Revista Brasileira de Farmacognosia
BRAZILIAN JOURNAL OF PHARMACOGNOSY
www.journais.elsevier.com/revista-brasileira-de-farmacognosia/

Original article

Medicinal plants traded in the open-air markets in the State of Rio de Janeiro, Brazil: an overview on their botanical diversity and toxicological potential

Fernanda Leitão[a,*], *Suzana Guimarães Leitão*[a], *Viviane Stern da Fonseca-Kruel*[b], *Ines Machline Silva*[c], *Karine Martins*[a]

[a]*Faculdade de Farmácia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, RJ, Brazil*
[b]*Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, Rio de Janeiro, RJ, Brazil*
[c]*Universidade Federal Rural do Rio de Janeiro, UFRRJ, Seropédica, RJ, Brazil*

ARTICLE INFO

Article history:
Received 25 February 2014
Accepted 16 April 2014

Keywords:
Brazil
Medicinal plants
Open-air markets
Rio de Janeiro
Toxic plants
Urban Ethnobotany

A B S T R A C T

Medicinal plants have been used for many years and are the source of new active substances and new drugs of pharmaceutical interest. The popular knowledge contained in the open-air markets is studied through urban ethnobotany, and is a good source of information for ethnobotanical research. In this context, we surveyed the literature on works concerning open-air markets in the State of Rio de Janeiro to gather knowledge of the commercialized plants therein. A literature search resulted in ten studies with 376 listed species, distributed in 94 families and 273 genera. Asteraceae family had the greater representation, followed by Lamiaceae and Fabaceae. *Solanum* was the most frequent genus. Two hundred and twenty four species could be considered potentially toxic or potentially interact with other drugs/medicines. Eighteen species are referred as “not for use during pregnancy”, and 3 “not for use while nursing”. These results are a source of concern since in Brazil, as it is worldwide, there is the notion that plants can never be harmful. The results for the Sørensen Coefficient showed greater similarity between works performed in very close study areas. Other studies presented low similarity, mainly because of the difficulty in plant identification or a very specific focus in methodology.

Introduction

Medicinal plants have been used for many years, and currently are used as the source of new active substances and new drugs of pharmaceutical interests. Ethnobotany and ethnopharmacology have been the primary scientific approaches to select these medicinal plants (Albuquerque and Hanazaki, 2006; Leitão et al., 2013). The scenario of urban populations is different from that of traditional communities regarding the use of the, often limited, resources. The city, as an ecosystem, possesses its own ecological dynamics and its residents build their knowledge around it (Almada,

* *Corresponding author.*
E-mail: fernandals@ufrj.br (F. Leitão).
0102-695X/$ - see front matter © 2014 Sociedade Brasileira de Farmacognosia. Published by Elsevier Editora Ltda. All rights reserved.
http://dx.doi.org/10.1016/j.bjp.2014.04.005

2010). The popular knowledge kept in the open-air markets is studied by urban ethnobotany, which observes the human-plant relationship. Hence these studies are a good source of information for ethnobotanical research, which have opened many doors to knowledge that has rarely been catalogued (Bye and Linares 1983; Balick and Lee 2001; Ceuterick et al., 2008; 2011; Philander 2011). Open-air markets are often the link between the urban population and natural products. These markets concentrate and diffuse empirical knowledge about plant and animal resources, including the use of medicinal and ornamental plants, foods and other products that have regional value (Martin, 2000; Albuquerque et al., 2007; Monteiro et al., 2010).

In Brazil, these studies are of great importance since it is the most biologically diverse country of the world (MS, 2006). Despite its relevance, only a few studies have been performed (Berg, 1984; Almeida and Albuquerque, 2002; Nunes et al., 2003; Pinto and Maduro, 2003; Albuquerque et al., 2007; Alves and Rosa, 2007; Lima et al., 2011; Freitas et al., 2012). Almada (2010) mentions these articles to point out possibilities of research in ethnoecology. Monteiro et al. (2010) conducted a revision of studies in markets and open-air markets in many parts of the world, fifteen from Brazil, of which only three were carried out in Rio de Janeiro (Azevedo and Silva, 2006; Maioli-Azevedo and Fonseca-Kruel, 2007; Leitão et al., 2009). Despite the work from Monteiro et al. (2010) regarding open-air markets in Brazil, there is still a lack of information about the diversity and potential toxicity of the species sold in markets in the state of Rio de Janeiro.

The state of Rio de Janeiro has a total area of 43,780.172 km², and a population of 15,989,929 inhabitants (365.23 inhabitants/km²) distributed in 92 municipalities (IBGE, 2013) (Fig. 1). This state is located within the Atlantic Forest biome, recognized by UNESCO as one of the most vital biomes for global biodiversity conservation. Less than 8% remain from its original territory (Rambaldi et al., 2003) and it is one of the 35 global biodiversity hotspots (Martinelli and Moraes, 2013). This is worrying because, in order to supply the plant quota requested by the markets some of the species come directly from forest areas (Silva, 2008). An important issue generally unattended, refers to the possibility of the population being at risk of ingesting toxic plants sold in popular markets, due to misidentifications, as it is the case of *espinheira-santa* (*Maytenus aquifolia* or *M. ilicifolia*). At the majority of Rio de Janeiro State markets, the species termed *espinheira-santa* is oftenly *Sorocea blomplandii* (Coulaud-Cunha et al. 2004; Leitão et al., 2009; Parente and Rosa, 2001) or *S. guilleminiana* Gaudich, Moraceae (Maioli-Azevedo and Fonseca-Kruel, 2007; Azevedo and Silva, 2006). Although a report on the acute toxicity of *S. bomplandii* exists (Gonzalez et al., 2001), the safety of this species has not been fully determined.

In this context, we searched the literature for works concerning open-air markets in the state of Rio de Janeiro, in order to answer the following questions: which plants are sold at open-air markets in the state of Rio de Janeiro? Is there a variation of species richness within the studied open-air markets? Which species are considered native to Brazil and show some degree of endangerment? Are species with toxic potential being sold in these markets?

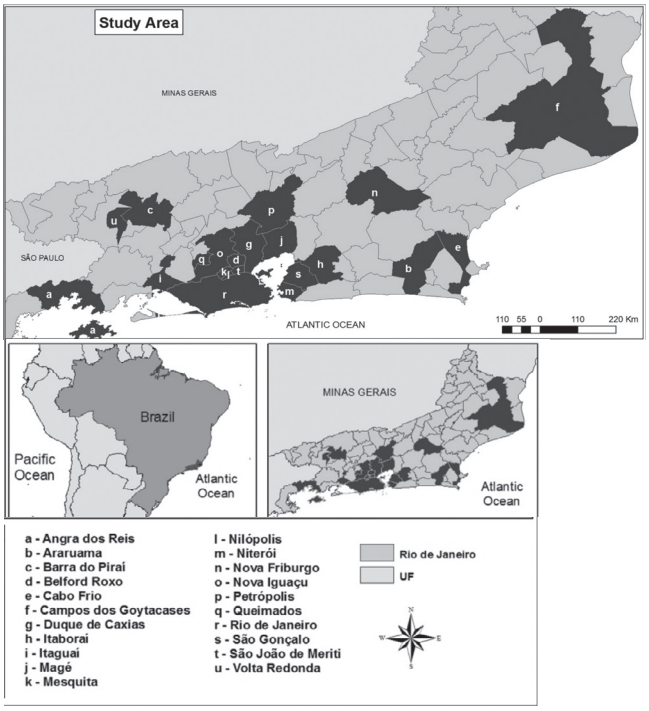

Figure 1 - Map of the State of Rio de Janeiro, Brazil, showing the municipalities from which open-air market studies were found.

Materials and methods

Data collection of open-air markets studies

This study was carried out using five scientific databases: Science Direct, JSTOR, Scopus, Web of Science, and SciELO; as well as Capes Journals Portal (www.periodicoscapes.gov.br). The literature search retrieved: 10,998 articles in Science Direct; 6270 in JSTOR: 77 in Scopus; 41 publications in the Web of Science; and 52 in SciELO. The following keyword combinations were used: "*feiras livres* Rio de Janeiro"; "free fair Rio de Janeiro", "public market Rio de Janeiro"; "Urban Market Rio de Janeiro"; "Open air Market Rio de Janeiro". In addition, the references in each article were used as source for further searches. When a study was not found on the web, we would ask authors and researchers to send them. Ten national publications concerning free-trade of medicinal plants in Rio de Janeiro were found, between 2000 and 2013.

Systematization of plant names and data on their origin

The species listed on the selected studies were compiled and their scientific names were updated in accordance to the List of Species of the Brazilian Flora (Lista de Espécies da Flora do Brasil, 2014), The International Plant Names Index (2013), Tropicos (2013) and The Plant List (2013), in that order. The native species were labeled (*) in Table 1 according to the List of Species of the Brazilian Flora (Lista de Espécies da Flora do Brasil, 2014), which is the current reference for Brazil.