Short communication

Ethnobotanical reputation of plant species from two forests of Madagascar: A preliminary investigation

I. Norscia *, S.M. Borgognini-Tarli

Dipartimento di Biologia, Università di Pisa, Via S. Maria, 55, Pisa, Italy
Centro Interdipartimentale (Università di Pisa), Museo di Storia Naturale e del Territorio, Via Roma, 79, 56011, Calci, Pisa, Italy

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Abstract

Madagascar has one of the highest biodiversity and endemism rates in the world but the ethnobotanical reputation of Malagasy flora is still poorly investigated. This paper presents a preliminary survey on the medicinal use of plant species conducted in the dry forest of Kirindy and in the pluvial forest of Sainte Luce located in western and south-eastern Madagascar, respectively. With the help of standardized questionnaires, 8–10 local people working in the two forests were interviewed on the medicinal use of local flora. 45 morphospecies turned out to be used as a medicine by residents of the area and more than half are endemic to Madagascar. About one third of the plants are used to treat gastrointestinal disorders (diarrhoea, abdominal pain, parasite infections, etc.), more than one fourth for malaria/fever, and the remaining third are used to treat rheumatisms, cold, skin illnesses and inflammations.

Concluding, this paper (i) provides new information on medicinal plants from two forestry areas of Madagascar never investigated for ethnomedicine and (ii) represents the basis for pharmacological studies and broader surveys on the traditional use of endangered Malagasy flora, which needs to be protected and further explored.

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Madagascar, one of the biggest islands in the world, separated from Pangea some 150 million years ago and then split off from what would become the Indian subcontinent some 60 million years later. Due to such long isolation and to its tropical location, Madagascar is characterized by one of the highest rates of endemism and biodiversity in the world with approximately 12,000 species of vascular plants, more than 80% of which are endemic to the island (Robinson, 2004). For this reason Malagasy flora can provide a wide variety of medicinal plants (Rasoanaivo et al., 1993) as an affordable alternative to expensive western medicine. In fact, ethnomedical plants from Madagascar have already shown antimalarial and other antimicrobial activities (cf. Hudson et al., 2000; De Leo et al., 2004; Rasoanaivo et al., 2004). However, only an estimated 10% of Malagasy species have been screened for any biological activity (Hudson et al., 2000) and the available survey on Malagasy medicinal plants is far from being exhaustive, possibly due to the high level of endemism of the island (c.f. PetitJean et al., 1990; Rasoanaivo et al., 1993; Novy, 1997; Randrianarivelojosia et al., 2003).

Malagasy legislation is attempting to control the collection and the exportation of medicinal plants (Randimbivololona, 1996). However, the main threats to Malagasy vegetation are forest overexploitation and destruction through slash and burn for agricultural purposes and logging practices (Ganzhorn et al., 2001).

This investigation adds new information on Malagasy flora and represents a contribute to prevent the loss of knowledge due to ongoing forest destruction.

This ethnobotanical survey was conducted in September 2001 in the Kirindy forest and in October 2004 in the forest of Sainte Luce.

Kirindy is a deciduous dry forest situated in the central-western part of Madagascar (Forêt de Kirindy/CFPF), 60 km north of Morondava (44°39′E, 20°03′S).
The climate is highly seasonal, characterized by a long dry season (April–November), with progressive defoliation of several plants, and a short wet season (December–March) when fleshy fruit production and ripening occur (Sorg and Rohner, 1996).

Sainte Luce is a fragmented pluvial littoral forest situated in the south-eastern part of the island (47°17′, E24°77′S). The climate, still highly seasonal, is characterized by a long wet season (January–August) and a short dry season (September–December); fleshy fruit production and ripening occur during the first part of the wet season (February–March; Bollen and Donati, 2005).

One local healer and 7 residents in Marofandalia, next to Kirindy and one local healer and 9 residents in Ambandriky, near Sainte Luce, were interviewed in order to identify plants with an ethnopharmacological reputation. The residents interviewed during this study were field assistants in botanical and eco-ethological studies who knew rather well the local flora in terms of identification (Malagasy name of the morphospecies) and traditional use. Data on plant medicinal use were collected within a set of about 100 taxonomically identified morphospecies in each site (a total of about 200 morphospecies if we consider both sites). Such morphospecies were chosen a) on the basis of what the interviewees could remember about local medicinal plants used and b) on the basis of the morphospecies encountered along a 1 km trail in the study area used for phytophenological data collection.

Information on ethnobotanical reputation, parts used as treatment of some disease, and forms of administration were collected by using standardized questionnaires (the English version is reported in Fig. 1). Plant specimens of the plant species used as medicine were gathered, dried and deposited at the Herbarium Horti Pisani (University of Pisa). Voucher numbers given to each specimen are reported in this paper as a reference for possible future comparisons. Identification was provided by local botanists (see Acknowledgements) and scientific names are spelled following W3Tropicos indications and according to Schatz (2001). Specimens of the species

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**ETHNOBOTANICAL QUESTIONNAIRE**

**Age** ________

**Sex:** M F

**Plant name:** ______________________

1) **Do you know if this plant is used in traditional medicine?:**
   a) no, I don’t know;
   b) yes, it is used to cure diseases;
   c) other: ________________

2) **For which disease/s is the plant used?**
   - malaria
   - venereal diseases
   - infections
   - diarrhoea
   - rheumatisms
   - inflammations
   - vermifuge-antiparasitic
   - other: ________________

   **notes:** ______________________

3) **Which parts of the plant are used?**
   - leaves: ________________
   - flowers: ________________
   - root: ________________
   - gums/resins: ________________
   - fruits: ________________
   - bark: ________________
   - stem: ________________
   - other: ________________

4) **How the plant is administered?**
   - decoction
   - infusion
   - other kinds of beverage

   **Possible notes on preparation/administration:** ______________________

5) **Which is the dose required?**

8) **Is the plant used together with other plants?**
   - yes
   - no

   **If yes, which plants?** ______________________

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Fig. 1. Main questions included in the ethnobotanical questionnaire used to interview residents and healers about medicinal plants.
presented here are also deposited at the herbarium of the Parc Botanique et Zoologique de Tsimbazaza (Antananarivo, Madagascar).

Within a set of 200 investigated plant morphospecies, 45 — belonging to 28 different families — are used by local people as medicines. 10 specimens could be identified only at a generic level. Of the 45 species, 23 belong to the Kirindy flora and 22 are part of the Sainte Luce vegetation. Moreover, a total of 25 identified species (13 from Kirindy and 12 from Sainte Luce) are endemic to Madagascar and other species, such as *Strychnos* spp. included in Table 1, can be considered sub-endemic. Medicinal plants from Kirindy and Sainte Luce are listed in Tables 1 and 2, respectively.

In general, decoctions and infusions need to be taken 3 times/day. Exceptions are represented by the infusions *Albizia boivinii* (against fever and abdominal pains) and *Cephalostachyum* sp. (against malaria; Table 1): in these cases 1–2 L of infusion/day have to be ingested until symptom remission occurs.

As can be noted comparing Tables 1 and 2, the number of diseases recognized by Sainte Luce inhabitants (at least 17), mainly belonging to the Antanosy tribe, seems to be lower compared to the number of diseases recognized by the people of Kirindy (about 12), mainly belonging to the Veso-Sakalava tribe.

Regarding the type of illness, about one third of the plants are used for the treatment of gastrointestinal disorders (diarrhoea, abdominal pain, parasite infections, etc.), more than one fourth are used in case of malaria/fever, and the remaining third are mainly used to treat rheumatisms, cold, skin illnesses and inflammations.

Folk medicine represents an important tool to spot plants of pharmacological interest, since it can predict sources of bioactive compounds (Farnsworth et al., 1985). In fact, at least four species used at Kirindy are mentioned in phytochemical literature (*Strychnos decussata*: Olaniyi et al., 1981; *Tamarindus indica*: Kobayashi et al., 1996; *Rinorea ilicifolia*: Ziegler et al., 2002; and *Cedrelopsis grevei*: Gauvin et al., 2004; cf. Table 1). * Catharanthus roseus* (or *Vinca rosea*, the Madagascar periwinkle; Table 2), used in Sainte Luce against parasitic worms, is an important medicinal plant due to its anticancer properties (Dutta et al., 2005). It is also interesting to notice that *Tacca leontopetaloides*, which in Sainte Luce is

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**Table 1**

<table>
<thead>
<tr>
<th>Species</th>
<th>Family</th>
<th>No.</th>
<th>Traditional use</th>
<th>Parts</th>
<th>Administration*</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Uvaria ambongoensis</em> (Baill.) Diels</td>
<td>Annonaceae</td>
<td>2673/1</td>
<td>Malaria</td>
<td>Leaves</td>
<td>Infusion</td>
</tr>
<tr>
<td><em>Cephalostachyum</em> sp.</td>
<td>Bambusaceae</td>
<td>438/1</td>
<td>General weakness</td>
<td>Leaves</td>
<td>Rubbing on skin</td>
</tr>
<tr>
<td><em>Adansonia rubrostipa</em> b Jun et H. Perrier</td>
<td>Bombacaceae</td>
<td>5023/1</td>
<td>Malaria, intoxication</td>
<td>Leaves</td>
<td>Infusion</td>
</tr>
<tr>
<td><em>Terminalia boivinii</em> Tul.</td>
<td>Combretaceae</td>
<td>5544/1</td>
<td>Calcium deficiency</td>
<td>Bark</td>
<td>Decoction</td>
</tr>
<tr>
<td><em>Combretum grandiflorum</em> b Drake</td>
<td>Combretaceae</td>
<td>5538/1</td>
<td>Malaria, rheumatisms</td>
<td>Leaves</td>
<td>Decoction</td>
</tr>
<tr>
<td><em>Diospyros</em> sp.</td>
<td>Ebenaceae</td>
<td>6406/1</td>
<td>Oral inflammation</td>
<td>Bark</td>
<td>Rubbing on gingivas</td>
</tr>
<tr>
<td><em>Securinega seyrigii</em> b Léandri</td>
<td>Euphorbiaceae</td>
<td>4297/1</td>
<td>Asthma</td>
<td>Bark</td>
<td>Decoction</td>
</tr>
<tr>
<td><em>Dalbergia purpurascens</em> b Baill.</td>
<td>Leguminosae</td>
<td>3821/1</td>
<td>Hypertension</td>
<td>Bark</td>
<td>Decoction</td>
</tr>
<tr>
<td><em>Dyospiros microrhombus</em> Hiern</td>
<td>Leguminosae</td>
<td>6406/1</td>
<td>Rheumatism</td>
<td>Leaves</td>
<td>Infusion</td>
</tr>
<tr>
<td><em>Tamarindus indica</em> L.</td>
<td>Leguminosae</td>
<td>3508/1</td>
<td>Hypertension</td>
<td>Leaves</td>
<td>Infusion</td>
</tr>
<tr>
<td><em>Albizia boivinii</em> b E. Fourn</td>
<td>Leguminosae</td>
<td>3443/1</td>
<td>Inflammations</td>
<td>Bark</td>
<td>Rubbing on skin</td>
</tr>
<tr>
<td><em>Strychnos decussata</em> (Pappe) Gilg</td>
<td>Loganiaceae</td>
<td>6460/1</td>
<td>Hypertension</td>
<td>Leaves</td>
<td>Decoction</td>
</tr>
<tr>
<td><em>Strychnos madagascariensis</em> Poir.</td>
<td>Loganiaceae</td>
<td>6460/1</td>
<td>Inflammations, wounds</td>
<td>Roots</td>
<td>Rubbing</td>
</tr>
<tr>
<td><em>Ficus grevei</em> b Baill.</td>
<td>Moraceae</td>
<td>1961/1</td>
<td>Dehydration</td>
<td>Bark</td>
<td>Rubbing on skin</td>
</tr>
<tr>
<td><em>Anacolosa pervilleana</em> b Baill.</td>
<td>Olacaceae</td>
<td>2142/1</td>
<td>General weakness</td>
<td>Bark</td>
<td>Rubbing on skin</td>
</tr>
<tr>
<td><em>Cedrelopsis grevei</em> b Baill.</td>
<td>Ptaeroxylaceae</td>
<td>4158/1</td>
<td>Post partum infections</td>
<td>Bark</td>
<td>Decoction</td>
</tr>
<tr>
<td><em>Cedrelopsis gracilis</em> b Courchet</td>
<td>Ptaeroxylaceae</td>
<td>4158/1</td>
<td>General weakness</td>
<td>Bark</td>
<td>Decoction</td>
</tr>
<tr>
<td><em>Colabrina decipiens</em> b (Baill.) Capuron</td>
<td>Rhamnaceae</td>
<td>4882/1</td>
<td>Parastis, infections</td>
<td>Bark</td>
<td>Rubbing</td>
</tr>
<tr>
<td><em>Rothmannia</em> sp.</td>
<td>Rubiaceae</td>
<td>8283/1</td>
<td>Fever</td>
<td>Leaves</td>
<td>Infusion</td>
</tr>
<tr>
<td><em>Canthium boivinii</em> b Cavaco</td>
<td>Rubiaceae</td>
<td>8352/1</td>
<td>Infections</td>
<td>Bark</td>
<td>Decoction</td>
</tr>
<tr>
<td><em>Chloroxylon falcatum</em> b Capuron</td>
<td>Rutaceae</td>
<td>4065/1</td>
<td>Malaria</td>
<td>Bark</td>
<td>Infusion</td>
</tr>
<tr>
<td><em>Grewia cyclea</em> b Baill.</td>
<td>Tiliaceae</td>
<td>4966/1</td>
<td>Diarrhoea</td>
<td>Leaves</td>
<td>Decoction</td>
</tr>
<tr>
<td><em>Rinorea ilicifolia</em> (Welw. Ex Oliv.) O. Ktze</td>
<td>Violaceae</td>
<td>5262/1</td>
<td>Malaria</td>
<td>Leaves</td>
<td>Infusion</td>
</tr>
</tbody>
</table>

Voucher numbers refer to specimens deposited at the *Herbarium Horti Pisani* (University of Pisa).

* a Decoctions and infusions are for drinking, unless differently specified.

* b Endemic species.

* c For washing.
known to provide mineral supplementation (Table 2), is also used to treat diarrhoea in Maroantsetra (Novy, 1997). The fact that Kirindy inhabitants apparently use medicinal plants to treat a higher number of diseases compared to those from Sainte Luce (cf. Tables 1 and 2) can be due to the differences in local economy and main activity: Sainte Luce economy is very much related to the sea, (fishing) whereas in the villages near Kirindy (60 km away from the coast), the forest is one of the most important sources of subsistence (hunting, fruit collection).

A major issue in conservation is the recurring loss of not yet known medicinal plants due to forest destructions by humans (Chapman et al., 1999). In this respect, this preliminary survey not only provides the basis for pharmacological studies but it also contributes to the knowledge of Malagasy flora, whose potentiality needs to be protected and further explored.

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References


