

*Full Length Research Paper*

# Contribution to the knowledge of medicinal plants of the Dja Biosphere Reserve, Cameroon: Plants used for treating jaundice

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**An ethnobotanical survey was conducted in two phases in the Dja region in 1995 and 2000. A total of 63 herbalists prescribed 45 plants and 84 recipes in the treatment of jaundice. These plants are distributed in 44 genera and 31 botanical families. The fact that a same plant species be mentioned by different persons or by the same persons after five years for treating the same ailment, is a credibility index which can be attributed to that plant species. *Annickia chlorantha*, *Harungana madagascariensis*, *Carica papaya*, *Bidens pilosa*, *Cassia alata*, *Coffea canephora*, *Emilia coccinea* are such plant species. *A. chlorantha* and *H. madagascariensis* are also confirmed in the literature to possess effective chemical compounds against jaundice. Some 34.5% of the recipes cited were also indicated by healers to possess diuretic, purgative or vomitive effect. Such effects are confirmed in the literature for *E. coccinea* and *H. madagascariensis*. These results lead credibility to the folk medicine use in the Dja Reserve, and to the method used to identify medicinal plants indicated in traditional medicine.**

**Key words:** Medicinal plants, herbalists, common usage, Dja Biosphere Reserve, jaundice.

## INTRODUCTION

According to the World Health Organisation (OMS, 1983) about 75 - 80% of the people living in development countries and mostly in Africa consult traditional healers for their health care. Jaundice is known as one of the most important ailment cited in traditional medicine in west (Richel, 1995) and central (Bitsindou, 1996) Africa, in Cameroon pharmacopoeia (Adjanohoun et al., 1996) and in the Dja reserve (Betti, 2001). In the Congo Basin and in particularly in Cameroon, local medicines are often preferred to modern medicines for treating jaundice. They are of course less expensive, but they are regarded as being more "effective".

Many works have been done on the traditional use of medicinal plants in Cameroon. For example, Kébou (1993)

listed medicinal plants used by the Foto people in the Menoua subdivision (West region), Betti (2004) described medicinal plants used by the family mothers in the Dja biosphere reserve and listed (Betti, 2002) medicinal plants sold in the Yaoundé markets. Cameroon government collaborated with the Scientific and Technical Research Commission of the Organization of African Unity to carry out in collaboration with traditional healers a survey of medicinal plants. The findings were published in 1996 in a 600 pages compendium "Traditional Medicine and Pharmacopoeia: Contribution to Ethnobotanical and Floristic Studies in Cameroon" (Adjanohoun et al., 1996). Over 500 traditional healers volunteered and participated in this important study.

All the works cited above described the recipes and discussed the relative importance of the plants based on the common usage by different informants, what we call the "spatial common use". This is the way of using the same plant species by different informants for treating the

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same ailment. No study has discussed the relative importance of medicinal plants based on their common usage in different periods, different years, what we call the “temporal common use” or the way of using the same plant for treating the same ailment in the same area in different years.

This paper analyses the relative importance of plants used in the Dja biosphere reserve for treating jaundice through their both “spatial” and “temporal” common usage.

## MATERIAL AND METHOD

### The study site

The Dja Biosphere Reserve is located in the East and South Provinces of Cameroon, between 2°50 and 3°30 latitude North, and 12°20 and 13°40 longitude East. It covers an area of 5,260 sq. km and is classified among the largest protected areas of the Guinea-Congolian tropical rain forests. The major ethnic groups, the Bantus and the Baka Pygmies live side by side in and outside the reserve. The Bantus include the Badjoué in the North, the Nzimé in the East, the Mbulu in the West, the Fang-Nzaman in the South, and the Baka Pygmies and the Kako farmers who live mostly scattered in small settlements, mainly in the forest at some distance from the Bantu villages and roads. According to Gartlan (1989), the population density is not high, about 1.5 inhabitants/ sq. km. These people depend directly on the resources in the reserve for livelihood. The Bantus practice “slash and burn” type of cultivation with a bimodal annual farming cycle, which is entirely dependent on the rainfall pattern (De Wachter, 1996). Hunting and gathering are practiced by all, but more intensively by the Baka Pygmies.

### Ethnobotanical survey

The data for this study were obtained from direct interviews with the local people, mostly herbalists, living in and around the Dja Reserve. The originality and the strength of this method derive from its both “spatial” and “temporal” common usage approaches. In fact, the survey was conducted in two phases, in two different years. The first phase of the survey was conducted from July to December 1995, whereas the second phase was conducted from January to May 2000. The idea was to return five years later to the same area (but not necessarily to the same informants), and ask the same survey questions. Information was collected according to a standardized enquiry list of the “Médecine traditionnelle et Pharmacopée (PHARMEL)” database sheets (Adjanohoun et al., 1994). This is a database of medicinal plants used in traditional medicines of Africa. Enquiry was made as to “what ailments were treated by which plant species”, rather than asking “which plants were used to treat which ailments”. The former method (ailments-plants) ensures good data collection, while the second (plants - ailments) may lead to the wrong data. This is because the healer always tries to provide an answer for any plant indicated. For each health problem cited, details of prescriptions (plant part used, mode of preparation, etc.) were carefully recorded. The vernacular names of the plants were recorded as much as possible, and we tried to collect the plants mentioned by the informants. Some of the plants were identified in the field with the help of Mr. Koufani from the National Herbarium of Cameroon (YA). The final identification was made at YA with the help of Mr. Koufani, Mr. Paul Mezili and Dr. Onana. Herbarium specimens are kept at YA and BRLU.

The therapeutic statements were made of a specific disease, a symptom or a physiological effect. Information on the diagnosis of

ailments were provided through a semi-structured interview of nurses or local health officials. In this paper, anti-jaundice plants refer to the plants used for treating indifferently the hepatic type or the hemolytic type of jaundice. These ailments are largely well known in the Dja biosphere reserve in almost all ethnic groups who call them “zoom”. To classify the data according to the world system, the ailments were grouped according to the classification proposed by the World Health Organisation and adapted by the African Unity Organisation (AUO) for the Cameroonian pharmacopoeia (Adjanohoun et al., 1996). In this classification, jaundice belongs to the “specific symptoms” ailments group.

## RESULTS

### Sample

A total of 63 informants prescribed plants in the treatment of jaundice. Thirteen informants provided those data twice, which means in years 1995 and 2000. This gives a total number of 76 interviews conducted in the two years of survey (37 interviews in 1995 and 39 in 2000). The distribution of interviews in different ethnic groups is as follow: Badjoué in the North of the reserve (10 interviews), the Nzimé in the East (10), the Mbulu in the West (6), the Fang (7) and Nzaman (3) in the South, and the Baka Pygmies (24) and the Kako fishers (16) who live mostly scattered in small settlements, mainly in the forest at some distance from the Bantu villages and roads.

### Recipes cited

A total number of 45 plant species were cited in the treatment of jaundice. These plants are distributed in 44 genera and 31 botanical families (Table 1). Asteraceae (4 plant species), Euphorbiaceae (3) and Fabaceae (3) are the most important families. A total of 217 citations and 84 recipes were recorded (Table 2).

Stem barks (88 citations; 40.5% of citations) and leaves (54; 25%) are the plant parts that were mostly cited in the recipes. Decoctions (69; 31.8%), macerates (67; 30.8%) and juices (50; 23.04 %) are the most cited pharmaceutical forms. All recipes are almost administered to patients through oral voice (204; 94%).

### Relative importance of plant species and recipes cited

The most cited plants are: *A. chlorantha* (37 interviews), *Saccharum officinarum* (24), *H. madagascariensis* (20), *E. coccinea* (18), *C. papaya* (9), *C. alata* (8), *Tetracera potatoria* (6).

Some plants are used in one ethnic group. For example *Albizia ferruginea*, *Picralima nitida* and *Terminalia superba* are used only by the Baka pygmies, while *Momordica charantia* is limited to the Fang group.

Other species which we consider as the most important

**Table 1.** List of plants cited against jaundice in the Dja reserve.

Latin name	Voucher number	Family
<i>Albizia ferruginea</i> (Guill. & Perr.) Benth.		Mimosaceae
<i>Alchornea cordifolia</i> (Sch. & Thonn.) Müll. Arg.	BETTI 2090	Euphorbiaceae
<i>Baphia leptobotrys</i>		Fabaceae
<i>Bidens pilosa</i> L.	BETTI 2070	Asteraceae
<i>Carica papaya</i> L.	BETTI 243	Caricaceae
<i>Cassia alata</i> L. (syn : <i>Senna alata</i> L.)	BETTI 70	Caesalpiniaceae
<i>Chromolaena odorata</i> (L.) R. King & H. Robinson	BETTI 258	Asteraceae
<i>Citrus limon</i> (L.) Burm. f.		Rutaceae
<i>Coffea canephora</i> Froehn. (syn : <i>Coffea robusta</i> Linden.)		Rubiaceae
<i>Costus lucanusianus</i> J. Braun ou C, afer Ker Gawl	BETTI 299	Costaceae
<i>Cucurbita pepo</i> L.		Cucurbitaceae
<i>Dracaena arborea</i> (Willd.) Link	BETTI 129	Agavaceae
<i>Elaeis guineensis</i> Jacq.		Arecaceae
<i>Emilia coccinea</i> (Sims) G. Don	BETTI 90	Asteraceae
<i>Annickia chlorantha</i> Oliv.	BETTI 121	Annonaceae
<i>Erythrina excelsa</i> Bak.	BETTI 343	Fabaceae
<i>Garcinia Kola</i> Heckel	BETTI 42	Clusiaceae
<i>Gossypium barbadense</i> L.	BETTI 2077	Malvaceae
<i>Harungana madagascariensis</i> Lam. ex Poir.	BETTI 263	Hypericaceae
<i>Leea guineensis</i> G. Don	BETTI 174	Leeaceae
<i>Maesopsis eminii</i> Engl.	BETTI 95	Rhamnaceae
<i>Megaphrynium macrostachyum</i> (Benth.) Milne-Redh.	BETTI 166	Marantaceae
<i>Momordica charantia</i> L.	BETTI 2067	Cucurbitaceae
<i>Musa paradisiaca</i> L.		Musaceae
<i>Musa sapientum</i> L.		Musaceae
<i>Musanga cecropioides</i> R. Br.	BETTI 246	Moraceae
<i>Myrianthus arboreus</i> P. Beauv.	BETTI 251	Moraceae
<i>Ongokea gore</i> Pierre		Olacaceae
<i>Picralima nitida</i> (Stapf) Th. Dur.	BETTI 67	Apocynaceae
<i>Piptadeniastrum africanum</i> (Hook. f.) Bren.	BETTI 284	Mimosaceae
<i>Polyalthia suaveolens</i> Engl. & Diels	BETTI 67	Annonaceae
<i>Potomorphe umbellata</i> (L.) Miq. (syn : <i>Piper umbellatum</i> )	BETTI 255	Piperaceae
<i>Pterocarpus soyauxii</i> Taub.	BETTI 60 at Yaoundé	Fabaceae
<i>Pycnanthus angolensis</i> (Welw.) Excell	BETTI 32	Myristicaceae
<i>Saccharum officinarum</i> L.		Poaceae
<i>Solanum anguivi</i> Lam. (syn : <i>Solanum indicum</i> )		Solanaceae
<i>Terminalia superba</i> Engl. & Diels	BETTI 2107	Combretaceae
<i>Tetracera potatoria</i> Afz. ex G. Don		Dilleniaceae
<i>Tetrorchidium didymostemon</i> (Baill.) Pax & Hoffm.	BETTI 2108	Euphorbiaceae
<i>Trema orientalis</i> (L.) Blume	BETTI 139	Ulmaceae
<i>Uapaca paludosa</i> Aubrév. & Léandri	BETTI 2154	Euphorbiaceae
<i>Vernonia conferta</i> Benth.	BETTI 104	Asteraceae
<i>Xanthosoma sagittifolia</i> (L.) Schott		Araceae
<i>Zanthoxylum heitzii</i> (Aubr. et Pell.) Waterman	BETTI 197	Rutaceae
<i>Zea mays</i> L.		Poaceae

plants are cited in many ethnic groups (spatial common usage) and in the two years of survey (temporal common usage). Species such as *A. chlorantha*, *S. officinarum*, *H.*

*madagascariensis*, *E. coccinea*, *C. papaya*, *C. alata*, are cited in the two years of survey and at least in 4 different ethnic groups. A total of 12 plant species are cited twice

**Table 2.** Citations of plants used against jaundice in the Dja reserve in 1995 and 2000.

Rec	Ver-name	Plant species	As-pl,	Pl-part	Pharm,	Adm,	Inf,	Observ,
1	Elonda	<i>Albizia ferruginea</i>		St-ba	de	g-ba	Bke15b	
2	Elonda	<i>Albizia ferruginea</i>		St-ba	de	or	Bke15b	
3	Sawé	<i>Baphia leptobotrys</i>		St-ba	de	or	Bks24b	
4	Andjôn missi	<i>Bidens pilosa</i>		le	de	or	Kks13b	Lo-sa
4	Andjôn missi	<i>Bidens pilosa</i>		le	de	or	Kke9b	Su
5	Biokouar	<i>Bidens pilosa</i>		le	inf	or	Bdn1b	
6	Biokouar	<i>Bidens pilosa</i>		ro	ma	or	Bdn4b	Lo-sa
7	Popo	<i>Carica papaya</i>		le	de	or	Bdn2b	Lo-sa
8	Fofó	<i>Carica papaya</i>		le	ma	or	Fgs5a, Zme5a, Bdn12b	
9	Fofó	<i>Carica papaya</i>		fr		or	Nzs1a, b	Ker
10	Ntawala	<i>Cassia alata</i>		le	de	or	Bdn2b, Kke8a, Kks13b, Blo5b, Bdn12b, Zme7a	Lo-sa
11	Ndawolo	<i>Cassia alata</i>		le	ma	or	Fgs5a	
11	Ndawolo ntang'an	<i>Cassia alata</i>		le	ma	or	Fgs5b	
12		<i>Citrus limon</i>		fr		or	Kks13b	Chi-eg, Lo-sa
13	Cofi	<i>Coffea canephora</i>		y-le	inf	or	Zme2a, b	
14	Elen	<i>Elaeis guineensis</i>		y-le	ma	or	Bdn4b	
15	Mbila	<i>Elaeis guineensis</i>		y-le	inf	or	Bke13b	Lo-sa
16	Alon vouh	<i>Emilia coccinea</i>		le	tr	eye-in	Kks13b	
17	Do'o	<i>Emilia coccinea</i>		le	ma	eye-in	Zme3a	
18	Alonko'o	<i>Emilia coccinea</i>		le	ma	or	Blo5b, 7a, Bke7a, Bks25a, Kks13b	Diu
18'	Lémbo mpolè	<i>Emilia coccinea</i>		le	ma	or	Kke3b	Lo-sa
18''	Alonko'o	<i>Emilia coccinea</i>		le	ma	or	Fgs5b	mo-mi
18'''	Alon vouh	<i>Emilia coccinea</i>		le	ma	or	Fgs5a	Mo-mi, Diu
19	Do'o	<i>Emilia coccinea</i>		le	de	or	Bdn12b	Lo-sa
20	Epfoué	<i>Annickia chlorantha</i>		st-ba	cr	eye-in	Bke1b	
21	Epfoué	<i>Annickia chlorantha</i>		st-ba	de	or	Kke9b	Su
21'	Epfoué	<i>Annickia chlorantha</i>		st-ba	de	or	Kks13a, Bks25a, Bke13a, 14b, 15b, Bdn7b, Zme7a	
22	Epfoué	<i>Annickia chlorantha</i>		st-ba	inf	or	Zme2b	
23	Nfol	<i>Annickia chlorantha</i>		st-ba	ma	or	Bks22b, 26b, 24a, 23b, 25b, Bke16b, 1b, 7a, 13a, b, Fgs5a, b, Bko19a, 20b, Blo5b, Kke18a, Kks13b	
24		<i>Erythrina excelsa</i>		st-ba	ma	or	Bko20b	
25	Mbore coton	<i>Gossypium barbadense</i>		le	ma	or	Kke1a	Lo-sa

Table 2. Contd.

Rec	Ver-name	Plant species	As-pl,	PI-part	Pharm,	Adm,	Inf,
26	Moundou	<i>Harungana madagascariensis</i>	st-ba	de	or	Bko20b, Bks25b, Fgs6b, Kke4a, Zme7a	Diu
27	Etondô	<i>Harungana madagascariensis</i>	st-ba	ma	or	Bkn17a, Bdn5a, 9a	
28	Ekoéka	<i>Megaphrynium macrostachyum</i>	le	de	or	Bdn12b	Lo-sa
29	Oyale zoom	<i>Momordica charantia</i>	le	ma	or	Fgs1a, 4b, 5a	
30	Kombo	<i>Musanga cecropioides</i>	sa		or	Bke10b, 12b	Sa-ro
31	Boussolo	<i>Ongokea gore</i>	wo	de	or	Bks24b	
32	Motokotoko	<i>Picralima nitida</i>	st-ba	de	or	Bko20a, Bke2b	
33	Tôm	<i>Piptadeniastrum africanum</i>	st-ba	ma	or	Nzs3a	
34	Botunga	<i>Polyalthia suaveolens</i>	st-ba	ma	or	Bks25b	
35	Eboma	<i>Potomorphe umbellata</i>	le	ma	re	Bdn1b	
36	Meboma	<i>P. umbellata</i>	le	ma	or	Bdn2b	Diu, pu
36	Eboma	<i>P. umbellata</i>	le	ma	or	Bdn1b, Blo10a, Zme8a	
37	Nguèlè	<i>Pterocarpus soyauxii</i>	wo	de	or	Bks24b	
38	Ntimé	<i>P. soyauxii</i>	st-ba	ma	or	Zme7a	Ton
39	Nkoumso	<i>Pycnanthus angolensis</i>	st-ba	ma	or	Zme6a	Lo-sa
40	Canne à sucre	<i>Saccharum officinarum</i>	st	ju	or	Zme4a	Diu
41	Ngolou	<i>Terminalia superba</i>	st-ba	de	or	Bks25a, Bko20b	
42	Moung gbé ngô	<i>Tetracera potatoria</i>	sa		eye-in	Kke3b	
43	Kpwo ngô	<i>T. potatoria</i>	sa		or	Bko20b	Diu
43'	Kpwo ngô	<i>T. potatoria</i>	sa		or	Bks23b, Kke3b, 4a	
44		<i>Tetrorchidium didymostemon</i>	st-ba	ma	or	Kke4a	
45	Ossom ndékobo	<i>Uapaca paludosa</i>	ro-ba	de	re	Zme4a	
46	Sengui	<i>U. paludosa</i>	ro-ba	de	or	Bke7a	
47	Ossom ndékobo	<i>U. paludosa</i>	ro-ba	ma	or	Zme2b	
48	Ossom ndékobo	<i>U. paludosa</i>	ro-ba	inf	or	Zme2a	
49	Abanga	<i>Vernonia conferta</i>	ro-ba	ma	or	Bks23b	
50	Mbang'a	<i>V. conferta</i>	st-ba	de	re	Zme1a, 7a	
51	Mbang'a	<i>V. conferta</i>	st-ba	de	or	Zme1a, 7a	Lo-sa
52	Ekabi	<i>Xanthosoma sagittifolium</i>	tu	ma	or	Fgs4b	Lo-sa
52'		<i>X. sagittifolium</i>	tu	ma	or	Zme7a	Pu, vom
53	Bolongo	<i>Zanthoxylum heitzii</i>	st-ba	ma	or	Bks21b	
54		<i>Zea mays</i>	se	de	or	Kks12b	
55	Atiti	<i>Bidens pilosa</i>	le	de	or	Bks21b	Lo-sa

Table 2. Contd

Rec	Ver-name	Plant species	As-pl,	PI-part	Pharm,	Adm,	Inf,	Rec
55'	Canne à sucre	<i>Saccharum officinarum</i>	As-w <i>Bidens</i>	st	de	or	Bks21b	
56	Andjôn missi	<i>Bidens pilosa</i>	<i>Saccharum</i>	le	ju	or	Kke9a	
56	Canne à sucre	<i>Saccharum officinarum</i>	As-w <i>Bidens</i>	st	ju	or	Kke9a	
57	Popo	<i>Carica papaya</i>	<i>Solanum</i>	le	de	or	Zme3a	
57	Mpéna	<i>Solanum anguivi</i>	As-w <i>Carica</i>	fr	de	or	Zme3a	
58	Popo	<i>Carica papaya</i>	<i>Tetracera potatoria</i>	fr		or	Bks26b	Ker
58	Kpwo ngô	<i>Tetracera potatoria</i>	As-w <i>Carica</i>	sa		or	Bks26b	
59	Bokassa	<i>Chromolaena odorata</i>	<i>Saccharum</i>	le	ju	or	Kks13b	
59		<i>Saccharum officinarum</i>	As-w <i>Chromolaena</i>	st	ma	or	Kks13b	
60	Alen okpweng	<i>Dracaena arborea</i>	<i>Musa</i>	st-ba	de	or	Kks13b, Blo4a	
60	Ekon	<i>Musa paradisiaca</i>	As-w <i>Dracaena</i>	fr	de	or	Kks13b, Blo4a	
61	Alon vouh	<i>Emilia coccinea</i>	<i>Musa sapientum</i>	le	de	or	Fgs4b	
61	Zec	<i>Musa sapientum</i>	As-w <i>Emilia</i>	fr	de	or	Fgs4b	
62	Do'o, Lémbo mpolè	<i>Emilia coccinea</i>	<i>Saccharum</i>	le	ju	or	Zme3a, Kke5a	Diu
62	Canne à sucre	<i>Saccharum officinarum</i>	As-w <i>Emilia</i>	st	ju	or	Zme3a, Kke5a	Diu
62'	Canne à sucre	<i>Saccharum officinarum</i>	As-w <i>Emilia</i>	st	ju	or	Zme4a, Blo6b, Kke9b, Kke4b	
62'	Alonko'o, Lémbo mpolè	<i>Emilia coccinea</i>	<i>Saccharum</i>	le	ju	or	Zme4a, Blo6b, Kke9b, Kke4b	
63	Do'o	<i>Emilia coccinea</i>	<i>Solanum</i>	le	de	or	Zme3a	Diu
63	Mpéna	<i>Solanum anguivi</i>	As-w <i>Emilia</i>	fr	de	or	Zme3a	
64	Alon vouh	<i>Emilia coccinea</i>	<i>Xanthosoma</i>	le	ma	or	Fgs2b	
64	Ekabi	<i>Xanthosoma sagittifolium</i>	As-w <i>Emilia</i>	tu	ma	or	Fgs2b	Pu, vom
65		<i>Zea mays</i>	As-w <i>Emilia</i>	se	de	or	Zme6a	
65	Do'o	<i>Emilia coccinea</i>	<i>Zea</i>	le	de	or	Zme6a	
66	Aboe	<i>Alchornea cordifolia</i>	As-w <i>Annickia</i>	le	de	or	Fgs3a	Ton
66	Nfol	<i>Annickia chlorantha</i>	<i>Alchornea</i>	st-ba	de	or	Fgs3a	
67	Popo	<i>Carica papaya</i>	As-w <i>Annickia</i>	fr		or	Bks26a	Ker
67	Epfoué	<i>Annickia chlorantha</i>	<i>Carica, Tetracera</i>	st-ba	ma	or	Bks26a	
67	Kpwo ngô	<i>Tetracera potatoria</i>	As-w <i>Annickia</i>	sa		or	Bks26a	
68	Péyé	<i>Annickia chlorantha</i>	<i>Elaeis, Garcinia</i>	st-ba	wi	or	Zme4a	
68		<i>Elaeis guineensis</i>	As-w <i>Annickia</i>	sa	wi	or	Zme4a	
68		<i>Garcinia Kola</i>	As-w <i>Annickia</i>	ro-ba	wi	or	Zme4a	
69	Nfol	<i>Annickia chlorantha</i>	<i>Pterocarpus</i>	st-ba	de	or	Blo3a	
69		<i>Pterocarpus soyauxii</i>	As-w <i>Annickia</i>	st-ba	de	or	Blo3a	

Table 2. Contd.

Rec	Ver-name	Plant species	As-pl,	PI-part	Pharm,	Adm,	Inf,	Rec
70	Poyo, Nfol	<i>Annickia chlorantha</i>	<i>Saccharum</i>	st-ba	ju	or	Kke2b, 2a, 3b, 8a, b, 9a, Fgs6b	Diu
70	Canne à sucre	<i>Saccharum officinarum</i>	As-w <i>Annickia</i>	st	ju	or	Kke2b, 2a, 3b, 8a, b, 9a, Fgs6b	
71	Atondok	<i>Harungana madagascariensis</i>	<i>Citrus limon</i>	st-ba	de	or	Nzs1b	Chi-eg, Lo-sa
71	Ngombang	<i>Citrus limon</i>	As-w <i>Harungana</i>	fr		or	Nzs1b	
72	E'nteneu	<i>Harungana madagascariensis</i>	<i>Cucurbita pepo</i>	st-ba	de	or	Bdn12b	
72	Concombre	<i>Cucurbita pepo</i>	As-w <i>Harungana</i>	se	de	or	Bdn12b	
73	E'nteneu	<i>Harungana madagascariensis</i>	<i>Musa</i>	st-ba	de	or	Bdn12b	
73		<i>Musa paradisiaca</i>	As-w <i>Harungana</i>	fr	de	or	Bdn12b	
74	E'nteneu	<i>Harungana madagascariensis</i>	<i>Musa paradisiaca</i>	st-ba	po	or	Bdn7b	Pu
74		<i>Musa paradisiaca</i>	As-w <i>Harungana</i>	fr	po	or	Bdn7b	
75	E'nteneu	<i>Harungana madagascariensis</i>	<i>Saccharum</i>	st-ba	ju	or	Bdn9b	Diu
75	Canne à sucre	<i>Saccharum officinarum</i>	As-w <i>Harungana</i>	st	ju	or	Bdn9b	
75'	Atondô	<i>Harungana madagascariensis</i>	<i>Saccharum</i>	st-ba	ju	or	Blo7a, Bke6b, Fgs2b, Kke4b, 3b, Kko10b, Nzs1b	
75	Canne à sucre	<i>Saccharum officinarum</i>	As-w <i>Harungana</i>	st	ju	or	Blo7a, Bke6b, Fgs2b, Kke4b, 3b, Kko10b, Nzs1b	
76	Andjôn missi	<i>Harungana madagascariensis</i>	<i>Saccharum</i>	st-ba	de	or	Kks13b	
76		<i>Saccharum officinarum</i>	As-w <i>Harungana</i>	st	de	or	Kks13b	
77	Atondok	<i>Harungana madagascariensis</i>	<i>Saccharum, Annickia</i>	st-ba	de	or	Nzs1a	
77	Nfol	<i>Annickia chlorantha</i>	As-w <i>Harungana</i>	st-ba	de	or	Nzs1a	
77	Canne à sucre	<i>Saccharum officinarum</i>	As-w <i>Harungana</i>	st	de	or	Nzs1a	
78	Djanga langa	<i>Leea guineensis</i>	<i>Saccharum</i>	st-ba	ju	or	Bks26b	
78		<i>Saccharum officinarum</i>	As-w <i>Leea</i>	st	ju	or	Bks26b	
79	Djomlo	<i>Maesopsis eminii</i>	<i>Costus</i>	st-ba	ju	or	Bdn9b	Pu
79	Mien	<i>Costus lucanusianus</i>	As-w <i>Maesopsis</i>	st	ju	or	Bdn9b	
80	Essia	<i>Musanga cecropioides</i>	<i>Trema</i>	sa		re	Bdn10b	Sa-ro
80	Edjuéssa	<i>Trema orientalis</i>	As-w <i>Musanga</i>	le	ma	re	Bdn10b	
81	Essia	<i>Musanga cecropioides</i>	<i>Trema</i>	sa		or	Bdn10b	Sa-ro
81	Essia	<i>Musanga cecropioides</i>	<i>Trema</i>	sa		or	Bdn10a	
81'	Edjuéha	<i>Trema orientalis</i>	As-w <i>Musanga</i>	le	ma	or	Bdn10a	
81'	Edjuéssa	<i>Trema orientalis</i>	As-w <i>Musanga</i>	le	ma	or	Bdn10b	
82	Komtilé	<i>Myrianthus arboreus</i>	<i>Saccharum</i>	st-ba	ju	re	Zme9a	
82	Canne à sucre	<i>Saccharum officinarum</i>	As-w <i>Myrianthus</i>	st	ju	re	Zme9a	

Table 2. Contd

83	Komtilé	<i>Myrianthus arboreus</i>	<i>Saccharum</i>	st-ba	ju	or	Zme9a	Ker
83	Canne à sucre	<i>Saccharum officinarum</i>	As-w <i>Myrianthus</i>	st	ju	or	Zme9a	
84	Ntimé	<i>Xanthosoma sagittifolium</i>	<i>Pterocarpus</i>	tu	ma	or	Bdn5a	Pu, vom
		<i>Pterocarpus soyauxii</i>	As-w <i>Xanthosoma</i>	st-ba	ma	or	Bdn5a	Ton

Citation: Each informant in front of a given plant species represents one citation. For example, in this table, Recipe n°8 (Rec8) is represented by tree citations (Fgs5a, Zme5a, Bdn12b). Rec: recipe; one recipe= one, two, three or many citations with the same plant, the same (s) associated plant (s), the same plant part, the same pharmaceutical form, the same mode of administration. Vernacular names (Ver-name): names which are used by the informants. Associated plants (As-PI): plants which are prescribed together with other plant(s) for the same prescription. For example four informants proposed to pound the stem barks of *Annickia chlorantha* together with the stem of the sugar cane (*Saccharum officinarum*) and drink the juice. As-w= associated with. Plant part (PI-part): fr= fruit; le= leaf; ro= root; ro-ba= bark of the root; sa= sap; se=seed; st=stem; st-ba=bark of the stem; tu= tuber; wo=wood; y-le= young leaf. Pharmaceutical form (Pharm): cr= crushed; de= decoction; inf=infusion; ju= juice; ma=macerate; po= pounding; tr= triturated; wi= wine. Mode of administration (Adm): eye-in= instillation in eye; g-ba= general bath; or= oral voice; re=rectal voice. Observations (Observ): here we give some precisions (the physiological effect, use of salt, kerosene, or mother milk): Lo-sa= Add a pinch of local salt; ker= Add drops of kerosene; mo-mi= mix in mother milk (natural milk); Sa-ro=collect the sap from roots early in the morning; diu= diuretic; pu= purgative; vom= vomitiv; ton= tonifiant (which gives tonus); su= add sugar; chi-eg= mix with local chicken's eggs. Informants (Inf): each informant is identified by a cod comprising four letters and one number. The two first letters of the cod indicate the ethnic group: Bd: badjoué, Bk: baka, Bl: mbulu, Fg: fang, Kk: kako, Nz: nzaman, Zm: zimé; The third letter designates the area: e : east part of the Dja reserve, n: north, o: west, s: south. The last letter precises the year of survey: a: 1995, b: 2000. The number in the cod indicates the position (n°) of the informant in his ethnic group among the total informants interviewed for the total ailments recorded in the Dja Reserve (108 informants for 84 ailments in total in 1995 and 2000 [Betti 2001]). For example: Fgs4b represent a Fang healer, based in the south of the reserve interviewed in year 2000.

(in the two years of survey) by the same informants (self common usage): *A. chlorantha* (8 persons cited the same plant in 1995 and 2000), *S. officinarum* (4), *H. madagascariensis* (3), *C. papaya* (2), *B. pilosa* (1), *C. alata* (1), *C. canephora* (1), *E. coccinea* (1), *Musanga cecropioides* (1), *Tetracera potatoria* (1), *Trema orientalis* (1), *Uapaca paludosa* (1). This confirms the traditional use of those 12 plant species in the treatment of jaundice by the Dja Reserve people.

There are recipes which are cited in many ethnic groups (spatial common usage) and in the two years of survey (temporal common usage). The following are five examples of such recipes with their reference number as precised in Table 2:

1). Rec 18 (including 18', 18'', and 18'''): squeeze the leaves of *E. coccinea* in water and drink the macerate. This recipe was prescribed by seven informants belonging to four ethnic groups (Baka, Fang, Mbulu, and Kako), based in the east, south and west of the reserve.

2). Rec 21': prepare the stem bark of *A. chlorantha* in water and drink the decoction. This recipe was cited by eight informants distributed in four ethnic groups (Badjoué, Baka, Kako and Zimé).

3). Rec 23: macerate the stem barks of *A. chlorantha* in water and drink it. This recipe was cited by 18 informants belonging to the Baka, Fang, Kako and the Mbulu ethnic groups.

4). Rec 26: prepare the stem barks of *H. madagascariensis* in water and drink the decoction as diuretic. This recipe was cited by five informants belonging to the Baka, Fang, Kako and Zimé ethnic groups.

5). Rec 36: squeeze the leaves of *Potomorphe umbellata* in water and drink the macerate as diuretic. This was cited by four informants belonging to Badjoué, Baka and Zimé groups.

Some plants used for treating jaundice are indicated by herbalists to possess diuretic, purgative or vomitiv effects. For example, the maceration of the leaves from *E. coccinea* (Rec

18) is drunk for its diuretic effect while that of the white cocoyam (*Xanthosoma sagittifolia*) is drunk for its purgative and vomitiv effect. Five plant species are cited to possess diuretic effect, including: *E. coccinea*, *H. madagascariensis*, *Potomorphe umbellata*, *S. officinarum*, and *T. potatoria*. Four plant species are indicated to have purgative effect, comprising *H. madagascariensis*, *Maesopsis eminii*, *Potomorphe umbellata* and *X. sagittifolium*.

## DISCUSSIONS AND CONCLUSIONS

Some plants largely cited in the Dja Biosphere Reserve are also known in the literature for their active compounds for the same usage. These plants are presented hereby, with their vernacular names, and the pharmacological inquiries related to that ailment:

1). *A. chlorantha* (Annonaceae), Epoué (Baka), Pényé (Badjoué, Zimé), Nfol (Bulu, Fang, Nzaman),



Poyo (Kako). The plant was cited for treating jaundice by 29 persons belonging to all ethnic groups in the Dja. Eight (8) informants cited the same plant in the two years of survey. *A. chlorantha* is known for the same usage in Cameroon in the east region by the Baka mothers (Betti, 2004), in the Bipindi-Akom II in the south region (Dijk, 1996) and by the sellers (Betti, 2002) in Yaoundé city. This usage is also mentioned in the Cameroon Pharmacopoeia (Adjanohoun et al., 1996) as well as in other African countries, such as Congo-Brazzaville (Diafouka, 1997), central (Bitsindou, 1996) and West (Richel, 1995) Africa. The popularity of *A. chlorantha* in the treatment of jaundice in Cameroon could be link to the yellow colour of its stem barks. This yellow colour is, according to Pousset (1989) due to the presence of three alkaloids including palmitine, jathorrhizine and colombine which are yellow. This is what ethnopharmacologists call the "theory of signature". This theory aims to link a sign of the plant to its applications in folk medicine. But in this specific case, Pousset (1989) confirmed the *A. chlorantha*'s properties and effectivity in the treatment of jaundice.

2). *H. madagascariensis* (Hypericaceae), Ndjènè (Baka), Kaandi (Kako), E'nteneu (Badjoué, Zimé), Atondok (Mulu, Fang, Nzaman) was cited for treating jaundice by 17 informants. Three informants cited *Harungana* in the two years of survey. The plant is known for the same usage in the Dja region in the general pharmacopoeia (Betti, 2004), in Gabon (Bitsindou, 1996) and in Congo-Brazzaville (Diafouka, 1997). The yellow colour of the stem barks is due to the presence of harunganine which is yellow. The extracts from *H. madagascariensis* stimulate the exocrine functions of the pancreas. Total extracts showed the hepato-protector properties (Kerharo and Adam, 1974).

Most of the plants involved in the treatment of jaundice are chosen for their diuretic, purgative or vomitive effects. Following are examples of such a plant species:

i). *E. coccinea* (Rec 18, 62 and 63), *H. madagascariensis* (Rec 26, 75), *S. officinarum* (Rec 40, 62), *E. chlorantha* (Rec 70), *P. umbellata* (Rec 36) and *T. potatoria* (Rec 43) were cited for their diuretic effect. *C. papaya* was not cited for its diuretic effect in the Dja. But the plant contains an alkaloid, carpaïne, which has diuretic properties (Pousset, 1991);

ii) *H. madagascariensis* (Rec 74), *M. eminii* (Rec 79), *P. umbellata* (Rec 36) and *X. sagittifolia* (Rec 52, 65, 84) were cited for their purgative effect. *M. eminii* is also known in Gabon (Adjanohoun et al., 1984) for its purgative effect. *Ongokea gore* and *Tetrorchidium didymostemon* were not cited for their purgative properties, but these two plants are known for that effect in Gabon (Adjanohoun et al., 1984) and in Congo (Adjanohoun et al., 1988) respectively. *C. alata* was not indicated to possess purgative properties. Bruneton (1996) mentioned the laxative and purgative properties of the leaves and fruits of *C. alata*. Purgative properties have also been reported by authors such as Khan et al. (2001),

Oliver-Bever (1986) and Ogunti et al. (1993).

*X. sagittifolia*, the white cocoyam, is the unique plant that was cited for its vomitive effect (Rec 52, 65, 84). To enhance the purgative effect of some recipes, traditional healers use to add some drops of kerosene (Rec 9, 58, 67, 83) or a pinch of local salt (Rec 4, 6, 7, 10, 15, 18, 19, 25, 28, 39, 51, 52, 55) for their purgative effect. To obtain local salt, the tradipractitioner burns the dried flowers from the palm tree (*Elaeis guineensis*). The ash obtained, is then used in folk medicine as the local salt. In all, 29 recipes (34.5%) are cited for their diuretic, purgative or vomitive effect.

*Alchornea cordifolia* (Rec 66) and *Pterocarpus soyauxii* (Rec 38, 84) were cited for their tonifiant effect, since jaundice ailment is often accompanied by weakness. The sugar cane (*S. officinarum*) is largely cited because of its utilization as adjuvant in folk medicine. In fact, *S. officinarum* is often associated with plants such as *C. alata*, *E. coccinea* and *A. chlorantha* for their bitter taste.

Data presented in this paper seems old, but we wanted to outline the aspect of "temporal common usage". The fact that a same plant species be mentioned by different persons or by the same persons after five years for treating the same ailment, is a credibility index which can be attributed to that plant species. We suppose that it is easier for a given informant to repeat the same truth than telling the same wrong inquiry after such a long period (5 years). The examples of *A. chlorantha* and *H. madagascariensis* show that the plants largely cited (spatial and temporal common usage) have often effective chemical substances.

Little data presented on the common usage of plants in Africa strengthen, not only those elements of credibility to be attributed to the plants cited, but they also illustrate the originality of the method used to select (put in evidence) the most interesting plants use in folk medicine for treating jaundice in the Dja reserve. The glaring development challenge at the back-ground of what precedes is the pressing need to implement strategies and programmes to identify active chemical substances of other plant species with spatial and temporal common usage as anti-jaundice in the Dja area.

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