowledge of medicinal plants from communities near a forest fragment of the western Paraná State (Parque Estadual da Cabeça do Cachorro), aiming to understand the pressures faced by the species of plants in this protected area, and suggest approaches to include the use of medicinal plants in formal health systems and contribute to the preservation of biodiversity.

## 2. Material and methods

### 2.1. Study area

This study was conducted in the western region of Paraná State, southeastern Brazil. A protected area and the support zone communities

(Fig. 1) were used in this study. The area refers to the “Parque Estadual da Cabeça do Cachorro” (PECC) – situated 5 km from the São Pedro do Iguçu city (coordinates 24°54'S and 53°55'W), and maintained by the Paraná State government in the Parks category (IAP, 2013). The regional climate is subtropical – Cfa, the average annual rainfall is 1600–1800 mm. The average annual temperature is 21 °C, with monthly maximum average (28 °C) occurring between December and February and minimum (17 °C) between June and August. The vegetation of the protected area is characterized as “seasonal semideciduous forests”, phytogeographic unit of Atlantic Forest biome. The study was authorized by the Environmental Institute of Paraná (IAP), the park management (Consent no. 132/2009).

### 2.2. Data collection

This research complies with the standards and guidelines in force for bioethical studies involving human beings (Resolution no. 196/1996 of the National Health Council – CNS). The study was approved by Research Ethics Committee (Pontifícia Universidade Católica do Paraná – PUCPR – no. 0002635/09) and conducted in two stages: in the first step an ethnobotanical survey was conducted in 2009 using semi-structured interviews and participatory observation (Cotton, 1996). Twenty-four residents of the park surrounding region were interviewed. Residents were invited to participate in the study after formal presentation and signing a prior consent form. For respondents, anonymity and the confidentiality of information was assured. Information was obtained from a script containing questions about the socioeconomic profile and traditional knowledge. Information about the medicinal plants resources in the region and details of their medicinal uses were obtained. The residents were questioned about preparation techniques, recommended doses, ways of administration and healing properties of various parts of the plants. In the second stage, respondents with greater knowledge about medicinal plants were invited to walk through the park to collect plant species *in situ*. The forest remnant areas were covered in the internal trails parks, observing five meters on both sides of the track.

### 2.3. Herborization

The medicinal species recognized by respondents that were presented in a reproductive stage were collected and herborized. For each species collected, a field form with collector's name, common name, habit, collection site was completed. Specimens of all the samples were deposited in the herbaria of the “Museu Botânico Municipal de Curitiba” (MBM), and “Universidade Católica do Paraná” (HUCP), Curitiba/Parana, Brazil. Identification of the herborized material was performed by specialists using comparisons with herbarium exsiccates and/or the literature.

### 2.4. Data analysis

The mentioned medicinal uses were classified according to British National Formulary (British Medical Association, 2009). The medicinal species were categorized according to the amount of claims for medical use (Table 1). In this sense, the uses mentioned by the interview subjects were grouped into 11 categories from the traditional use of diseases, symptoms and effects. Results from the field surveys also were rechecked and compared with scientific literature (Brandão et al., 2009).

### 2.5. Quantitative factors

Informant Consensus Factor (FIC) was used for the analysis of the general use of plants. The FIC was calculated according to the following formula:  $FIC = \frac{Nur - Nt}{Nur - 1}$ , where Nur refers to the

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