

Short communication

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

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Received 8 February 2006; accepted 26 April 2006

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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Keywords: Antanosy; Ethnobotany; Kirindy; Madagascar; Sainte Luce; Veso-Sakalava

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, ethnomedicinal plants from Madagascar have already shown antiplasmodial 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; Randrianariveolosia 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).

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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

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 _____ fruits _____
flowers _____ bark _____
root _____ stem: _____
gums/resins _____ other: _____

4) How the plant is administrated?
decoction other: _____
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? _____

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 rheumatism, 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). *Catharantus 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

Table 1
Medicinal use of 23 plant species from the Kirindy forest (Western Madagascar)

Species	Family	No.	Traditional use	Parts	Administration ^a
<i>Uvaria ambongoensis</i> (Baill.) Diels	Annonaceae	2673/1	Malaria	Leaves	Infusion
			General weakness	Leaves	Rubbing on skin
<i>Cephalostachyum</i> sp.	Bambusaceae	438/1	Malaria, intoxication	Leaves	Infusion
<i>Adansonia rubrostipa</i> ^b Jum et H. Perrier	Bombacaceae	5023/1	Calcium deficiency	Bark	Decoction
<i>Terminalia boivinii</i> Tul.	Combretaceae	5544/1	Malaria, rheumatism	Leaves	Decoction
<i>Combretum grandidieri</i> ^b Drake	Combretaceae	5538/1	Diarrhoea	Roots	Decoction
<i>Diospyros</i> sp.	Ebenaceae	6406/1	Oral inflammation	Bark	Rubbing on gingivae
<i>Securinega seyrigii</i> ^b Léandri	Euphorbiaceae	4297/1	Hypertension	Bark	Decoction
<i>Dalbergia purpurascens</i> ^b Baill.	Leguminosae	3821/1	Hypotension	Bark	Decoction
			Wounds	Bark	Rubbing on wounds
			Parasite infections	Bark	Decoction ^c
<i>Dyospiros microrhombus</i> Hiern	Leguminosae	6406/1	Rheumatic pains	Leaves	Infusion
<i>Tamarindus indica</i> L.	Leguminosae	3508/1	Hypotension	Leaves	Infusion
			Inflammations	Bark	Rubbing on skin
			Fever, abdominal pain	Fruits	Beverage
<i>Albizia boivinii</i> ^b E. Fourm	Leguminosae	3443/1	Asthma	Bark	Decoction
			Fever, abdominal pain	Leaves	Infusion
<i>Strychnos decussata</i> (Pappe) Gilg	Loganiaceae	6460/1	Rheumatic pain	Leaves	Decoction
			Venereal diseases	Bark	Decoction
<i>Strychnos madagascariensis</i> Poir.	Loganiaceae	6460/1	Inflammations, wounds	Roots	Rubbing
<i>Ficus grevei</i> ^b Baill.	Moraceae	1961/1	Dehydration	Bark	Rubbing on skin
<i>Anacolosia pervilleana</i> ^b Baill.	Olcaceae	2142/1	General weakness	Bark	Rubbing on skin
<i>Cedrelopsis grevei</i> ^b Baill.	Ptaeroxylaceae	4158/1	Post partum infections	Bark	Decoction ^c
			General weakness	Bark	Decoction ^c
			Diabetes, rheumatism	Bark	Decoction
<i>Cedrelopsis gracilis</i> ^b Courchet	Ptaeroxylaceae	4158/1	Fever	Bark	Infusion
<i>Colubrina decipiens</i> ^b (Baill.) Capuron	Rhamnaceae	4882/1	Parasites, infections	Bark	Rubbing
<i>Rothmannia</i> sp.	Rubiaceae	8283/1	Fever	Leaves	Infusion
<i>Canthium bosseri</i> ^b Cavaco	Rubiaceae	8352/1	Infections	Bark	Decoction
<i>Chloroxylon falcatum</i> ^b Capuron	Rutaceae	4065/1	Malaria	Bark	Infusion
			Diarrhoea	Leaves	Decoction
<i>Grewia cycled</i> ^b Baill.	Tiliaceae	4966/1	Malaria	Leaves	Infusion
<i>Rinorea ilicifolia</i> (Welw. Ex Oliv.) O. Ktze	Violaceae	5262/1	Fever	Leaves	Infusion

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.

Table 2
Medicinal use of 22 plant species from pluvial forest of Sainte Luce (South-eastern Madagascar)

Species	Family	No.	Traditional use	Parts	Administration
<i>Petchia madagascariensis</i> ^a (A.DC.) Leeuwenb	Apocynaceae	6616/1	Indigestion	Leaves	Decoction
<i>Catharanthus roseus</i> (L.) G. Don.	Apocynaceae	6598/1	Parasitic worms	Roots	Decoction
<i>Asteropeia multiflora</i> ^a Thouars.	Asteropeiaceae	5146/1	Diarrhoea	Leaves	Decoction
<i>Polycardia lateralis</i> ^a O. Hoffm.	Celastraceae	4631/1	Abdominal pain	Leaves	Decoction
<i>Tachadenus longiflorus</i> ^a Griseb.	Centianaceae	6518/1	Parasitic worms	Leaves	Decoction
			Parasitic worms	Roots	Decoction
<i>Weinmannia bojeriana</i> ^a Tul.	Cunoniaceae	3276/1	Partum facilitation	Bark	Decoction
<i>Suregada boiviniana</i> ^a Baill.	Euphorbiaceae	4464/1	Headache, cold	Leaves	Suffumigation
<i>Euphorbia lophogona</i> ^a Lam.	Euphorbiaceae	4498/1	Insect stings	Latex	Rubbing on skin
<i>Homalium involucreatum</i> ^a (Pers.) Baill.	Flacourtiaceae	5313/1	Malaria	Leaves	Decoction
<i>Cryptocarya</i> sp. R. Br.	Lauraceae	2813/1	Skin illnesses	Bark	Rubbing on skin
<i>Intsia bijuga</i> (Colebr.) Kuntze	Leguminosae	3509/1	Diarrhoea	Bark	Decoction
<i>Dracaena reflexa</i> Lam.	Liliaceae	1109/1	Abdominal pain	Leaves	Decoction
<i>Sida</i> sp. L.	Malvaceae	4888/1	Infected wounds	Leaves	Rubbing on wounds
<i>Tambourissa purpurea</i> (Tul.) A. DC.	Monimiaceae	2772/1	Skin illnesses	Leaves ^b	Rubbing on skin
				Leaves	Decoction
<i>Tambourissa</i> sp. Sonn.	Monimiaceae	2772/1	Abdominal pain	Roots	Sucking
<i>Olea</i> sp. L.	Oleaceae	6434/1	Cough	Leaves	Decoction
			Toothache	Roots	Rubbing on gingivas
<i>Dichaetanthera</i> sp. L.	Oleaceae	5662/1	Abdominal pain	Leaves	Decoction
<i>Tricalysia cryptocalyx</i> ^a Baker	Rubiaceae	8308/1	Malaria	Leaves	Decoction
<i>Saldinia littoralis</i> ^a Bremek.	Rubiaceae	8419/1	Diarrhoea	Leaves	Decoction
<i>Vepris elliotii</i> ^a (Radik) I. Verdoon	Rutaceae	4077/1	Malaria, cold	Leaves	Suffumigation
<i>Rhopalocarpus coriaceus</i> ^a (Scott-Elliot) Capuron	Sphaerosepalaceae	5252/1	Skin illnesses	Latex	Rubbing on skin
<i>Tacca</i> cf. <i>leontopetaloides</i> (L.) Kuntze	Taccaceae	1248/1	Mineral deficiency	Roots	Beverage ^c

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

^a Endemic species.

^b Dried leaves.

^c The beverage is prepared with root powder, water and dried leaves of *Ravenala madagascariensis* Sonn.

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.

Acknowledgements

Thanks are due to the Malagasy Government and Direction Générale des Eaux et Forêt, Parque Botanique et Zoologique de Tsimbasasa, and Université d'Antananarivo for the research and plant exportation permits; to Prof. P. Kappeler (University of Goettingen), Prof. J. Ganzhorn (University of Hamburg), and QMM for the logistic and scientific support; to Stacey Schmidt (University of Colorado) for the linguistic revision, and to Dr. V. Carrai (University of Pisa), C. Rakotondrasoa, R. Randriamarosoa (CFPF), D. Rabehevitra, and F. Kandrianta-

fika (QMM) for plant identification. Special thanks are also due to all the interviewees, who accepted to share their ethnobotanical knowledge with us.

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