

STATE OF KNOWLEDGE STUDY ON *Tabernanthe iboga* Baillon

A report for the Central African Regional Program for the Environment

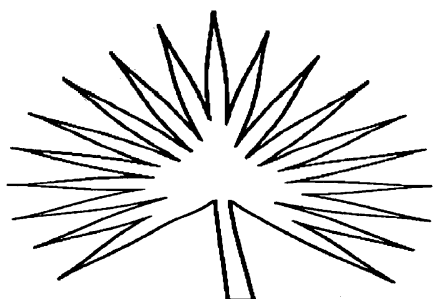


TONYE Mahop Marcelin
(Research Assistant)

ASAHA Stella
(Research Assistant)

Dr. NDAM Nouhou
(Research Co-ordinator)

Blackmore Paul
(Garden Adviser)



LIMBE
BOTANIC GARDEN

March 2000

TABLE OF CONTENTS

List of acronyms	i
List of illustrations	ii
Executive summary	iii
1 INTRODUCTION	1
1.1 Objectives	2
1.1.1 General objective	
1.1.2 Specific objectives	
2 METHODOLOGY	2
2.1 Literature search	
2.2 Herbaria search	
2.3 Internet search	
2.4 Field trips	
2.5 Key contacts	
2.6 Report writing	
3 RESULTS / FINDINGS	4
3.1 Taxonomic and ecological information	4
3.1.1 Taxonomy of <i>Tabernanthe iboga</i>	
3.1.2 Phenology	
3.1.3 Pollination	
3.1.4 Seed Dispersal	
3.1.5 Eco-geographical distribution	
3.1.6 Autoecology and Habitat	
3.1.7 Natural Regeneration and Recruitment	
3.2 Current harvesting and Exploitation	13

3.3	Market potential	14
3.4	Traditional, Spiritual and Modern Utilisation	16
	3.4.1 Traditional and spiritual utilisation	
	3.4.2 What is BWITI?	
	3.4.3 Modern utilisation.	
3.5	Pharmacology and clinical effects.	23
	3.5.1 Pharmacology of IBOGAINE	
	3.5.2 Toxicology and side effects	
	3.5.3 Treatment costs	
3.6	Propagation and Domestication trials	26
3.6	Legislation	28
	3.7.1 Cameroon	
	3.7.2 Gabon	
	3.7.3 Equatorial Guinea	
4	CONCLUSION AND RECOMMENDATIONS	31
	4.1 Conclusion	
	4.2 Recommendations	
	Bibliography	32
	Acknowledgements	34
	Appendices	
1)	List of institutions	
2)	Map of clusters	
3)	Clusters and specific sites of studies.	
4)	List of herbaria specimens.	
5)	List of contacts	

LIST OF ACRONYMS

AIDS:	Acquired Immune Deficiency Syndrome.
APFT:	Avenir des Peuples des Forêts Tropicales.
CARPE:	Central African Regional Program for the Environment
CDC:	Cameroon Development Corporation.
CICIBA:	Centre International de Civilisation Bantou.
CIFOR:	Centre pour la Recherche Forestière Internationale.
CIGs:	Common Initiative Groups
CIRAD:	Centre International de Recherches Agronomiques pour le Développement.
CNS:	Central Nervous System
CTC:	Conservation Through Cultivation
CUREF:	Conservacion y Utilizacion Racional de los Ecosistemas Forestales de Guinea Ecuatorial.
DDEF:	Divisional Delegate of Environment and Forestry.
ECOFAC:	Ecosystèmes Forestiers d'Afrique Centrale.
GERPIC:	Gerdes (Groupe d'Etudes et de Recherches sur la Démocratie et le Development Economique et Social) Promotion Iboga Culture.
ICASH:	International Coalition for Addicts Self-Help.
ICRAF:	International Center for Research in Agroforestry
IUCN:	International union of Nature Conservation.
LBG:	Limbe Botanic Garden
MCP:	Mount Cameroon Project
MINEF:	Ministry of Environment and Forestry.
NGO:	Non-Governmental Organisation
NIDA:	National Institute for Drugs of Abuse.
NTFPs:	Non-Timber Forest Products.
ONADEF:	Office National de Development des Forêts.
SOK:	State of Knowledge

List of illustrations

Table 1: Local names of <i>Tabernanthe iboga</i>	6
Table 2: Distribution of <i>Tabernanthe iboga</i> in the Congo basin	9
Table 3: Treatment cost for <i>T. iboga</i> products	26
Figure 1: Evolutionary steps in the Bwiti tradition	21
Plate 1: <i>Tabernanthe iboga</i> stand already bearing	12
Plate 2: Materials used in the Bwiti (Bottle of powder, roots, torch , kaolin blanc, kaolin rouge, honey)	16
Plate 3: Bwiti herbalist in South Cameroon.	17
Plate 4: Bwiti believers in the area of Mbini in Equatorial Guinea	18
Plate 5: <i>Tabernanthe iboga</i> seedlings planted around the Bwiti, 'Mbandja' at Ambam, Cameroon.	27
Plate 6: Graduate Assistant at the University of Omar Bongo, Bwiti member, in his Iboga Foundation office, Libreville.	30

EXECUTIVE SUMMARY

Tabernanthe iboga is an understorey species occurring in some specific low elevation forest sites in the Congo Basin. The spiritual properties of the species and their implication in the Bwiti tradition have lead to the wild harvesting of this species, which may be endangered if the trend is maintained. Research concerns on the species started as far back as 1901 and were mostly focused on the pharmacological aspect of IBOGAINE, the major active substance in *Tabernanthe iboga*. Today the plant is known for its healing properties in modern and traditional medicine. These include anti-addictive properties with respect to cocaine, heroin, alcohol, nicotine, etc. Numerous examples show that IBOGAINE, through which the species performs all its spiritual and medicinal virtues, can completely eliminate the desire of taking more alcohol (such as the local one called FOFO), cocaine, nicotine and other drugs (such as the local Marijuana). This has attracted the interest of institutions such as the Limbe Botanic Garden and Plantecam in Cameroon, and the creation of others such as the Iboga Foundation in Gabon.

Prior to the definition of an accurate program for the management of this species in the forests of the Congo basin, the Central African Regional Program for the Environment (CARPE) has funded a ten-month State of Knowledge Study on *Tabernanthe iboga*, from July 1999 to March 2000. The main goal of this project was to put together all the available information concerning the various aspects of the plant. Thus, information compiled in this report is the result of research throughout the area of study, including Cameroon, Equatorial Guinea and Gabon. Information gathered included aspects on the biology and botany of the plant, the propagation and domestication status of the species, exploitation and harvesting rates, various utilisation of the plant, the pharmacological aspect of the plant and the local and international trade of *Tabernanthe iboga* products. Although there are no statistics on the trade and exploitation rate of the species, it is obvious that local and international trade, as well as the exploitation of *Tabernanthe iboga* are very active.

We hope this report will help to avoid overlaps in endeavours towards the management of this species in the Congo Basin. Not only CARPE but also other environmental bodies will benefit from this study in helping to design an accurate program for the sustainable management of *Tabernanthe iboga*.

1.0 INTRODUCTION

The protection and conservation of Biodiversity is actually the main target of research institutions, NGOs and many international bodies. Biodiversity is referred to be the variety of genes, species and ecosystems.

After the Amazonian basin, the Congo basin is considered as the second largest tropical rainforest in the world with considerable natural resources (BSP, 1993). This area contains large numbers of plants species useful for their edible, medicinal properties or because of the high quality of their timber (Garcia and Emene, 1997; Hearn *et al.*, 1998). These plants need to be studied, so as to access what is known on them and identify gaps within our knowledge.

Within the Congo basin, there is one species on which few studies have already been done. However there are gaps still existing needing more research works. Thus it has been submitted to a "State of Knowledge study" by the Limbe Botanic Garden under the funding of Central African Regional Programme for the Environment. This species is *Tabernanthe iboga*.

1.1 Objectives

1.1.1. General Objective:

The general objective of this work is to gather the available information on *Tabernanthe iboga* Baillon.

1.1.2. Specific Objectives:

Specifically, this study is focused on the following aspects:

- Taxonomical and ecological aspects such as, phenology, dispersal, population density, eco-geographic distribution, pollination, natural regeneration and regeneration and recruitment, habitat, autoecology, etc. of the selected plant.
- Both traditional and modern utilisation of the plant; including local and international markets, level of trade, price variations and market potential and rates of exploitation.
- Pharmacology, clinical effects, treatment costs and toxicology of *Tabernanthe iboga* .
- Current harvesting and exploitation (e.g. part harvested, rate of harvesting, people involved in harvesting, harvesting effect on the plant, reason for harvesting, etc.).
- Propagation and domestication of *Tabernanthe iboga* .
- Existing legislation and other institutional issues pertaining to the exploitation of *Tabernanthe iboga*.

2.0 METHODOLOGY

To achieve these objectives, the methodology used is as follows:

2.1. *Literature search:*

In Cameroon, our literature search started at LBG library. We began first by putting together all the available material on *Tabernanthe iboga* knowledge found at LBG. The importance of this phase was to identify the gaps in the knowledge, such as to know exactly what we are seeking for during fieldwork. The next step of this search was conducted in other libraries and institutions in Cameroon, Gabon and Equatorial Guinea. The lists of institutions visited and specimen found in various herbaria are presented in Appendix 1.

2.2 *Herbaria search*

Similar to the literature search, the first step of herbaria search was carried at the LBG Herbarium. Later on this activity was pursued at the Cameroon National Herbarium in Yaounde, Equatorial Guinea National Herbarium at Bata and Gabon National Herbarium in Libreville. The list of specimens recorded is presented in Appendix 3.

2.3 *Internet search*

During the execution of the project, Internet searches were also completed. Most of this information concerned the pharmacological, toxicological and clinical effects of *Tabernanthe iboga* as well as information on its utilisation and treatment costs in modern medicine.

2.4 *Field Trips*

The area of study of this project included Cameroon, Equatorial Guinea and Gabon Republic. In an effort to maximise efficiency while sampling as many ethnic groups and geographical areas as possible, all fieldwork were organised into clusters. At the centre of each cluster was a town from which the team would travel each day to conduct the research (Appendix 2).

Our major purpose during the fieldwork was to assess the eco-geographical distribution of the species, the traditional utilisation, as well as the ecological aspects of *Tabernanthe iboga*. Moreover, these trips were very useful for the assessment of market potentials of the plant as well as the rate of harvesting and exploitation of the species.

2.5. *Key Contacts*

During the whole period of the project, we made useful contacts for our work. The list of people contacted during our throughout our fieldwork is presented in Appendix 4.

2.6. *Data processing*

This final aspect of our work was to put together all the information gathered, in a report. This work was done at the Limbe Botanic Garden, under the supervision of Dr. Nouhou NDAM, Research Co-ordinator of Limbe Botanic Garden and Mr Paul Blackmore, Technical Adviser to the Limbe Botanic Garden. We also solicited suggestions and comments from other MCP staff researchers at LBG.

3.0 RESULTS AND FINDINGS

3.1. Taxonomic and ecological information

3.1.1 *Taxonomy of Tabernanthe iboga*

The genus *Tabernanthe* is made of several species. According to some recorded data, 650 specimens have already been identified. These specimens were collected in the Central African region, notably in the South Province of Cameroon, the eastern region of Central Africa Republic, Equatorial Guinea, in the Republic of

Congo, the Democratic Republic of Congo, the Republic of Gabon and the Republic of Angola. The species so far identified are:

- *Tabernanthe iboga* Baillon
- *Tabernanthe teniflora* Staff
- *Tabernanthe bocca* Staff
- *Tabernanthe subsessilis* Staff
- *Tabernanthe manii* Staff
- *Tabernanthe pubescens* Pichon
- *Tabernanthe albiflora* Staff
- *Tabernanthe elliptica* Staff

Among these species, it is only *Tabernanthe iboga* Baillon, which has high economic potential and is highly demanded. Furthermore, some herbarium records highlight the fact that within the species mentioned above, hybridisation could occur between *Tabernanthe iboga* and *Tabernanthe elliptica*. From this process, forms arise that more or less resemble one of the parents.

In the indigenous classification, *Tabernanthe iboga* is made of two types, which are distinguished by the forms of their fruits:

- The male iboga with lengthened fruits called “iboga nomé” in the Myéné language in Gabon.
- The female iboga, with globular fruits, called “iboga ny’ anto” in the same dialect.

In the countries where *Tabernanthe iboga* occurs, the species has a variety of names depending on the locality. Table presents some of these appellations.

Table 1: Local names of *Tabernanthe iboga*.

COUNTRY	TRIBE	LOCAL NAME
Central Africa Republic	Sango	Mbenge
	Bagundu	Mbondo
	Pygmy	Bondo
Congo	Vili	Liboka
	Fang	Eboga
Gabon	Myéné	Iboga
	Yipunu	Dibuyi
	Itsogo	Ébogé
Equatorial Guinea	Fang	Eboka
Cameroon	Fang	Iboga

3.1.2 Phenology

Before discussing the phenology of *Tabernanthe iboga*, let us first present the structure of the inflorescence as described by Issembe (1995). According to this author, the inflorescence of *Tabernanthe iboga* is in corymbs and umbel forms. They are not dense and can bear up to twelve flowers. The calyx of the flowers presents five teeth. The corolla is tubular and slightly narrowed in its middle. The petals, which are curve up on the calyx, are white, pinkish or yellowish. The ovary is made of two carpels knitted together. The fruits of the plant ordinary appear in pairs. Their berries are avoid or somewhat spherical with smooth, thin pericardium with a cork-like integument.

The phenology of *Tabernanthe iboga* is a controversial subject. Individuals interviewed in the South Province of Cameroon, in Equatorial Guinea and Gabon, members and non-members of the BWITI tradition, mentioned that this species

does not have a specific period of flowering and fruiting within a year. It flowers and fruits throughout the year. However, according to one traditional healer in the South Province of Cameroon (at Ebounjda Kribi-Campoo road), the normal period for seed collection is during the dry season (November-May) and the flowering period is during the rainy season (June-October).

This controversy was also encountered during our literature search. Indeed, the overall writings gathered on this aspect underlined that iboga flowers and fruits throughout the year (Issembe, 1995).

3.1.3. *Pollination*

The pollination and breeding system of *Tabernanthe iboga* are not well documented. These are aspects, which require detailed study.

3.1.4. *Seed dispersal*

Apart from individual comments and the little information found in documents, very little is actually documented on the seed dispersal of *Tabernanthe iboga*. However it was raised that mammals and small rodents that feed on the fruits of the shrub could disperse *Tabernanthe iboga* seeds. Indeed, many of the individuals interviewed in the field research emphasised that the fruits and the roots of *Tabernanthe iboga* attract elephants, buffaloes, porcupine and even gorillas. These animals are taken in an excitatory state after having ingested these products.

3.1.5. *Eco-geographical distribution*

Tabernanthe iboga is only found in the tropical Africa forest. Precisely, the species is confined to the Congo Basin. The countries in which the species has already been identified are the following:

- Republic of Gabon

- Republic of Cameroon
- Republic of Congo
- Republic of Equatorial Guinea
- Democratic Republic of Congo
- Central Africa Republic
- Republic of Angola.

Based on Hebaria specimens, Table 2 presents the distribution of this plant in the Congo Basin

Table 2: Distribution of *Tabernanthe iboga* in the Congo basin.

COUNTRY	PROVINCES	SITES
Cameroon	South	Ambam
	East	Yokadouma, Lomié
	Littoral	Mouanko
	Centre	5 km S Mbalmayo
Equatorial Guinea	Littoral	Etembue, region continentally (Reserva de Ndote. N1° 17' E 9° 25')
	Centre-South	
	Wele Nzas	
	Kie-Ntem	
Gabon	Estuaire	Libreville
	Moyen –Ogoué	Ndjolé
	Haut-Ogoué	Franceville, Moanda
	Woleu-Ntem	
	Ngounié	Mimongo, Mbigou, Etéké, Mouila.
	Ogoué-Maritime	Gamba,
	Nyanga	Mayumba
	Ogoué-lolo	Lastoursville,
	Ogoué-Ivindo	Makokou, Mekambo

Central African Republic		Boukoko
Congo		Kouilou, Ngokamina, near Oyabi, 25 km w of Sibiti, Tchisséka, near Brazzaville, near Kinkala.
Democratic Republic of Congo.	Bas-Zaire	Between Malemba and Matambana, Moanda, Nsimundele, Luki, Sandala, Bingila, Matomba, Sanga, Kisantu, Kingana, Kingemba Kinga, Kimvula.
	Kinshasa	Sabuka, Kimuenza, Kinshasa, Lemba, between Kinshasa and Ndjili, Ndjili, Kinkole, Kimpoko, Menkao, Bombo.
	Bandundu	Kole, Mongadjale, Bokoro, Ipamu, between Dekese and Bumbuli, Popokabaka, Kiyaka, Kidima, Kisangi, Panzi.
	Equateur	Bas-Uele, Bombura, Bobutu, Boketa, Ekuta, Guluma, near Likimi, Dundusana, Upoto, Coquilhatville (Mbandaka), Eala, Mongo, Mondjo, Tolongote, between Mompono and Befori, Wendji, Lake Tumba, Bobanda, between Boteka and Makako, Boteka, Bolengambi, Botoke, Bokondji, Lolia Buma, Mondombe, Monkoto.
	Haut-zaire	Mobwasa, Yandjali, Yangambi, kisangani, near Osuke.
	Kasai occidental	Badibanga.
	Kasai oriental	Near Booke, Mukumari, Katabo Kombe, Sangaie.
	Kivu	Mutambo.

	Maiombe	Buco Zau.
	Uige	Entre
Angola	Lunda	Near Dundo, Nordeste (<i>Tabernanthe pubescens</i>), Dala.
	Cuanza Sul	Amboin, Gabela.
	Bie-Cuando-Cubando	Between Chitembo and Chiguela, near longa.
	Mulanye	Pungo Andongo (<i>Tabernanthe pubescens</i>)

3.1.6. Auto-ecology and habitat

Tabernanthe iboga is an understorey shrub reaching 1,50 m in height with abundant latex and a noxious smell. Its stems are in scattered lenticels (Plate 1). The leaves are simple. They are opposed, elliptical or oval lanceolot, about 12 cm long and 3 cm wide.



Plate 1. *Tabernanthe iboga* stand already bearing (Photo Tamnjong)

The ecology of *Tabernanthe iboga* is variable. In the wild, the species grows in forest understorey, in fallow forest, in high forest shade or in forest gallery. More often, *Tabernanthe iboga* is found in riverine forest, swampy soils, or relatively wet savannas. Its altitudinal range is from 0 to 1500 m.

3.1.7. Natural regeneration and recruitment

The regeneration and recruitment of *Tabernanthe iboga* in the forest is effective. It is ensured by wildlings that grow under the crowns of *Tabernanthe iboga* stands or else where in the forest after the dispersion of the seeds. This was mentioned by staff of forestry department in Gabon, villagers, and botanists met during the field research.

3.2. Current harvesting and exploitation

The healers who use *Tabernanthe iboga* products in their traditional medicinal practices harvest the leaves, and bark from the stem and the roots.

The bark of the roots represents the part of the plant of greatest interest. Rootbark is used in three major levels of utilisation that will be mentioned later. Obviously heavy exploitation and harvesting of this important part of any plant constitutes a serious threat to the survival of the population.

In the South Province of Cameroon, the harvesting methods used are quite simple. These methods consist of digging the soil around the plant to expose its roots, peeling the bark from the roots and then recovering the roots with the soil. According to some harvesters interviewed, this method does not endanger the plant. This is because the bark is peeled from the roots when they are still connected to the shrub, which is not totally removed from the ground. Immediately after harvesting, the soil is replaced to cover the roots, and the plant will restart growing. However, this harvesting method will seriously affect the growth of the plant (Author's. Pers. Comm.). Indeed, certain stands were seen completely up-rooted. Under this harvesting pressure the plant will hardly grow beyond 3m height.

It is possible to come back to the same plant for another harvesting, underlined one "Bwiti" member in Gabon; but the period of rotation (that is the period for the plant to regenerate the removed bark) which is not yet mastered by the harvesters is not less than two years.

During discussions with individuals, it was heard that a three years old *Tabernanthe iboga* stand, either raised from seeds or cuttings, is enough mature for the roots to be used.

This method described in South Cameroon is also the one predominantly used in Gabon and Equatorial Guinea. However, some people totally remove the plant from the ground and cut all the available roots in order to maximise the harvested quantities of roots.

Tabernanthe iboga is highly demanded by those who are aware of the various potentials of its products. Over the Internet, the powder is highly advertised. Locally, researchers, pharmaceutical industries, traditional healers and members of Bwiti request the product.

Although statistics are not actually recorded on the exploitation rate and trade levels of this plant, it is fact that considerable quantities of roots are currently exploited and exported to western countries.

Harvesting of *Tabernanthe iboga* rootbark is a lucrative activity for forest dwellers in the Congo Basin. For that reason, people of various ages, male and female, are increasingly getting involved in the exploitation of *Tabernanthe iboga* root bark.

3.3. Market potential

Within the area of study, the trade of *Tabernanthe iboga* products was more important in Gabon than in Cameroon or Equatorial Guinea. The roots and rootbark of *Tabernanthe iboga* are easily found in the traditional pharmacies and markets of the main towns like Libreville, Oyem and Bitam in Gabon. Unfortunately, no statistics are recorded anywhere in the country, which could present the prices, the quantity locally sold or exported, the peak period for the availability of the products within a year, and other market characteristics.

During our surveys in the markets, the following prices were recorded: A bottle of 0,1875 l of iboga powder is sold at 4000 Fcfa; the one of 1l is sold at 15000 Fcfa and the one of 0.05l is sold at 1000 Fcfa. *Tabernanthe iboga* products are mostly sold and bought by the members of the Bwiti society and other users of the plant like the traditional healers. However, for scientific interest some organic chemists, pharmacologists and pharmacists request the products of this plant, particularly the rootbark.

According to Nnoh (pers. comm.) a Gabonese in Europe once exported quantities of rootbark at a value estimated to be 6,000,000 Fcfa.

The sale of iboga products (roots and powder) is done along side with other products that are useful during the ceremony of initiation in the Bwiti tradition (Plate 2). These products are:

- “Le Kaolin Blanc”: a particular white soil found in streams. It is called “Kaolin Blanc” when it is dried.
- “Le Kaolin rouge”: a powder of a particular timber species (*Pterocarpus soyauxii*). This powder is obtained by scraping two sticks of this timber with the use of sand that is placed in between the two sticks. The powder, mixed with water and dried, is called “kaolin rouge”. The local name of this *Pterocarpus soyauxii* within the Matsongo tribe from the Province of Ogooué-Lolo Gabon is “Moungouili”.
- Honey: Because the powder of iboga roots is extremely bitter, the honey helps to facilitate the absorption of a sample of this powder.
- Torch: This is a natural torch that provides light in the night during the ceremonies of Bwiti. This torch is made with the sap of Okoumé (*Aucoumea klaineana*) that is wrapped in the bark of *Xylopia acutiflora*.
- “CITAR” and “MUNGONGO”: These are special musical instruments that are used during the ceremonies of Bwiti.

All these subsidiary products among others are usually sold in Gabon along side iboga products.

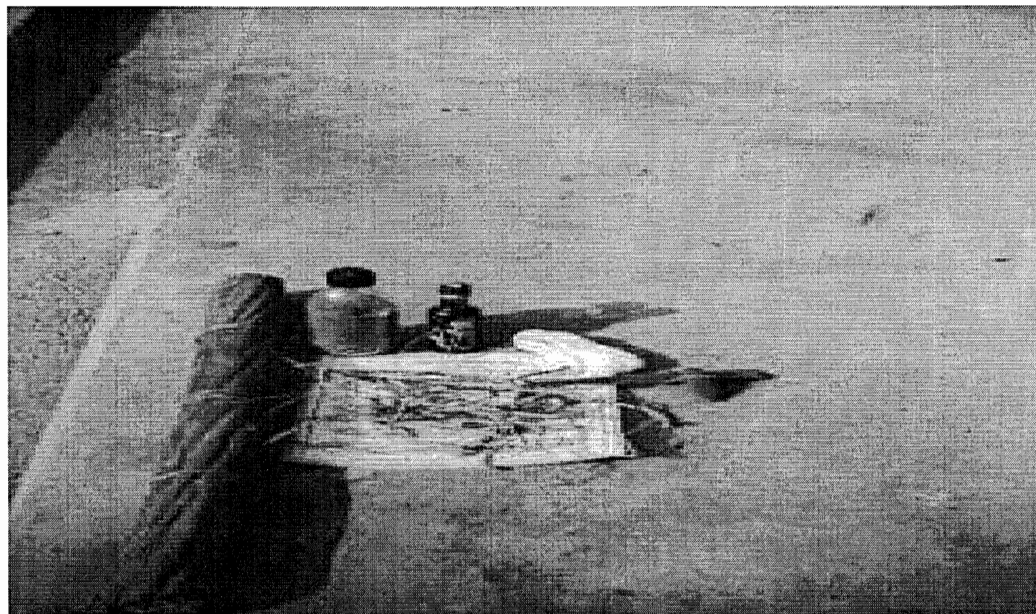


Plate 2. Materials used in the Bwiti tradition (Bottle of powder, roots, torch, kaolin rouge, kaolin blanc, honey) (Photo Tonye)

3.4 Traditional, Spiritual and Modern utilisation

3.4.1 *Traditional and Spiritual utilisation*

Tabernanthe iboga is used in traditional medicine by most of the traditional practitioners (Plate 3) met in the South Province of Cameroon. The plant is said to have lots of medicinal virtues, not all of which have been discovered. According to one of the traditional healers, Mr. Simba (met at Ebounja about 20 km from Kribi on the Kribi-Campo road), *Tabernanthe iboga* is a very powerful medicinal plant. He reported that one leaf of this plant can treat about 12 diseases, but unfortunately, did not go into further details on the types of diseases nor on how to process the plant's parts before administering them to the patients. However, all the traditional healers interviewed emphasized that many parts of the plant are medicinally useful: the leaves, stem bark and root bark. These products can be administered alone or in mixture with parts of other

forest species such as *Garcinia cola*, *Enantia chloranta* etc, depending on the type of sickness. This is the direct use of *Tabernanthe iboga* products targeted to specific sicknesses.



Plate 3. Bwiti herbalist in South Cameroon (Photo Ndam)

Most of the traditional healers named sicknesses like fever, stomachache, liver disorders, madness, and addiction (consumers of local drug called MBANGA and local alcohol called FOFO). The products of the plant can also be administered to babies in order to enhance their immunization system. In addition, some traditional healers, strong believers of the potentials of this plant, guessed that the plant could even treat AIDS.

Many traditional healers also mentioned that decoctions of the roots and leaves of *Tabernanthe iboga* are used for the treatment of diarrhea, physical and intellectual asthenia and in some cases, of nervous depression. In addition, there is an ordinary usage of the plant in some village by hunters and fishermen or

paddlers as a neuro-stimulant or aphrodisiac. For this usage, *Tabernanthe iboga* products are preferred to coffee and cola-nut (*Garcinia cola*).

In a spiritual way, *Tabernathe iboga* is used within the BWITI tradition. It is the major ingredient of the ceremonies of initiation to this tradition. This initiation is a kind of “rite de passage” from childhood to adulthood. The Bwiti believers (Plate 4) assert that non-initiates cannot use the plant; also the outsiders cannot really know all the virtues of this plant.



Plate 4. Bwiti believers at Mbini in Equatorial Guinea (Photo CUREF Bata)

According to some traditional healers of the Bwiti tradition, *Tabernanthe iboga* does not directly treat any disease. It is a sort of “SERUM OF TRUTH”. By taking a dose of its product, a healer will be carried into communication with his ancestors. It is actually these ancestors that guide him to which plant to use for the treatment of a particular sickness. It also helps the patients themselves to make revelations for the treatment of their sickness. These ones will guide the healers in their practices. In addition, the plant is spiritually used in the treatment of female sterility or sexual impotence in males.

Within the Bwiti tradition, during the ceremony of initiation, the new member, by taking a simple dose of *Tabernanthe iboga* is shown the film of his life. The plant will present him his past, his present and his future. In fact, *Tabernanthe iboga* helps in self-reflection and learning about oneself. In the Bwiti tradition, the plant is believed to carry people over the nine spheres that lead to God. The Bwiti believers in Gabon underlined that a dose of *Tabernanthe iboga* powder can develop your mind, work your spirit, and make someone to become more intelligent than before.

It should be however noted that most of the medicinal attributes mentioned above have no scientific basis, meaning that there is a need of more scientific screening of the traditional and spiritual healing pattern of this plant.

According to Nnoh (Pers. comm.), *Tabernanthe iboga* is the plant of the last chance for the Africans. It is the plant of life and death.

3.4.2. *What is Bwiti?*

According to Mme Nnoh who is secretary of direction at CICIBA Libreville also a Bwiti believer, "Bwiti" is not a religion, it is neither a secret society, it is not even a sect. "BWITI" is simply a tradition of our ancestors that everyone must know and understand, particularly Africans. Prior to understanding this tradition, everybody must pass through initiation rites. This tradition is practised in the nine provinces of the Republic of Gabon. The tradition is actually divided into nine branches. The first branch that is known as the "BWITI ORIGINEL" is as old as the world. This branch is called "Bwiti Lissoumba". The other eight branches coming from the Bwiti Lissoumba are:

- Bwiti Missogo
- Bwiti Boumbayano
- Bwiti Mezeng Mefang
- Bwiti Abandzi
- Bwiti Inanga
- Bwiti Ziriang
- Bwiti Mouri
- Bwiti Ekasso

Basically, for their normal functioning the various branches use the following:

- * *Tabernanthe iboga*
- * "Mungongo"
- * "Harpe sacrée"

"Mungongo" and "Harpe sacrée" are special musical instruments that are used during ceremonies of initiation to Bwiti.

Within the tradition the status of all the initiates changes with the duration in the Mbandja (The Bwiti church). Following the figure bellow, these are hierarchically the steps one must go through once in the Bwiti tradition. After the Nganga it is the level the Father of the Mbandja (the BWITI church) who can actually initiate.

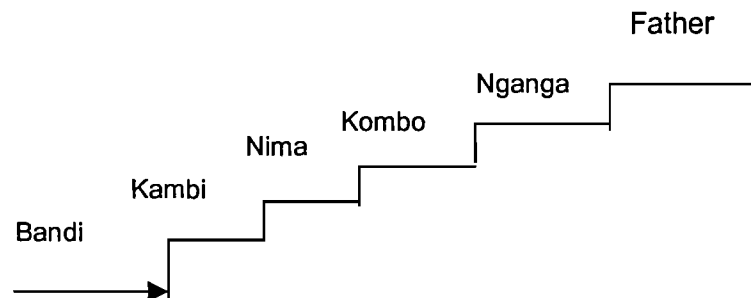


Figure 1. Evolutionary steps in the Bwiti tradition

3.4.3. *Modern utilisation*

“IBOGAINE” is the major alkaloid extracted from the rootbark of *Tabernanthe iboga* and represents 90% of the 30 alkaloids found in the roots of this species. This product was used in western medicine as far back as the beginning of the 1900s. According to Issembe (1995), “IBOGAINE” was used for the treatment of flu, convalescence of infectious diseases, neurasthenia and sleeping sickness. Later on, other beneficial characteristics of IBOGAINE were discovered through research. For example, in 1983 Lotsof reported IBOGAINE as having anti-addictive properties. Lotsof obtained four US patents of IBOGAINE for the treatment of opiate addiction, cocaine and amphetamine abuse, and ethanol and nicotine dependency.

From preclinical studies conducted in Holland on 30 American heroin addicts (volunteers) by NIDA, it was reported that two-thirds of the group remained drug-free for the periods from 4 months to 4 years from a single administration of IBOGAINE HCL, the synthetic form of IBOGAINE. Furthermore, the report

underlined that when IBOGAINE is administered to people seeking to beat addiction to heroin, alcohol, cocaine or tobacco, the product achieves two major things:

- Firstly, there is complete removal or severe attenuation of the symptoms of withdrawal, allowing the addict to detox painlessly.
- Secondly, there is the removal of the desire to use drugs for a more or less long period. Follow-up dosing may be undertaken at three monthly intervals should the patient wish it.

According to Prof. Ayafor (Pers.comm.), the ENDABUSE™ procedure, using IBOGAINE HCl provides long term interruption of the desire of taking more drugs. ENDABUSE™ is a treatment procedure developed by Howard Lotsof (President of NIDA) in collaboration with ICASH (International Coalition for Addicts Self Help).

The ENDABUSE™ method of treatment consists of an experimental pharmacotherapy which has proven itself to be a highly effective means of interrupting both cocaine and heroin dependency following a single two day procedure. This procedure is described in the following United States patents:

- 4,449,096: Rapid Method for Interrupting the Narcotic Addiction Syndrome.
- 4,587,243: Rapid Method for Interrupting the Cocaine and Amphetamine Abuse Syndrome
- 4,857,523: Rapid Method Attenuating the Alcohol Dependency Syndrome.

Prof. Ayafor mentioned that after two days of treatment ending with the administration of a single dose of IBOGAINE HCl, one is completely withdrawn from addiction. Several cases of heroin addicts, cocaine addicts or cases of

heroin-cocaine cross addiction, successfully underwent this procedure and are actually out of addiction.

IBOGAINE has been reported for the treatment of what is called “post-war syndrome”. Soldiers and people in countries with long period of political unrest, are often affected with this syndrome (Ewusi, pers comm.). Currently, two research teams in Israel are working in collaboration, one trying to ascertain the existence of this syndrome and the other one trying to link the use of IBOGAINE HCl in the treatment of this syndrome.

In the West as we can see, IBOGAINE HCl has lots of prospects, even though the treatment is still officially prohibited in most countries including the USA and UK. Currently only one medical doctor established in Northern Italy in Europe is known as prescribing IBOGAINE to his patients. However there exist unofficial networks, which provide the treatment in USA using settings such as hotels rooms. Otherwise, people seeking the treatment must travel to Europe.

3.5. Pharmacology and clinical effects

3.5.1 *Pharmacology of IBOGAINE*

Researchers throughout the world have carried out numerous studies on the pharmacology of IBOGAINE. These studies started immediately after the first isolation of IBOGAINE in 1901 by Dybowski and Landren.

More recent studies (Glick *et al.*, 1991; Maisonneuve *et al.*, 1991; Glick *et al.*, 1992; Dzjolic *et al.*, 1988), done on rats, primates, mice and pre-clinical studies on humans report that IBOGAINE antagonises with cocaine induced locomotor stimulation in mice. For the period that preceding its complete elimination from

the body, IBOGAINE can affect brain dopaminergic systems. During that time, the response systems to morphine change.

According to John Mann (1992), the pharmacology of IBOGAINE resembles that of the tricyclic antidepressant amitriptyline. Though there is some confusion in its mode of action, it is probable that it produces a generalised disruption in the uptake of the neurotransmitter noradrenaline and serotonin into neurones. This probably increases the availability of serotonin and noradrenaline in the central nervous system. Further detailed studies done by researchers in USA, Lawrence and Gordon (1992); Glick *et al.* (1992) separated the pharmacology of IBOGAINE into four parts:

- The general pharmacology
- The central nervous pharmacology
- The cardio vascular pharmacology
- The interaction of IBOGAINE with drugs of abuse.

As for its aphrodisiac properties, John Mann reported that “IBOGAINE could act like the known Yohimbine, thus increasing the blood supply to the erectile tissues of the genitalia and also a central enhancement of the reflexes involved in the control of ejaculation”.

3.5.2 *Toxicology and side effects*

The toxicology of IBOGAINE is a subject of controversy. NIDA studies done on primate and rats reported IBOGAINE to be neurotoxic. From the results of these studies, IBOGAINE is said to induce cell damage and neurotoxicity in the cerebellum of rats, when given at 100-mg/kg. However, while NIDA studies on IBOGAINE neurotoxicity in monkey cerebellum are ongoing, preliminary studies, report that when IBOGAINE is given to primates at 25 mg/kg for 4 days, it failed to show neuronal toxicity. Furthermore, several individuals were treated in Holland

with 25 mg/kg. This trial revealed a transient postural tremor and truncal ataxia (NIDA, 1992).

However, recent NIDA studies and according to Sanchez-Ramos *et al.* (1999), of the University of Miami, giving 1 mg/kg to three human volunteers who had previously experienced IBOGAINE at higher doses while in Holland, no tremors, ataxia or hallucinogenic effects were noted. The authors reported that the Volunteers felt nothing at all, except perhaps being more calm than usual. Pharmacokinetics studies are currently being done with blood samples taken from these subjects.

The side effects of IBOGAINE depend on the dose administered to the patients. The side effects recorded for subjects under pre-clinical trials, include an increase in hepatic enzymes, decrease in body weight and food consumption, and some minimal central nervous system signs at the highest doses. In cats and dogs, it was shown that the administration of 150 mg/kg/day produced mortality and morbidity after two or three daily doses.

3.5.3 *Treatment Costs*

Treatment with IBOGAINE is not authorised in the UK or the USA. However, the demand from addicts and the lack of formal approval of IBOGAINE has led to unofficial treatments which provide IBOGAINE in non-medical setting such as apartments or hotel rooms. According to Prof. Ayafor (pers.comm, 1999), 50mg of IBOGAINE HCl (also called introspectineTM) used in ENDABUSETM, is priced in the USA between 2500 and 5000 dollars.

Currently one medical doctor based in Northern Italy is the sole in Europe known as prescribing IBOGAINE to patients. This Doctor charges around 2,500 pound sterling per treatment. The table below shows estimates of treatment cost in certain countries.

Table 3: Treatment costs of *Tabernanthe iboga* products.

Country	Treatment cost in US dollars	
	Rootbark	IBOGAINE HCl
Panama		15,000
Italy		2,500
France	1,000	
USA (Florida)		2,500

Sources. <http://perso.club-internet.fr/ideesum>, <http://ibogaine..net/IBOGAINE.html>, www.ibeginagain.org/.

However, the purchase of IBOGAINE hydrochloride and rootbark for self-administration under appropriate supervision cost respectively, US\$500/g for the hydrochloride and US\$8/g for the rootbark. But these prices are subject to variation. But because of legal restrictions, IBOGAINE and *Tabernanthe iboga* rootbark cannot be sent to the USA, Belgium or Switzerland.

The cost and duration of treatment in traditional medicine depend not only on the type of the sickness, but also on the stage of the sickness and even on the practitioner. For example, for the treatment of madness the duration is estimated between 5 to 8 months. Addiction to MBANGA (marijuana) or FOFO (the local alcohol) is said to decrease in the following 24 to 30 hours after one has swallowed or sniffed a sample of iboga rootbark.

3.6 Propagation and Domestication trials

No scientific study has been done on the methods of propagation and domestication of *Tabernanthe iboga* in Cameroon, Gabon and Equatorial Guinea. Consequently, there is no *Tabernanthe iboga* field establishment in any of the mentioned countries. However, Group GERPIC in Libreville–Gabon

(Gerdes Promotion Iboga Culture) is currently carrying preliminary studies on these issues.

However, throughout our visits, we noticed that members of Bwiti or traditional healers plant this species in the surroundings of their houses or churches (Plate 5). This is to ensure access to the plant in case of urgency. It is the only domestication pattern used for this species.



Plate 5. *T. iboga* planted around the Bwiti church (Mbandja) at Ambam-South Cameroon). (Photo Ndam)

In the areas where *Tabernanthe iboga* is heavily harvested and used for traditional or spiritual practices, the species is seriously endangered. This was recognised by the users and the villagers themselves. No conservation strategy has been undertaken by the main users of the species except planting it in household compounds. Because of that, Limbe Botanic Garden decided to include the species in its Conservation Through Cultivation program (CTC).

Plantecam, based at Mutengene has also set up a nursery of *Tabernanthe iboga* seedlings for prospective pharmaceutical purposes.

3.7. Legislation and Institutional issues on the exploitation of *T. iboga*

3.7.1 Cameroon

In Cameroon, due to the fact that *Tabernanthe iboga* is not well known by the local population, research institutions and decision-makers, for the moment there are no laws governing the exploitation of this species. In fact, according to the Sub-director in charge of NTFP at MINEF (Ministry of Environment and Forestry), apart from *Prunus africana* no NTFP is directly addressed in Cameroonian legislation. In the case of *Prunus africana*, there are rules and regulations proposed by projects and issued by the administration of forestry, which all *Prunus* exploiters are called to strictly follow. These constitute a sort of barrier to over exploitation and wrong harvesting methods. It may also be noted that the government of Cameroon has seriously taken in consideration the whole sub-sector of NTFP. Recently a sub-directory in charge of NTFP has been created, having as major responsibilities to define and control the implementation of rules and regulations governing the exploitation of these specific products.

Two institutions in Cameroon are actually working with this species, notably:

- ✓ Limbe Botanic Garden: the CTC program of this institution has started studies on the propagation of the species. Seedlings are actually being raised at the LBG nursery.
- ✓ Plantecam: a pharmaceutical company based at Mutengene has also set up an interesting nursery made of *Tabernanthe iboga* seedlings.

Apart from these two institutions, CDC (Cameroon Development Corporation) is showing an interest for field establishment of the species.

A few individuals are also interested in the species. This is mainly for research purposes. These include Pr. Johnson Ayafor (Organic Chemist, Vice Chancellor of the University of Dschang) and Dr. Ndumbe Ewusi (Pharmacist based at Nkongsamba, Littoral Province).

3.7.2. *Gabon*

The situation in Gabon is not much different from that of Cameroon, although in Gabon the plant is widely known and used in the whole territory. For the moment, there is no law regulating the exploitation of *Tabernanthe iboga* in Gabon. However, one NGO called GERPIC (Gerdes Promotion Iboga Culture) is actively working in many aspects of the species. GERPIC has drafted a proposal that includes rules and regulations concerning the methods of harvesting of the plant, the exploitation and exploitation quota among others. According to the members of GERPIC (who are mostly the BWITI initiates), after the meeting with the Prime Minister, it is likely that the Gabon government will approve this proposal. It will then be used as guide to all exploiters of *Tabernanthe iboga*. These harvesting rules and regulations will have force of law and will be monitored by the Department of Forestry, projects and NGO s acting in the field.

With respect to institutions interested in this species in Gabon, for now there is only GERPIC acting in the field. GERPIC is a well-organized NGO mostly made of Bwiti believers. Members are pharmacists, medical doctors, university lecturers (Plate 6), botanists, diplomats and graduates students from University Omar Bongo, engineers' etc. Within GERPIC, all these people are working on the various aspects of the plant. Very few (non-initiated) researchers are members of this NGO.



Plate 6. Graduate assistant at the University of Omar Bongo, member of the Bwiti, in his iboga foundation office, Libreville. (Photo Ndam)

Three individuals who also have a special concern with this plant in Gabon are Prof. Jean Noel Gassita, Pharmacologist; Prof. Moussavou Kombila Gastro enterologue and Dr. Boroubou Boroubou, Botanist lecturer at the University of Omar Bongo.

3.7.3 *Equatorial Guinea*

The law in Equatorial Guinea seems to be interested in two NTFPs because of their economical values in the country. These plants are: *Prunus africana* and Rattan. Apart from these two taxa, exploitation of any other NTFPs including *Tabernanthe iboga* is virtually unregulated.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 *Conclusion*

The information gathered on *Tabernanthe iboga* shows how rich the species is in terms of medicinal properties. There are significant gaps in the understanding of the biological and ecological aspects of *Tabernanthe iboga*. However, the modern utilisations as well as the pharmacological aspects of the plant's products show how important this plant is in the fight against drug abuse.

A considerable amount of data are available on the modern utilisation of IBOGAINE. However significant gaps exist in the biological and ecological data of the plant. There are highlighted in recommendations as next steps for further research in order to have a broader understanding of the plant.

The traditional and spiritual uses of *Tabernanthe iboga* are also well represented in literature and anecdotal data. These need to be confirmed through serious ethnobotanical studies, as well as structured scientific experimentation.

4.2 *Recommendations*

Further efforts should be focused on the following aspects of *Tabernanthe iboga* in order to enable the sustainable management of this species in the Congo Basin, as well as the better understanding of the plant:

- ◆ More knowledge on the taxonomy, precisely on the criteria of identification of the plant is needed. Indeed, in the markets of Libreville for example, we realised that under the appellation IBOGA, lots of fake products were sold.
- ✓ Studies on the phenology, pollination and breeding systems, seed dispersal and population densities should also be carried out. Then, appropriate

periods for seed collection in the wild will be mastered. This will be helpful for the purposes of propagation and domestication of the species.

- ✓ Since the species is reported to have a lot of potential, which is not completely known, it is important that ethnobotanical studies should be undertaken in the whole geographical area of the species.
- ✓ The propagation and domestication of the species should be seriously considered, since the plant is increasingly becoming rare in the wild due to over exploitation and unsustainable harvesting methods.
- ✓ Studies on the harvesting methods of the root bark should also be carried out. This will help to assess the rotational period for the roots of a particular *Tabernanthe iboga* stand to recover.
- ✓ The assessment of the distribution of the species within the Congo Basin and even within each specific country should also be seriously addressed.

Bibliography

BSP 1993. Central Africa global climate change and development-technical report, Washington, DC, Biodiversity Support Program.

Dybowski J. and E. D. Landren 1902. Chimie végétale sur l'iboga, sur ses propriétés excitantes, sa composition at sur l'alcaloïde nouveau qu'il renferme, l'ibogaine.

Dzjolic *et al.* (1988). Effect of IBOGAINE on naloxine-precipitated withdrawal of chronic morphine dependent rats. Archive of international pharmacodynamics. pp 64-70.

- Garcia J. E.; Emene F. (1997). Diagnostico de las areas criticas para la Conservacion. Proyecto Conservacion y Utilizacion Racional de los ecosistemas Forestales de Guinea Ecuatorial (CUREF).
- Glick *et al.* (1991). Effects and after effects of IBOGAINE on morphine self-administration in rats. *European Journal of pharmacology*. Vol. 195: 341-345.
- Glick *et al.* (1992). Interaction between IBOGAINE and cocaine in rats. An *in vivo*. microdialysis and motor behaviour. *European Journal of pharmacology*. Vol. 121:263-266.
- Hearn G. W. *et al.* (1998). Census of diurnal primate groups in the Gran Caldera de Luba, Bioko Island. Report to the government of Equatorial Guinea.
- Issembe S. A. (1995). L'iboga ou le bois sacré du Gabon: La plante de toutes les vertues.
- Lawrence, T. and Gordon P. 1992. IBOGAINE: In vitro binding profile and effects on cocaine-stimulated locomotor activity. Neuroscience department, Menlo Park, California.
- Lotsof, H. S. 1992. Patents 5,124,994; rapid method for interrupting or attenuating poly-drug dependency syndromes.
- Maisonneuve, *et al.* 1991. IBOGAINE a potential anti-addictive agent. An *in vivo* microdialysis study. *European Journal of pharmacology*. Vol. 199. pp 35-42.
- Mann, J. 1992. Murder magic and medicine. 101 pp.

Acknowledgement

The Research Assistants wish to express their gratitude to all those who in one way or the other have made this project a success. We want specifically to thank Dr. Nouhou Ndam, Research co-ordinator of Limbe Botanic Garden his close collaborators Mr. Paul Blackmore, the Botanic Garden technical advisor and Mr. Nkefor Joseph, head of CTC unit for their complete devotion to the project. We also want to express our gratitude to Ms. Laurie Clark whose advice throughout the project was very helpful.

We cannot forget the management of the Mount Cameroon Project especially the Director Mr. Joseph Besong and the project Manager Mr. Alex Forbes. Their sense of responsibility and co-ordination has contributed positively to the success of this project.

We want to thank CARPE for this opportunity given to us, which has actually enhanced our research capabilities, and to express our interest in pursuing more research.

Support for this project has been provided through the Biodiversity Support Program, a consortium of the World Wildlife Fund, The Nature Conservancy and World Resources Institute, with funding by the United States Agency for International Development. The opinions expressed herein are those of the authors and do not necessarily reflect the views of BSP or the U.S. Agency for International Development.

Appendix 1: List of institutions

- APRA Malabo
- APFT Yaounde
- CICIBA Libreville
- CIRAD-forêts Yaounde
- Cameroon National herbarium in Yaounde
- CUREF Bata.
- CIFOR Yaounde
- Campo Man'n project Kribi
- ECOFAC (Yaounde, Bata)
- Equatorial Guinea National Herbarium at Bata.
- Gabon National herbarium, Libreville
- IUCN Malabo
- ICRAF library Yaounde
- MINEF
- Ministarío de la Bosque y Forestale (Equatorial Guinea)
- National High school of Forestry, Mbalmayo
- Omar Bongo University/ Iboga Foundation library, Libreville
- PlanteCam Pharmaceuticals Mutengene
- Tropenbos Project Kribi
- University of Dschang

Appendix 2: MAP OF CLUSTERS for *Tabernanthe iboga*

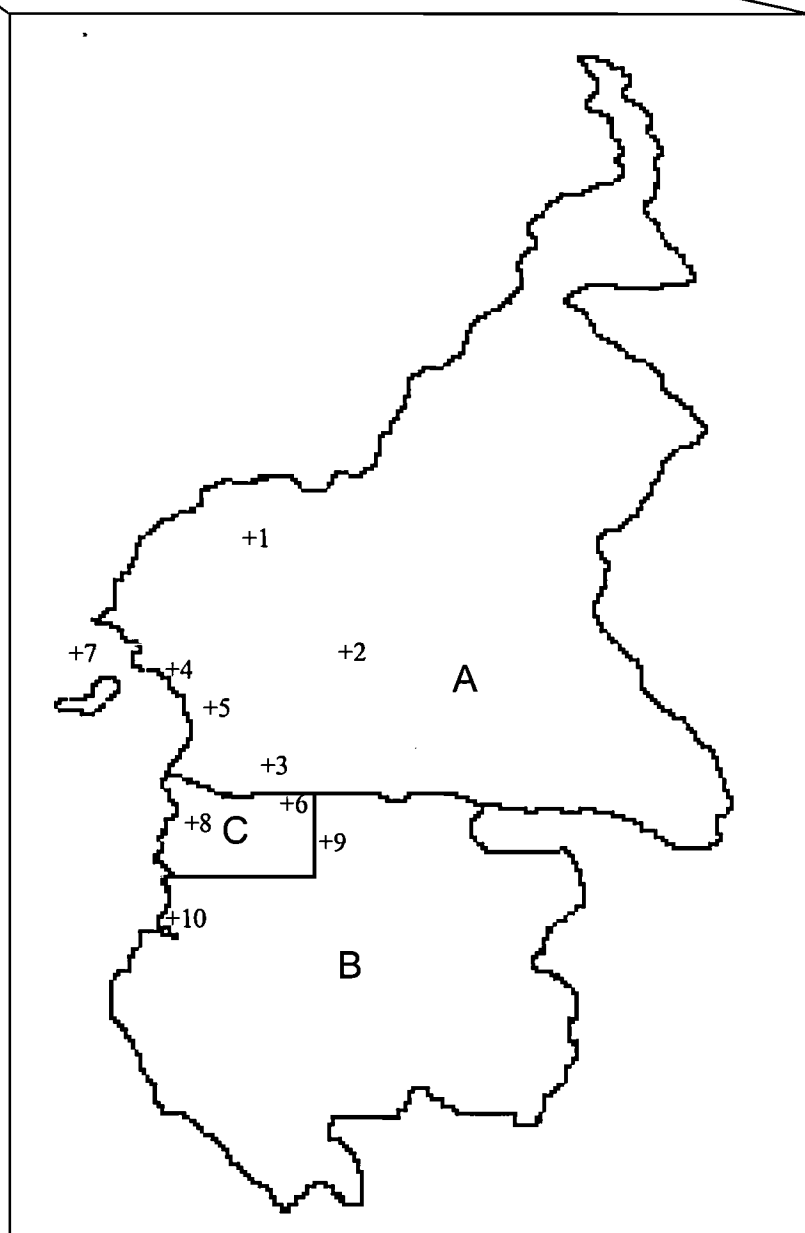


Countries Involved

- A. Cameroon
- B. Gabon
- C. Equatorial Guinea

Main Cluster Towns

- +1----Bamenda
- +2----Yaounde
- +3----Ebolowa
- +4----Douala
- +5----Kribi
- +6----Ebibeyin
- +7----Malabo
- +8----Bata
- +9----Oyem
- +10---Libreville



Appendix 3(a). Established clusters showing each research site, and type of resource users in Cameroon.

Cluster	Central Town E	Research sites	Information source
1	Douala	Douala	Markets, factories, Ports, MINEF
		Mouanko	Forest, Traditional doctors
		Babimbi	Forest, Market, Traditional doctors
2	Bamenda	Bamenda	Factory, MINEF
		Bafoussam	MINEF, Factory
		Dschang	Biochemist (Uni. of Dschang)
		Nkongsamba	Pharmacists
3	Yaounde	Mfou	Herbalists,
		Mbalmayo	MINEF, Traditional doctors,
		Yaounde	MINEF, Institutions, National Herbarium
4	Kribi	Kribi	MINEF, Institutions, Markets
		Campo	Forests, MINEF, Consumers, Herbalists
		Ebounja	Herbalists
		Bonguen	Herbalists
5	Limbe	Limbe	MINEF, Institution, LBG Herbarium,
		Buea	Plantecam
6	Ebolowa	Ebolowa	MINEF
		Ambam	MINEF, Consumers, Harvester, Herbalist

Appendix 3(b). Established clusters showing each research site, and type of resource users in Equatorial Guinea.

Cluster	Central town	Research sites	Information source
1	Ebebyin	Ebebyin	Staff of Agric Service, markets
		Mongomo	Market
2	Bata	Bata	Staff of Forestry Service, Consumers, Harvesters, Herbalists Bwiti believers, Institution
3	Malabo	Malabo	Staff of the Ministry, Institutions, Market

Appendix 3(a). Established clusters showing each research site, and type of resource users in Gabon.

Cluster	Central Towns	Research sites	Information source
1	Oyem	Oyem	Markets, Consumers, Herbalists
		Bitam	Markets, Consumers, Herbalists, Bwiti believers
2	Libreville	Libreville	Markets, Authorities, Consumers, Staff of forestry Service, Herbalists, Scientists, Bwiti believers
		Bifoun	Markets, Consumers, Herbalists, Bwiti believers
		Ndjole	Markets

Appendix 4 (a). *T. iboga* specimens at Cameroon National Herbarium-Yaounde.

Collector/No	Nat. Herbarium No	Location	Habitat	Phenology
R.Letouzey No 5558	6433	Between Mang and Asip(60km ENE of Lomie	Fallowed forest	Fruit and flower 6/8/1963
R.Letouzey No12156	28746	Near Zokadiba (55km SSW of Yokadouma		Fruit/flower 23/3/1973
Biholong No.269	28759	Near Alati S.E.of Djoum		Fruit 16/01/1973
J.J Bos No.4192	30566	9km from Kribi,Ebolowa road,Lobe trail	High forest, shade	Fruit/flower 21/3/1969
J.J Bos No.5618	30584	7km N. of Kribi	Riverine forest away from stream	Flower 29/01/1969
R.Letouzey No12822	32076	Near Nsola (20km N. Bipindi)		Flower 29/01/1974
JN Asonganyi No. 682	49923	West of Lake Tissongo 15km EES of Mouanko		Fruit 17/09/1983
Mikio Kaji No. 77a	53828	Mivini 3km east of Campo		Fruit 30/10/1983
Mikio Kaji No. 329	53833	Mivini 35km east of Campo		Fruit 29/09/1983

Appendix 4 (b). *Tabernanthe iboga* specimens at Equatorial Guinea National Herbarium-Bata

COLLECTOR'S NAME AND NUMBER	DATE	LOCALITY	HABITAT	OBSERVATION
Eneme et Lejoly 62	18/08/97	Region Continental Etembue (Reserva de Ndote N 1° 17' E 9° 25')	R4 assoc. De lisiere a Barteria nigritana (ecotone pradera/forêt)	fleurs jaunes

Appendix 4 (c). *T. iboga* specimen at Gabon National Herbarium-Libreville

Collector Name & No	Locality	Habitat	Observation
Nze-Ekekang Lucienne No 10 4/03/96	Village Enayene (SOTEGA) Chez l'Abbe Noël Ngwa, Province de l'Estuaire		Feuilles vertes, fruits jaunes, fleurs jaunes hauteur: 1.5m
J J de Wilde No 9170 06/12/96	Coastal shrub with patches savanna, about 8 km N. of Mayumba, Alt. ±5m 3° 21' S; 10 40 E	Sandy soil not far from the Ocean Littoral.	Shrub of about 1.5 m high, corolla pale yellows, some fine orange red stripes leading into the throat. Fruits pale green, apiculate very common here, exuding white latex.

A M Louis No 988 28/11/83	Massif du challet. Sangou mountain between Dibandi and Mounyanama, about 20 km E of Minongo AH. ±10,20m 1 ° 37' S; 11 ° 46' E	Primary forest	Treelet about 3m high. Twig dark green, Leaves smooth herbaceous to high papery, darkgreen above, paler beneath, calyx shiny, pale green immature fruits shiny, pale green flowers & fruits in sp.coll.
J C Arends No 504 28/11/84	4km E of Mouilla, on the road to yeno Alt. ±320 1 ° 40' S; 11 ° 20' E	Secondary vegetation along the road	Shrublet about 50cm high growing in undergrowth where the forest was cut. Corolla: Pale greenish yellow. Fruits: green turning orange at maturity pointed towards the apex
JM et Reitsma No 3579 26/01/88	Rembo river	Primary forest	Shrub of 1m high. Fruits yellow-orange 4cm long & 2.5cm wide. White latex.
AM Louis No 375 4/11/83	Massive of chaillu about 10km along the road from Mimongo to Mbigou. Alt. ±600m	In old Secondary forest along the road	Shrub about 3m high strongly branched, leaves green, the younger leaves paler. Calyx greenish. Corolla pale yellow, the tube inside with red stripes. Fruits ovoid, 2.5 cm in diameter, somewhat ribbed bark of roots used as stimulant. Cultivated near the houses of a village. Flowers and fruits.
AJM Leeuwemberg No 12543 19/11/82	Gabon: Akoga near Mbe River left bank 0 ° 48' N; 10 ° 30' E Alt. ±500m		Cultivated shrubs 1.80m high; trunk 3cm diameter, repeatedly dichotomous branched; bark smooth, pale grey, leaves herbaceous, calyx pale green, corolla pale-yellow, fruits orange, ellipsoid, lemon like slightly bumpy, 45-50+ 29- 35=29-33 mm. acute Sp. Col in Wag. At least root bark contains hallucinogens.
AJM leeuwemberg	Akoga, near Mbé, road left	Cultivated	Cultivated. 1.50m height. Trunk of 3cm diameter. Repeatedly

No 12544 19/11/82	bank 0° 48' N, 10° 30' E Alt: 500m		dichotomously branched. Bark smooth, pale grey leave herbaceous, eaten by black-yellow grasshoppers. Calyx pale green; corolla pale yellow with violet spots in throat. Fruit orange narrowly ellipsoid, acuminate and with a blunt tip, smooth, 29-50+13-23+13-22 mm. Spirit coll. In WAG only the root bark contains hallucinogenous drugs reported by Mintza Eduard. Tested.
AJM leewemberg No 12542 19/11/82	Gabon Akoga near Mbe road left 0° 48' N, 10° 30' E Alt 500m	Cultivated	Cultivated shrub. 2.50 m height, trunk 10cm diameter; repeatedly dichotomously branched bark smooth pale, grey leaves, herbaceous calyx pale green, corolla pale yellow, with violet spot in throat, fruits orange citrus like, subgelose. 34-46+32-40+30-39mm. White latex. All parts of plant contain hallucinogens Tested by Mintza Eduard/ Spirit collected in Wag.
A m LOUIS No 2024 25/10/82	Former road Libreville Ntoun km-13 Province de L'estuaire	Près d'une maison entretenu	Shrub of 2m high Corolla: Yellow pale pointed in violet Calyx Green
Gauchotte No 1882 October 1957	Province d'ikoy		Collected with fruits
Bourobou et Moussavou No 126	South of Libreville		Shrub of about 1,5m height; yellowish flowers

Appendix 5. List of contacts

CAMEROON

- Dr. Achoundong (Director National Herbarium Yaounde)
- Pr. Ayafor Johnson (Researcher, University of Dshang)
- Dr. Ewusi Ndumbe (Pharmacist, Nkongsamba)
- Mr. Robert Nkuinkeu, PLANTECAM Botanist
- Mr. Essengue Ekani Dieudonné: DDEF Vallée du Ntem, Ambam
- Mr. Siizeh Isidore: Agent Adminisyratif du Projet APEC (Appui à la Protection de l'Environnement au Cameroun), BP. 199 Ambam

EQUATORIAL GUINEA

- Frank Stenmanns: Asistente Tecnico Principal, APDO 207-Bata –Guinea Equatorial. Telefono: (240) 8 33 38-8 33 40. Fax: (240) 8 33 39.
- Pablo Esono Esono Nchama, Ingeniero tee-Forestal. APDO 207-Bata. Telefono: (240) 8 33 38-8 33 40. Fax (240) 8 33 39. E mail: [_ HYPERLINK mailto:curef@internet.gq](mailto:curef@internet.gq) .
- Norberto Simon Nguema, Ingeniero tee Forestal, APDO 207 Bata-Equatorial Guinea. Telefono casa: (240) 83602. Officino: (240) 8 33 38-8 33 40. Fax: (240) 8 33 39. Email: [HYPERLINK mailto:curef@internet.gq](mailto:curef@internet.gq) .
- Benito Mba Medja, CUREF-BAA Equatorial Guinea, APDO 207-Bata-Equatorial Guinea. Teefono: (240) 8 33 38-8 33 40. Fax (240) 8 33 39. Email: curef@internet.gq.
- Jaine Malonga oko, Directeur General des Forêts. Telefono: (240) 9 28 06
- Alfredo Abesso Onguene, scretaire general minister des forêts Guinée Equatorial. Telefono (240) 9 32 35.
- Niconor Ona Nze, assistant technique de la CEFDHAC, correspondant National, BP: 840 Malabo Guinée Equatorial. Telefono (240) 9 49 14-9 51 92. Telefono casa: (240) 9 43 13. Email: [_ HYPERLINK mailto:cefdhac@intet.gq](mailto:cefdhac@intet.gq) . Fax (240) 9 49 14-9 29 05.
- Edelmizo Castanto Bizantino, Directeur Général de l'Environnement. Telefono: (240) 9 13 05; Fax: (240) 9 29 05

- Santiago Francisco Engonga Osono. Autoroté Scientifique CITES, Direction générale de l'environnement. Telefono: (240) 9 13 05; Fax: (240) 9 29 05
- Mr Miguel Ndong kvo, Geographe, Direction Générale de l'Environnement, Ministerio de la Bosque y Forestale-Malabo Guinée Equatoriale.
- Juan Asaha Ndong, Official Administrative, Direction générale de l'Environnement. Telefono: (240) 9 13 05; Fax: (240) 9 29 05.
- Gregorio Martinez Font, Administration Apra, Carrera de Rebois, S/n (Barrio Lampert). Telefono officina: (240) 9 28 31; Fax: (240) 9 33 48. Telefono casa: (240) 9 45 87; Fax: (240) 9 45 86. Malabo-Republica Guinea Ecuatoriale

REPUBLIC OF GABON

- Pr. Daniel Ona-Ondo, Minister of Culture, arts and Popular Communication. Tel: (241) 72 91 66 / 76 32 33; Domicile: 72 69 10. BP: 1113. Email: ona@inet.ga.Libreville Gabon.
- Pr. Jean Noel Gassita, BP 100 Libreville Gabon. Tel: (241) 73 28 59; Fax: (241) 73 70 06.s
- Nnoh Francine yveline, Secrétaire de Direction; BP 770 CICIBA. Tel: (241) 77 50 88-70 40 96
- Omva Ovono Hervé, Fondation GERPIC (Gerdes "Promotion Iboga Culture) assistant de recherches. Tel: (241) 73 56 57 poste 46; Domicile (241) 76 46 85, Libreville-Gabon.
- Dieudonné Pambo, Directeur du Centre National de la Recherche Scientifique et Technologique, BP 842, Tel: (241) 73 47 86.
- Dr. Posso Paul, directeur de l'Institut de Recherche en ecologie Tropicale; BP: 13354 Libreville Gabon. Personnelle 13614 Libreville Gabon.
- Dr Bourobou Bourobou Henry, Institut de Recherche en ecologie Tropicale; BP: 13354 Libreville Gabon; Tel: (241) 73 47 86, Fax: (241) 73 25 78 Libreville-Gabon.
- Robert Solem, CARPE Gabon, BP: 9144; Tel: (241) 73 56 33; Fax: (241) 73 58 85; Email: carpe@internetgabon.com

Others

- The Director of Ivory Coast National Herbarium