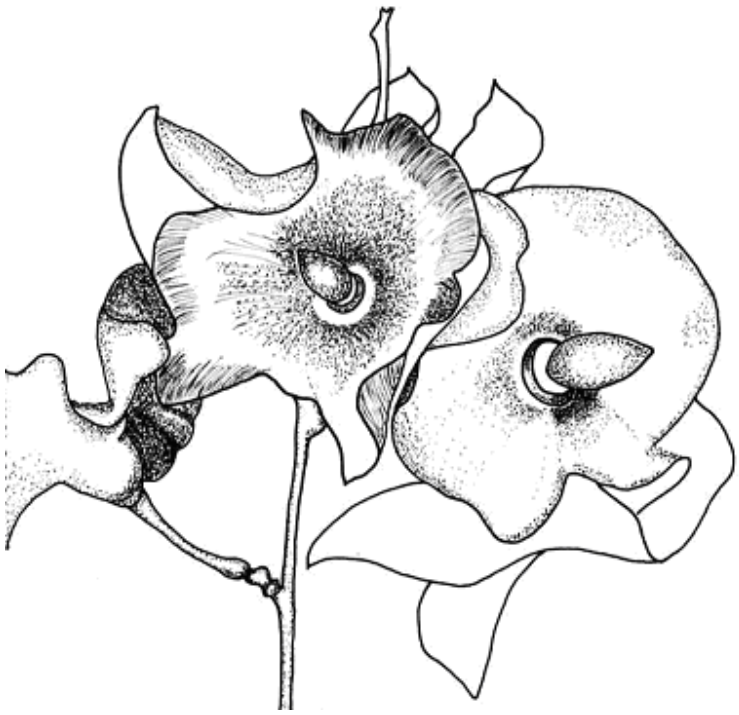
A Preliminary checklist of the Vascular Plants and a key to *Ficus* of Goualougo Triangle, Nouabalé-Ndoki National Park, Republic of Congo.



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MSc Thesis

Biodiversity and Taxonomy of Plants

University of Edinburgh

Royal Botanic Garden Edinburgh

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Cover illustration:

Aptandra zenkeri, Olacaceae

Specimen: Ndolo Ebika, S.T. 28

By Sydney Thony Ndolo Ebika

Acknowledgments

The achievement of this MSc thesis in Biodiversity and Taxonomy of Plants is the result of advice, support, help and frank collaboration between different people and organizations and institutions. Without these people this thesis could not have been achieved.

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The Goualougo Triangle Ape Project (GTAP) is the area where all of the specimens treated in this thesis were collected. The team of this project was always looking after me night and day from 2006 to 2009. I would like to thank both principal investigators of the Triangle both Dr. Morgan, D. and Dr. Sanz, C. for their support to me. They assisted me everyday, encouraged me to collect and identify plants in the GTAP and provided me with any equipment I needed for carrying out my botanical work in the field. The guides of the GTAP, who I trusted, taught me about the forest. I learnt a lot of ethnobotany from them. I would like particular to thank Marcelin Mokoti who taught me the navigation in the forest without relying too much on the GPS. I remember him saying to me: “if you rely too much on your GPS to walk in the forest, what will happen to you when, once in the forest far aways from the base camp, the GPS broken down?”

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The last version of the dichotomous key to 15 fig species in chapter four is a product of several attempts which included comment and suggestions from 13 people who tested the different versions. Without the feedback from these people, the key would not have been as good as it is. Many thanks to Dr. Harris, D.J. and Ms. Atkins, H.; Mr. Elliott, A., Mr. Gruter, N.; Mrs. Blasy, V.; Ms. King, C.; Xinjie, D.; Nieto, E.; Filimban, F.; Hajah Noor Linda Haji Najir; Ms. Oldroyd, L.; Ms. Sharpe, N. and Ms. Goodwin, Z.

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My study for the MSc in Edinburgh was funded by a post project funding from the Darwin Initiative.

Dedication

This thesis is dedicated to my partner Préfina Ossindza and our lovely son Jules Presney Ndolo Ebika.

List of abbreviations

±	more or less
c.	*circa*; approximately
BM	Natural History Museum Herbarium
d.b.h.	diameter breast height.
F.C.B.	Flore du Congo Belge et du Ruanda-Urundi
F.C.R.B.	Flore du Congo, du Rwanda et du Burundi
F.T.E.A.	Flora of Tropical East Africa
F.W.T.A.	Flora of West Tropical Africa
Fl. Cam.	Flore du Cameroun
Fl. Gabon	Flore du Gabon
GTAP	Goualougo Triangle Ape Project
GPS	Global Positioning System
NNNP	Nouabalé-Ndoki National Park
P	Paris Herbarium
vel sp. aff.	*vel species affinis*; this species or a close species
Ref.	References

Abstract

This work is the result of the identification of 214 specimens collected by the author in the Nouabalé-Ndoki National Park, Republic of Congo from 2006 to 2008. The specimens were identified in Edinburgh and Kew from May to July 2010. The specimens represent 58 families, 143 genera and 194 species of which 186 were fully identified to species (96% of the species) and 8 species could not be fully identified. 29 out of the 186 species are new records to the Sangha Trinational landscape which is an area covered by the previous botanical studies. The 194 species were identified in five stages. This work provides a dichotomous key, descriptions and illustrations of 15 species of *Ficus* identified. It is clear that a plant name from a botanically poorly know area must have a specimen linked to it in order to confirm the name.

Table of Contents

Chapter One: **Introduction**

1. **General background**

The Nouabalé-Ndoki National Park in the Republic of Congo is well known for the faunal diversity especially large mammals found in this area. This is due to many studies which have been carried out and are ongoing (gorillas, chimpanzees and elephants for example) in different study sites of the park (Mondika, Mbeli, Goualougo, Mabalé and Mingingi). However, on the plants side, there have been few botanical studies undertaken in the park (Moutsamboté *et al.*, 1994) and there are not many botanists in the Republic of Congo.

Unlike the neighbouring countries of Cameroon, Gabon and the Democratic Republic of Congo, the Republic of Congo does not have a Flora yet. Because of this, collecting and identifying plants are very important for future Floras in the Republic of Congo. As part of a long term project leading to knowing the plants in my country, I have been collecting botanical specimens in northern Congo from 2006 to 2008.

2. The author's background and interest

In March 2006, I joined the Goualougo Triangle Ape Project as Research Assistant in the Nouabalé-Ndoki National Park. In August 2006, I was among the trainees who participated to the botanical training organized by both Dr. Harris and Dr. Moutsamboté. In May 2007, I went on a two-week trees identification trip with Dr. Harris in the north of the National Park. Inspired by these training sessions I collected, and started to identify plants in the Goualogo Traingle. In iddition to my botanical research, I was studying the feeding ecology of great apes, especially chimpazees, carrying out plots surveys and the phenological monitoring of tree species for great apes feeding ecology. I was also interacting with the local guides employed by Goualougo Project to know what they were using plants for in their culture.

Because of what I had learnt from 2006 to 2009 in the forest of the Nouabalé-Ndoki National Park, I was interested in carrying out an in-depth study of the genus *Ficus*. The species belonging to this genus are one of the most important sources of food for great apes but primatologists cannot easily identify these species. In the future I would like to work in collaboration with primatologists in order to help them document the feeding ecology of the animal species of their interest by producing photoguides of items eaten by the animal species. In addition, because great apes are endangered species, a better understanding of the items eaten by these animals will contribute in preserving their habitat and their foods. Finally, I am interested in illustrating plants species to aid plant identification.

3. Aim of the study

The short term aim of this study is to increase our knowledge of the plants of the Nouabalé-Ndoki National Park and in particular the genus *Ficus*. In the long term by making available in national and international herbaria specimens from this area, I aim to contribute to our understanding of the taxonomy, floristics and phytogeography of Central Africa.

Chapter Two: Process of plant identification in an area with no flora.

1. Introduction

The process of plant identification I am writing about is from my own experience and can be seen as a series of stages. I worked in the field with local guides who used common names in different languages (Mbendzélé, Ngombé and Bomassa), compared plant specimens with illustrations, collected specimens and identified them at the herbaria of Edinburgh and Kew. This process, made up of several stages, is the method which led to the results presented in chapters three and four and Appendix 1 of this thesis. When I return to the field I will know which characters I must pay more attention to to distinguish species in a given genus after working from the field to the herbaria to identify plant specimens.

2. Methods

2.1. In the field

By identification in the field I mean where the plant was growing or back at a base on the same day. In this section, I present the two ways of identifying unknown plants in the field which I used. I will include making botanical specimens which is not a way of identifying plant but a step leading to it.

2.1.1. Use of the expertise of local guides: common names, list of common names and scientific names

The use of local guides for botanical purposes is one of the ways leading to the identification of unknown plants. These people often have names for plants and more knowledge of plants when they use them to meet their needs such as food, medicine and construction.

Common names helped me when I did not know the scientific name of a plant. I asked my local guides, for any unknown plant, what they call that plant in their language. Sometimes, I did not hear the word properly and I asked them to pronounce the common

name slowly in order to have the right spelling. Then I read that name back and asked if I got it right.

To ensure that my local guide knew the plant we saw and its common name, I asked him few days later to tell me again the name of the same plant to check that he said the same name as before. In addition, I asked different guides from his tribe to check whether they called the plant the same as the previous guide or differently.

By making notes of common names of plants, I had basic information which will help me to go to the next stage: comparing a list of common and scientific names.

A list of common and scientific names is a link between a common name and a scientific name. This list is established often by a botanist who studied plants and worked with people from an area. When such a list is available, the scientific name of an unknown plant can be found if and only if the common name is linked to one scientific name. In my own case, for example, when I started to work with local guides (Bambendzélé) in the Nouabalé-Ndoki National Park in the Republic of Congo, I had never seen a *Santiria trimera* tree. One day in the field, I was impressed by stilt roots of that plant but I did not know the species. I asked the guide the name of the tree and he said "Baba". I wrote the common name in my field book. Back at the base in the afternoon, I went through the list of common and scientific names of the park and I found "Baba"= *Santiria trimera* (Burseraceae). Then, I had a possible latin name for "Baba" although I did not have any other references to check the description of that species and therefore, confirm the identification.

Although some plants have names in a particular language, others do not (Letouzey, 1982a) or may have but the local guide may not know it. In this situation, I used another process which is the use of illustrations.

2.1.2. Use of illustrations

Illustrations are tools that help to have a quick name of the plant in front of you just by comparing the plant with them (Letouzey, 1982b; Llamas, 2003; Barnes, 2004). This is a very simple stage which does not require any botanical background if the photo or illustration is of a high quality.

For example, when I collected the specimen Ndolo Ebika, S.T. 382, I did not know the scientific name of that specimen with ripe fruits but made careful notes of the specimen. My local guides also did not know the common name of the plant we collected. At the base, I was going through illustrations in Letouzey (1982b) and I found the drawing of *Lannea welwitschii* with fruits which matched the specimen Ndolo Ebika, S.T. 382. I had *Lannea welwitschii*, Anacardiaceae, as a potential name for Ndolo Ebika, S.T. 382.

2.1.3. Discussion of the identification process in the field

2.1.3.1. Common names

Although the use of common names can help to obtain a name of a given plant, if a list of common and scientific names is available, the technique may lead to a misidentification for three reasons:

1. One common name may be used for different species. This is the case for "Djolo" which is a common name in Mbendzélé for more than three species of *Ficus: F. elasticoides, F. kamerunensis, F. recurvata, F. wildemaniana*;
2. The local guide may just give a name to satisfy the researcher (Letouzey, 1982a);
3. The knowledge of plants may be different from the local guide who worked with the botanist who wrote the list of common name and the other guides. This may result to misapplying the same common name.

Despite these issues I found the process helpful on several occasions in providing a potential scientific name.

2.1.3.2. Illustrations

The use of illustrations is another way of getting a potential name for a plant species. Illustrations, when accompanied by a description, provide more details on characters of the illustrated species. Moreover, description notes help the reader to cross-check if the illustrated species matches the description.

Whether I had or did not have a potential scientific name for a given plant from both common names and illustrations, I collected specimens to confirm the potential name or identify the specimens later in a herbarium.

2.1.4. Making plant specimens

I collected plant specimens in the Nouabalé-Ndoki National Park for two main reasons: to identify plant specimens and to make specimens of the area available for taxonomic purposes.

2.1.4.1. Equipment

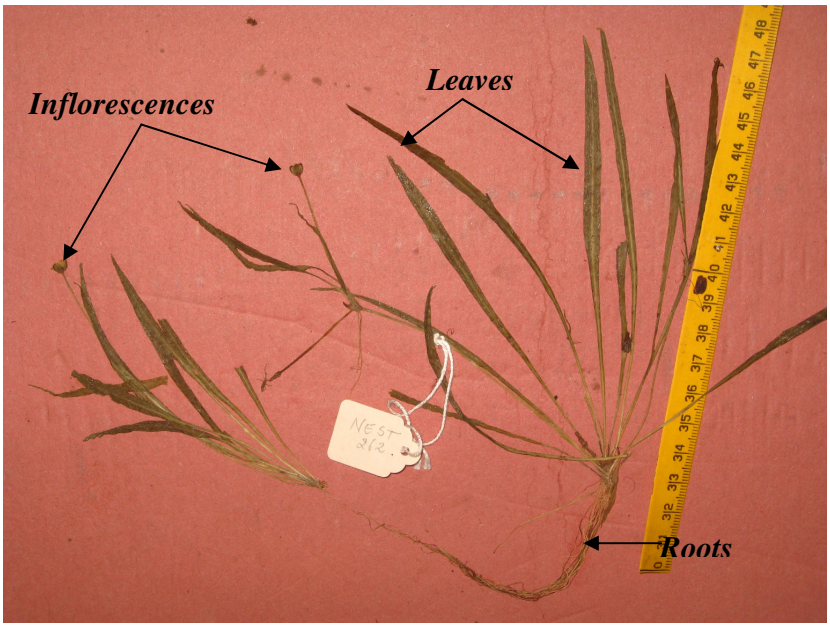
The equipment I used to make the specimens is:

1. Frames (wooden lattice presses),
2. Ventilators (corrugated metal sheets),
3. Straps with buckles,
4. Drying papers: felts or thick blotting paper,
5. Tags,
6. Newspaper,
7. Indelible marker,
8. Secateurs,
9. Clipper pole,
10. Portable stoves,
11. Kerosene.

2.1.4.2. Collecting plant specimens

Small plants can be collected entirely (Cullen, 2006). The photogragh 1 shows a specimen of *Ranalisma humile* (Alismataceae).

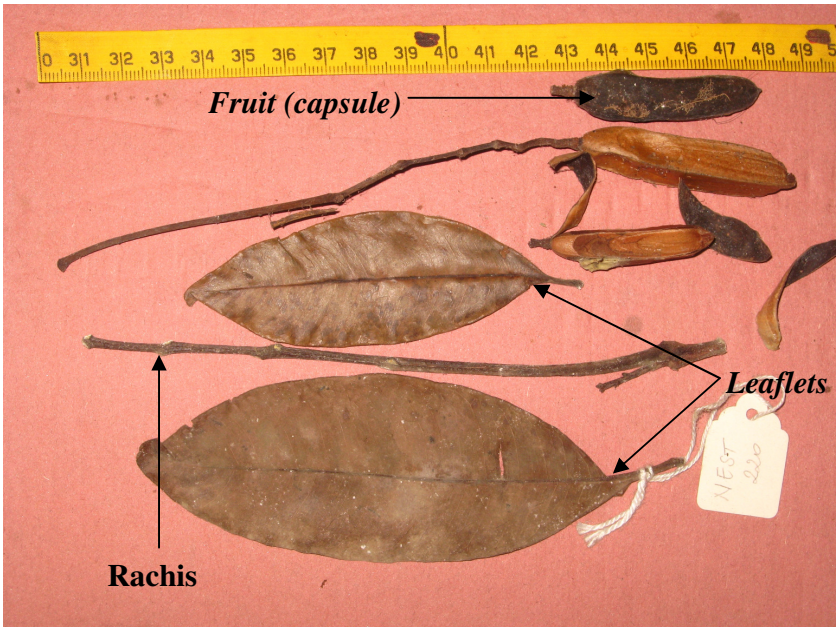
Unlike herbs, collecting shrubs and small trees is making specimens of twig showing the phyllotaxy (arrangement of leaves on twigs), flowers and/ or fruits attached to the twig (see photograph 2).



Photograph 1: Specimen *(Ndolo Ebika 262: Ranalisma humile,* Alismataceae*)* with roots, leaves and inflorescences.

Photograph 2: Specimen *(Ndolo Ebika* 420: *Tabernaemontana penduliflora,* Apocynaceae*)* showing the phyllotaxy and flowers.

In the case of tall trees, up to 50 m tall, only some parts of the tree could be collected on the ground but I had to ensure that organs I was collecting belonged to the same tree by comparing parts of the plant on the ground with those which were still attached to the tree. I did this by using binoculars and examining the shadow of fallen leaves on the ground directly under the canopy. The photograph 3 below is a specimen of fallen parts collected from the ground of a tree of 30 m high.



Photograph 3: Specimen *(Ndolo Ebika 220: Lovoa trichilioides,* Meliaceae*)* collected from under the tree with a rachis, leaflets, and some ripe fruits.

2.1.4.3. Making notes

Field notes attached to a specimen provided additional information on those seen on the specimen. The information I used included:

1. Date of collection;
2. Country/ first level administrative subdivision (department);
3. Collector name & collection number;
4. Scientific name (if known)
5. GPS point (latitude and longitude);
6. Altitude;
7. Plant description;
8. Habitat;
9. Locality;
10. Common name;
11. Language;

12. Use.

An example of field notes for the specimen *Ndolo Ebika 218 (Margaritaria discoidea,* Phyllanthaceae) is:

1. *11th October 2007;*
2. *Congo/ Sangha department;*
3. *Ndolo Ebika, S.T. 218;*
4. *Margaritaria discoidea*
5. *2.20086 N, 16.52558 E;*
6. *378 m;*
7. *Tree, 15 m high. Slash red, wet, on thick whitish layer. Lamina two-coloured: green above and silvery below. Fruits: 3-part capsules. 3 purple seeds;*
8. *Terra firma forest;*
9. *37.66 km E of Bomassa village;*
10. *Ekango;*
11. *Mbendzélé;*
12. *Firewood.*

2.1.4.4. Pressing and Drying

These two stages are as important as field notes. A badly pressed specimen will appear creased after drying whereas a well pressed one will appear flat as shown respectively on (a) and (b) in photograph 4 below.

(a) **(b)**

Photograph 4: (a) is creased: badly pressed *(specimen Ndolo Ebika 415: Lankesteria elegans,* Acanthaceae).

(b) is well pressed: it is not creased *(specimen Ndolo Ebika 270: Desplatsia chrysochlamys*, Malvaceae).

Savile (1962) described the way of pressing a specimen: "The Press consists of frames, ventilators, felts and straps. Lay the press frame on the bench or other available working surface and put a ventilator and a felt on it. Then add the first specimen in its folded newsprint. Continue this sequence of specimen -- felt -- ventilator -- felt -- specimen to the top of the press, ending with a ventilator and press frame, and close it with two straps". The photograph 5 shows the sequence of components of the press.

Photograph 5: Press ready for drying.

Once the press is made, the next step is drying specimens contained in the press. The drying station I used, see figure 1 below, consisted of:

- Shelter made of two posts branched on top and linked by a transversal peg and a tarpaulin;
- Drier made of wood;
- Portable kerosene stove.

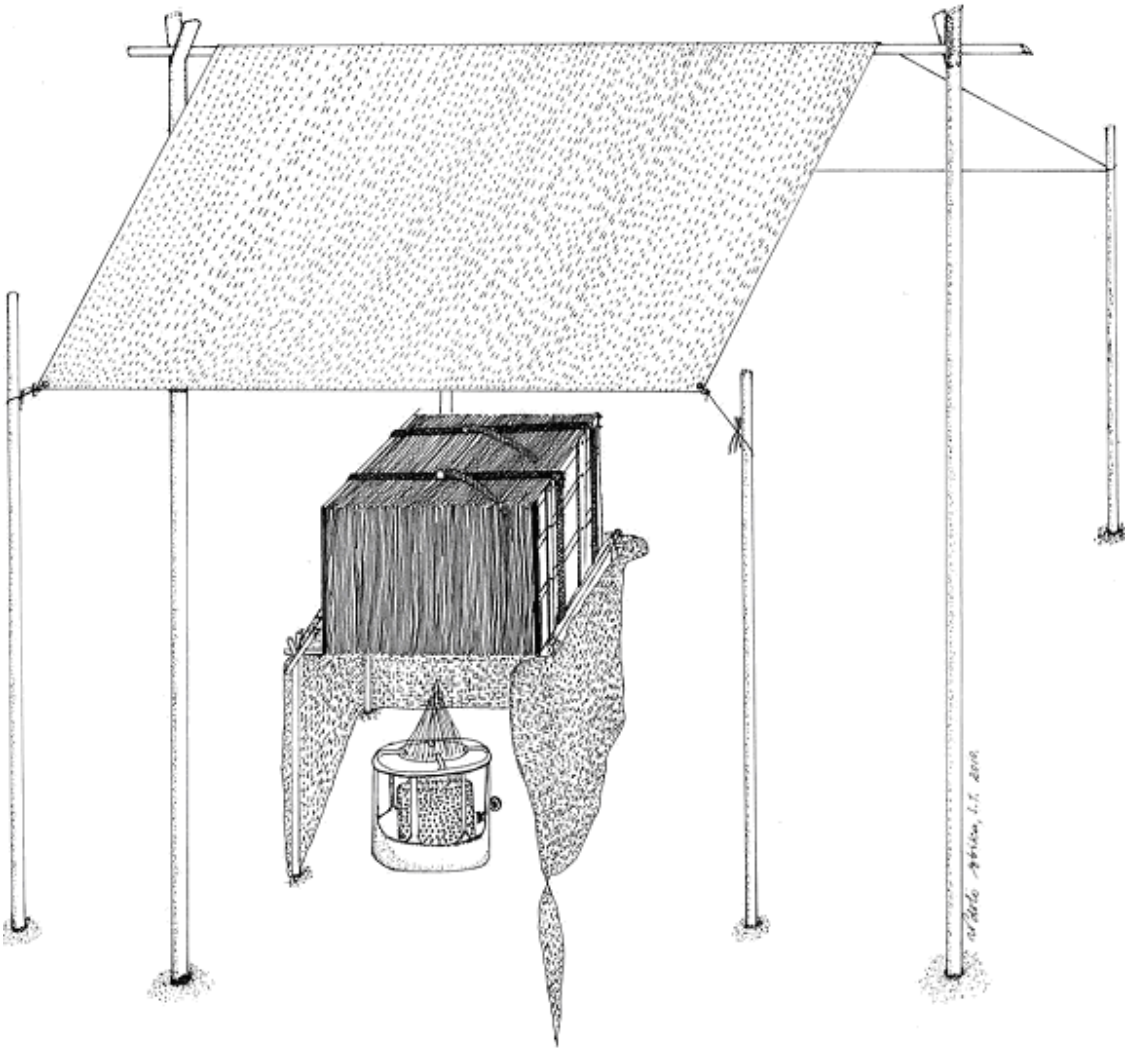


Figure 1: Drying station

2.2. In herbaria

After collecting specimens in the field, the next stage is identification in a herbarium. Before I identified my specimens in the Edinburgh herbarium and then at Kew, I thought it was an easy process consisting of comparing named specimens in the herbaria to mine but it was not the case. I had to follow a step by step process to identify a given specimen in Edinburgh herbarium and at Kew.

I followed five steps when working with the 214 specimens in the herbarium:

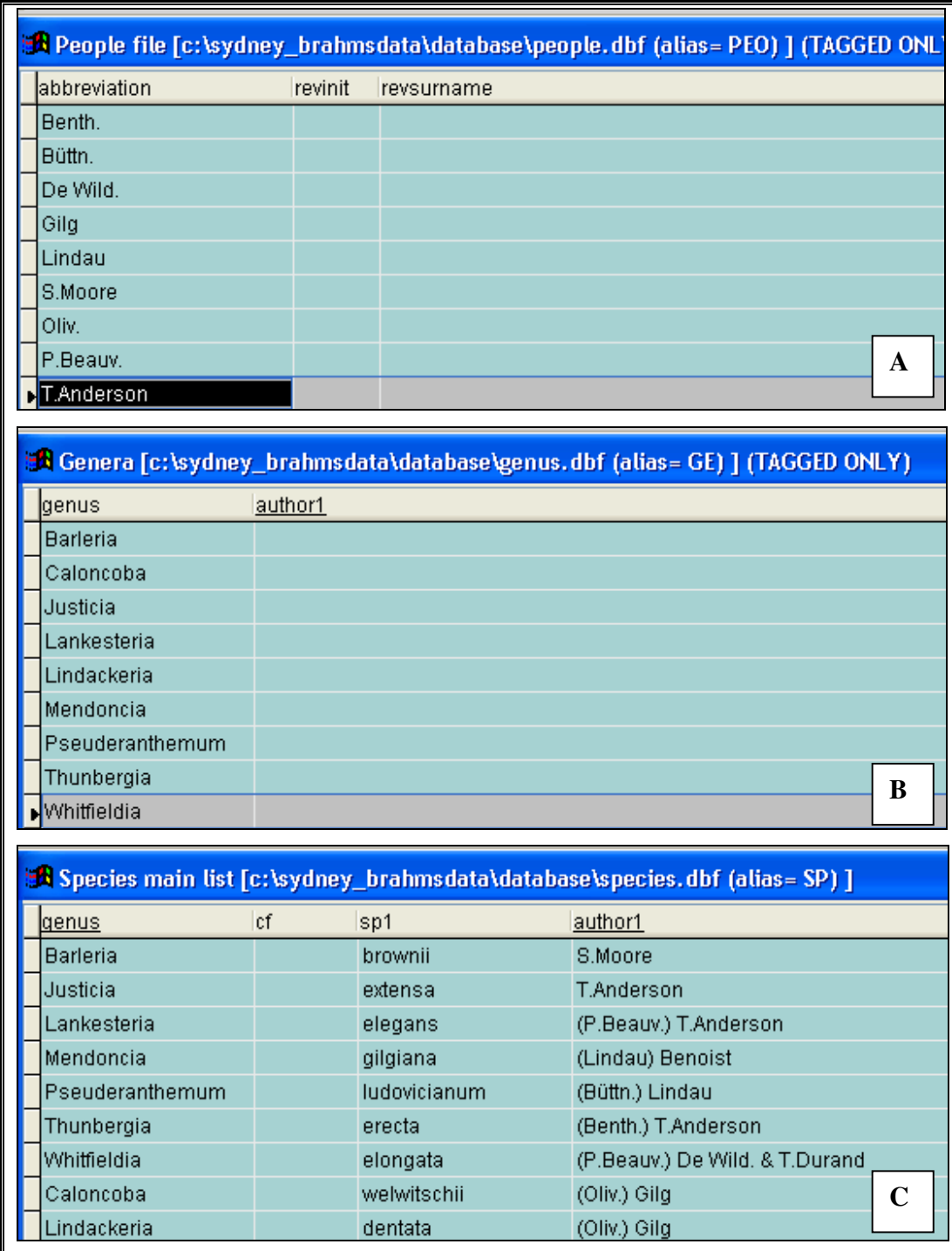
1. Databasing,
2. Classifying specimens into piles,
3. Gathering references,
4. Using dichotomous keys, reading description and looking at illustrations,
5. Confirming the identification made by matching identified herbarium specimens to mine.

I only took specimens which I could not identify in Edinburgh to Kew because of a lack of specimens to compare them with.

2.2.1. Databasing

I used BRAHMS version 6.7 (Botanical Research And Herbarium Management System) to create a specimen and taxon database to manage the data and produce various outputs. I spent two weeks learning the principles of the software and databasaing all of the information for the 420 specimens.

The software consists of many independent files which can be linked together to make a relational database. For example, authors (People) have a different file from genera; genera have a different file from the species but all of these three files can be linked to have a complete scientific name having the three parts: genus, species epithet and author. The photograph 6 (A, B and C) below shows three windows of the three different entries (author, genus and species).



People file [c:\sydney_brahmsdata\database\people.dbf (alias= PEO)] (TAGGED ONL

abbreviation	revinit	revsurname
Benth.		
Büttn.		
De Wild.		
Gilg		
Lindau		
S.Moore		
Oliv.		
P.Beauv.		
T.Anderson		

A

Genera [c:\sydney_brahmsdata\database\genus.dbf (alias= GE)] (TAGGED ONLY)

genus	author1
Barleria	
Caloncoba	
Justicia	
Lankesteria	
Lindackeria	
Mendoncia	
Pseuderanthemum	
Thunbergia	
Whitfieldia	

B

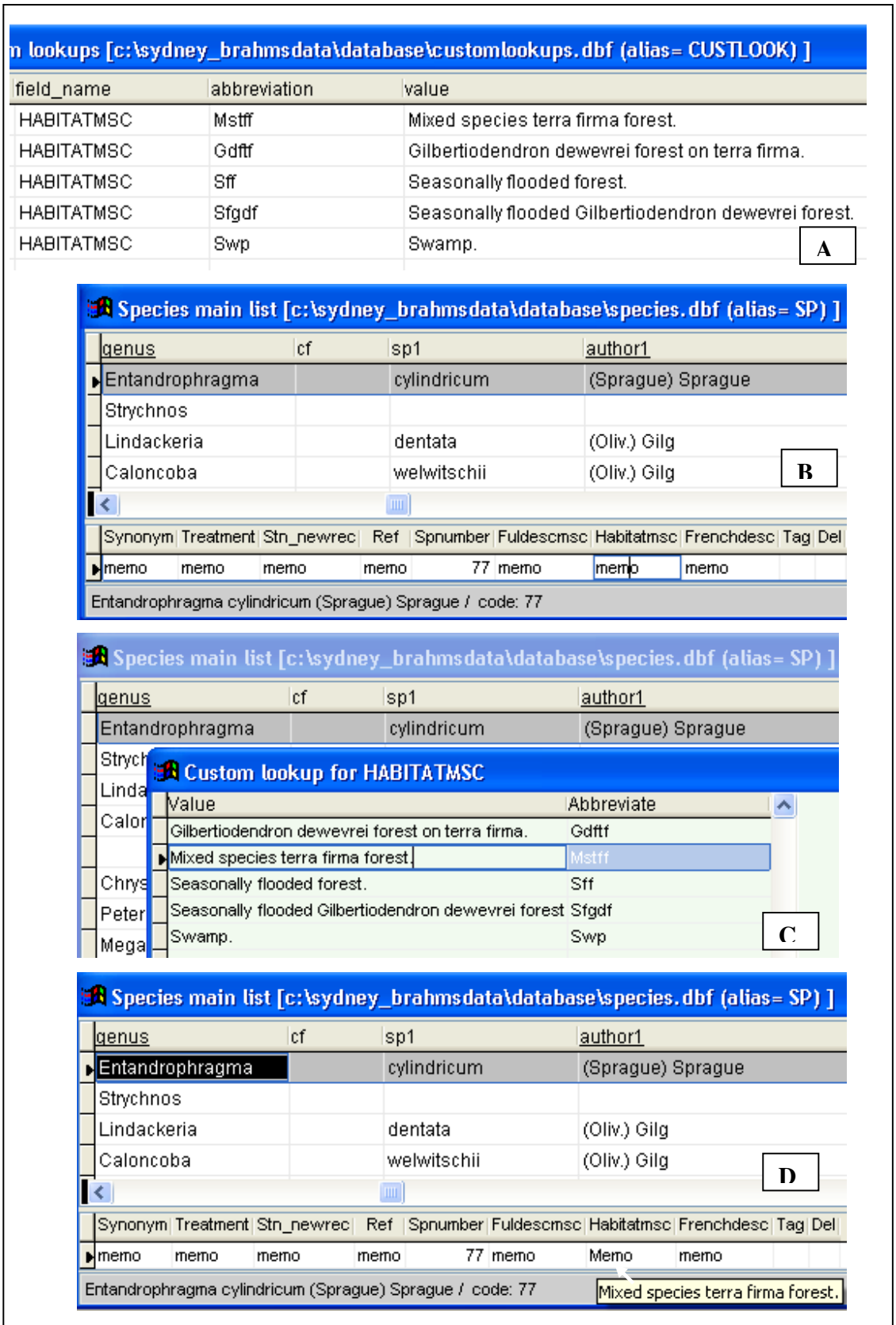
Species main list [c:\sydney_brahmsdata\database\species.dbf (alias= SP)]

genus	cf	sp1	author1
Barleria		brownii	S.Moore
Justicia		extensa	T.Anderson
Lankesteria		elegans	(P.Beauv.) T.Anderson
Mendoncia		gilgiana	(Lindau) Benoist
Pseuderanthemum		ludovicianum	(Büttn.) Lindau
Thunbergia		erecta	(Benth.) T.Anderson
Whitfieldia		elongata	(P.Beauv.) De Wild. & T.Durand
Caloncoba		welwitschii	(Oliv.) Gilg
Lindackeria		dentata	(Oliv.) Gilg

C

Photograph 6: Windows showing entries of author (A); genus (B) and species (C) in BRAHMS database.

In this way a person is only stored once, even if they are an author and a collector, a genus is only stored once and a species epithet is only stored once. The advantage of this is saving time when databasing by selecting the author, genus or species epithet instead of typing it each time. Data cleaning can be carried out by sorting electronically which often shows misspellings close to each other. Data verification for some fields can be done by ordering the database to compare a record against another data source on the web. For example I could check all my species names against the International Plant Names Index and Tropicos to check that they were spelt correctly. In addition time is saved during proof reading because the data is much cleaner and, when a mistake is found it only has to be changed once even though it occurs in several different outputs. One example I designed for my database to save time in data entry and to make the data more consistent was to use 5 different habitat types for all my specimens. I stored the habitats only once and when databasing a specimen, I selected directly from the habitat list already built-up. The photograph 7 below shows, for Entandrophragma cylindricum, how its habitat is selected from a stored habitat list: **A.** Stored habitat list; **B.** Right-click in the habitat field of the species; **C.** Selection of the appropriate habitat for the species: Mixed species terra firma; **D.** habitat inserted.



Photograph 7: Selection of a habitat from a stored list in BRAHMS database.

This software helped me to produce the preliminary annotated checklist of species of the Goualougo Triangle in chapter three and labels for all my specimens and the list of exsiccatae in Appendix 2.

2.2.2. Classification of specimens into piles

I classified the specimens into families. That means I knew the family or had a potential name for the family to which my specimens belonged. If I did not know a family, I showed those unknown specimens to Dr. David Harris. He told me the families of those specimens and I sorted those specimens into these families.

2.2.3. Gathering literature

The following references are the most important I used:

1. Checklists: *Vegetation and List of Plant Species Identified in the Nouabalé-Ndoki Forest, Congo* (Moutsamboté *et al*., 1994); *The Vascular plants of the Dzanga-Sangha reserve* (Harris, 2002).

   Both these checklists helped me to know which species occur in the Nouabalé-Ndoki National Park where I collected my specimens.
2. Floras: I mostly used the floras of Cameroon and Gabon because there is not one from Congo (Brazzaville).
3. Monographs such as *Studies in Begoniaceae VII* (De Wilde, 2002)
4. Special identification tools: *Sangha Trees* (Harris & Wortley, 2008) for identification of tree species; *Giant herbs of the Sangha Trinational Landscape* (Breuer-Ndoundou Hockemba, 2009) which helped me to easily identify Marantaceae and *Palisota* species.

When I was gathering references, because plants classification prior to the 21st century differs from the current Angiosperm Phylogeny Group II (APGII, 2008), I had to remember the older classifications such as Bentham and Hooker (1880s) or Cronquist's system (1981). To illustrate this, according to (Stevens, 2010) the current Malvaceae *sensu lato* is made up of nine subfamilies among which Bombacoideae and Sterculioideae. However, these two subfamilies used to be two distinct families,

Bombacaceae and Sterculiaceae, in the previous classifications. In *Flora of West Tropical Africa* and *Flore du Gabon* for example, these two families are treated separately from Malvaceae.

Although Moutsamboté *et al.* (1994) and Harris (2002) provide names of plants occurring in the area with habitat and habit of species, they do not give enough details on how to distinguish or identify different species listed. Also, these plant lists are not complete yet and the user should be aware that sometimes new records for the area can be found. In contrast to Moutsamboté *et al.* (1994) and Harris (2002), Harris & Wortley (2008) and Breuer-Ndoundou Hockemba (2009) provide details in identifying species. The former gave diagnostic characters and illustrated the species treated; the latter provided dichotomous keys to Zingiberales and *Palisota* and photoguide. However, there are some limitations in the use of *Sangha Trees*, Harris & Wortley (2008), as this literature treated only vegetative characters and there is no information of reproductive characters and no keys to the species.

The limitation I found in either Flore du Cameroun or Flore du Gabon is there is no treatment for Ochnaceae and Violaceae, for example. In the groups with a recent well written monograph I found these to be more helpful than the Floras. This was because the monographs contained all the species, not just those from a single country. In addition, the monographs had more information such as distribution maps.

Despite some issues related to some references treated above, the combination of their content is helpful because they tell the user whether the species occurs in the area or not; if the species does occur, how to distinguish it from the others.

2.2.4. Use of dichotomous keys

I used dichotomous keys in Floras, monographs and revisions as the main tool to identify plant specimens at the genus and species level. However, the species names I got from the keys were still potential names as the confirmation was not made yet. I mostly used the key to genera and from genera to species because, with Dr. Harris's help, and my

previous training almost the families in which specimens belong to were already known and I did not need to use a key to families.

When using dichotomous keys, I found some characters I did not pay attention to in the field. For Acanthaceae, the first character in the key is *eastivation of the corolla*. This character is very obvious on fresh material because Acanthaceae flowers are often showy while on dried material, flowers must be boiled or re-hydrated to see the aestivation. The dichotomous key to Melastomataceae species is also based on characters more obvious on fresh material such as *appendages of the anther connective*. Although these examples of keys are based on obvious characters, other keys will need a dissecting microscope to find the character mentioned in the key. This is the case for *Strychnos* species where the *hairiness* of the inner side of the corolla is used to distinguish group of species; this character being less obvious without a dissecting microscope because of the small size of *Strychnos* flowers.

After using dichotomous keys during this project, I now know which character I should pay more attention on once back in the field: the corolla aestivation as an important character for Acanthaceae while the important character for Melastomataceae is the anther connective. These characters are all easier to view on fresh material and should be noted in the field.

2.2.5. Confirmation of identification

Regardless of the methods I used to have a potential name of a specimen (use of common names, illustrations and dichotomous keys), the identification must be confirmed. I used descriptions and illustrations; checked synonyms and named herbarium specimens of the species to confirm an identification.

When, for example, I found in the list of common and scientific names that “Baba” is *Santiria trimera*, I had a potential name for the species. Later, I checked if the description of *Santiria trimera* matches the plant I saw in the forest. Because the description matched the individual I saw I still considered *S. trimera* as the possible name for that plant.

Illustrations helped me to understand terms I could not understand when reading a species description. For example, the appendages on the inner petals on some *Monodora* species are characters I never knew before and I went to the illustration to see what the author meant by appendages on petals.

When keying out from two different references, it sometimes happened that I obtain two different names. In this case, I checked if one name may be a synonym of the other. To illustrate, when I was identifying the specimen Ndolo Ebika, S.T. 412 belonging to the family Melastomataceae, I used different keys from four references: *Flore du Gabon and Flore du Cameroun* (same author), *Flora of Tropical Africa* and *Flora of West Tropical Africa.* The specimen was keyed out as the genus *Tristemma* in the four references but at the species level I obtained three different results:

1. *Tristemma mauritianum* from Flores du Gabon et Cameroun;
2. *T. schumacheri* from Flora of Tropical Africa and
3. *T. incompletum* from Flora of West Tropical Africa.

All of the three species descriptions matched my specimen. Then, I went to the website Tropicos (http://www.tropicos.org/) where I found that *Tristemma mauritianum* has 21 synonyms among which *T. incompletum* and *T. schumacheri.* I also checked some online specimens, from the JSTOR Plant Science website (http://www.bores.org/) to compare specimens from those three specimens against mine. There I found:

- (BM): *Tristemma mauritianum* J.F.Gmel. under Type of *Tristemma incompletum* R.Br. (*Smith,C. 59*).
- (P): *Tristemma mauritianum* J.F.Gmel. under *Tristemma schumacheri (Welwitsch F.M.J. 900).*

All of these specimens matched. Then, I went back to the Flore du Gabon where I found only *T. incompletum* as a synomyn of *T. mauritianum*. However, in the Flore du Cameroun, both *T. incompletum* and *T. schumacheri* are considered as synonyms of *T. mauritianum.* This explained why I found three different names using different literature and the information allowed me to choose *Tristemma mauritianum* as the correct name for this species and cite *T. incompletum* and *T. schumacheri* as synonyms of the species.

For each specimen I had a potential name, I went to the cupboard of the genus for which I had a potential name of the specimen and compared that specimen to named specimens. If those specimens matched mine, I would consider the species name and checked the literature to read the species description. This is how I confirmed the identification of the specimens Ndolo Ebika, S.T. 42 & 76 (*Salacia zenkeri,* Celastraceae). For the specimens I did not have a potential name, I compared my specimen against all of the named specimens of a given genus in the cupboard. For example, I identified the specimen Ndolo Ebika, S.T. 208 *(Ficus adolfi-friderici)* by matching the specimen to all of the named fig specimens in the cupboard at Kew because I had no success with getting a potential name from the keys.

2.2.6. Intervention of specialists of taxa

When I could not identify specimens or confirm the identification for some specimens, using the methods discussed above, I showed them to the specialist of the taxon to help me identifying the specimens. This was the case for the specimen Ndolo Ebika, S.T. 137 (Leguminosae-Papillionoideae) which I showed to Dr. Lewis, G. and he identified it as *Ostryocarpus riparius* and we went to the cupboard to find the specimens of that species to compare to mine. The matching was fine and I considered *Ostryocarpus riparius* as the current name for Ndolo Ebika, S.T. 137.

Despite my work at the two herbaria (Edinburgh and Kew), I still have some specimens which could not be identified.

3. How to deal with plants which still cannot be named

I used three categories to deal with specimens I could not confirm the identification or could not identify. I used *sp.* when a specimen was only identified at the genus level; *vel sp. aff.* for a specimens which I had a potential name; *sp.1* and *sp.2* were used when I studied diagnostic characters of the specimens and recognized them as different from all the other species in the genus.

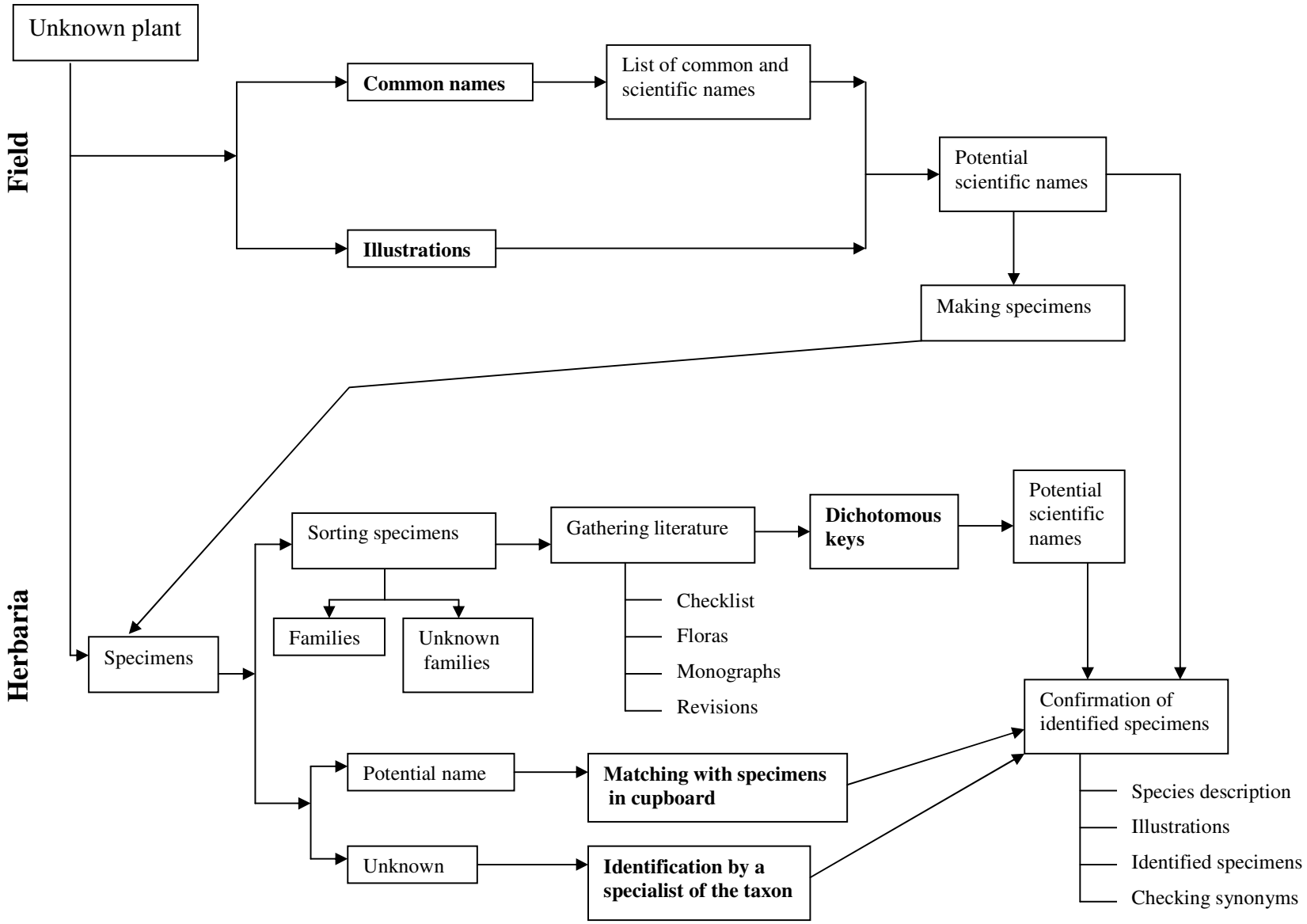


Figure 2: Diagram showing the process of plant identification. **In the field**: use of combination common & scientific names and/or illustrations leading to a potential scientific name from which a specimen and confirmation must be made. **In herbaria:** use of dichotomous keys, matching specimens and help by specialist.

4. Conclusion

For botanical purposes and the accuracy of species level identification, it is necessary to collect specimens and bring them into an herbarium or office where you have access to resources such as microscopes, literature, named specimens and specialists to confirm a potential name or identify the unknown plant specimens. In addition, a specimen is evidence for any species cited by the author. This evidence will help other botanists, in case of doubt, to check whether the identification was right or not.

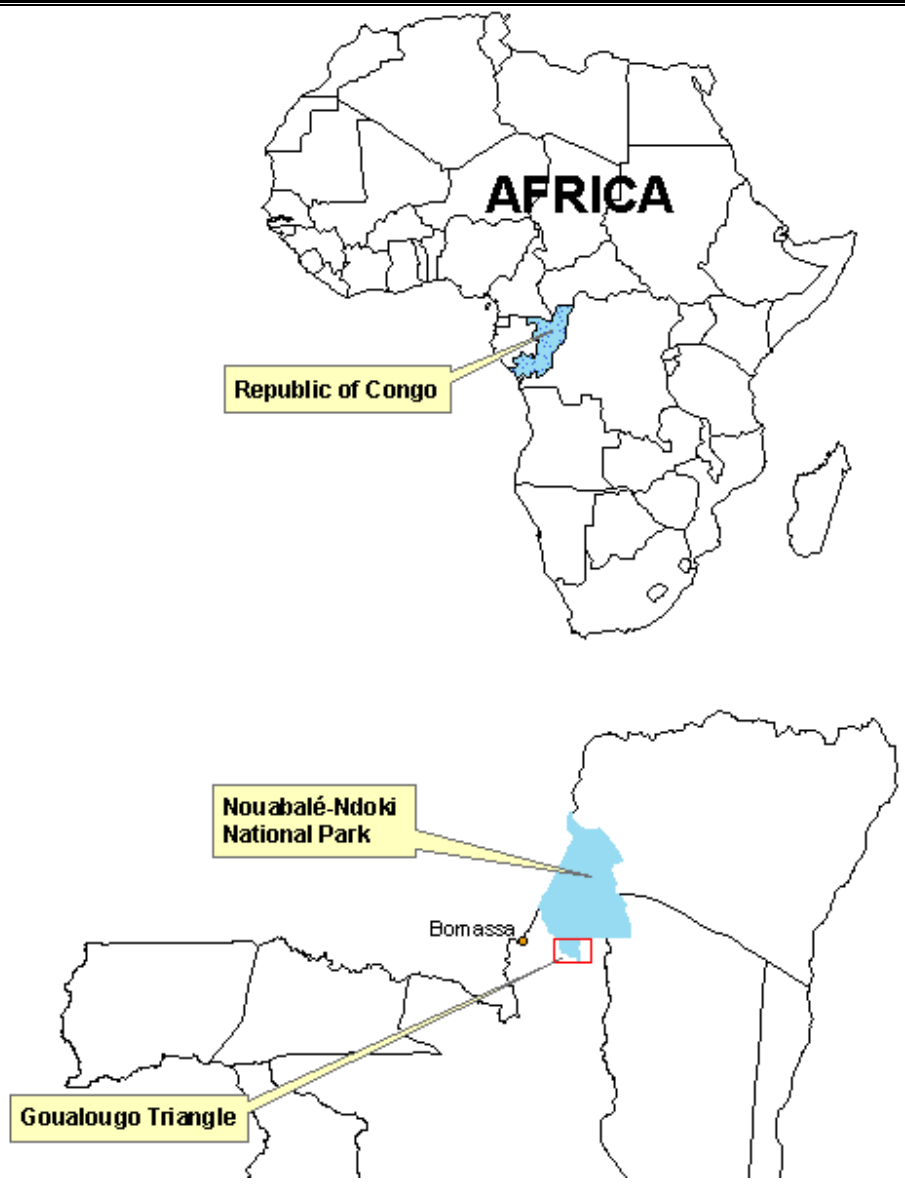
Chapter Three: Annotated list of vascular plants of the Goualougo Triangle Ape Project, Nouabalé-Ndoki National Park, Republic of Congo.

1. Introduction

This annotated list of vascular plants of the Goualougo Triangle is a result of a three-year period (2006, 2007 and 2008) of botanical field work in the Goualougo Triangle area, which is located within the Nouabalé-Ndoki National, Republic of Congo. During that period, 420 botanical specimens were collected and 214 among them were identified for the current list. All the non-field work part of this study, including the identification of the 214 specimens, databasing and production of results were all carried out from May to July 2010 as part of my MSc research project.

2. Study site

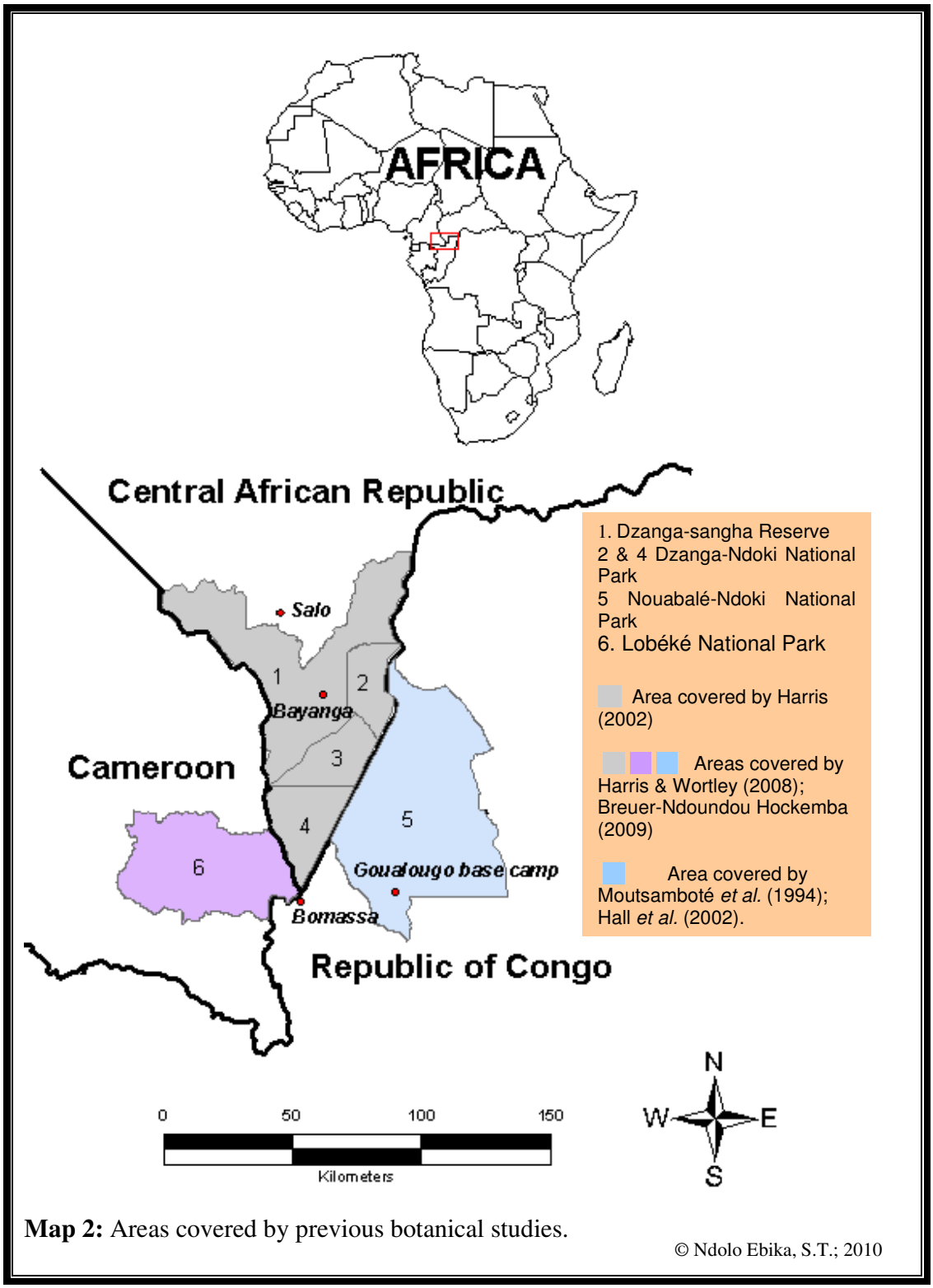
Located in the Southern part of the Nouabalé-Ndoki National Park, the Goualougo Triangle Ape Project Area covers 310 km^2 of lowland forest occurring in a range of altitudes between 330 and 600 m (Morgan *et al.,* 2006). The climate is equatorial (Moutsamboté *et al.,* 1994). Rainfall is bimodal: main rainy season from August to November; short rainy season in May (Sanz *et al.,* 2007). The Map 1 shows the location of the Goualougo Triangle.



Map 1: Location of the Goualougo Triangle.

3. Previous botanical studies

There are few botanical studies which have been undertaken in the Nouabalé-Ndoki National Park. According to Moutsamboté *et al*. (1994), it is in 1989 that botanists started to carry out botanical studies in the park. Among the botanical works which have been carried out in the park, Moutsamboté *et al.,* 1994 (*Vegetation and list of plants identified at Nouabalé-Ndoki Park*); Hall *et al.,* 2002 (*Preliminary Report on a Floristic Inventory of Two Mixed Species Forest Sites in the Southern Boundary Region of Nouabalé-Ndoki National Park*); Harris & Wortley, 2008 (*Sangha Trees*) and Breuer-Ndoundou Hockemba, 2009 (*Giant herbs of the Sangha Trinational landscape*) are important botanical resources for the area which still understudied. Although *The vascular plants of the Dzanga-Sangha Reserve* (Harris, 2002) is a product of botanical works not carried out in the Nouabalé-Ndoki National Park, this literature is important for the park. This is because the forest covered by all of the above references is continuous and therefore, plant species may be found out of the park is more likely to occur in the park as well. The use of *The vascular plants of the Dzanga-Sangha Reserve* during the identification of the 220 specimens collected in the Goualougo Triangle confirmed the occurrance of species plant species in the forest covered by the previous studies. The map 2 shows areas covered by all of the references cited above.



Map 2: Areas covered by previous botanical studies.

4. Results

4.1. Numbers of taxa

The number of specimens identified was 214. The number of species is 194 belonging to 143 genera and 58 families in which 52 Spermatophyta and 6 Pterydophyta. Among the 194 species, 29 species are new records in which there are 4 Pterydophyta, *see table 3* and 25 Spermatophyta, *see table 4*. The species names of these new records are listed in Index of new records.

From the specimens I identified, 4 genera have at least 4 species, see table 1. The number of genera which have 3 species each is 6; these genera are: *Celtis, Cola, Dorstenia, Chytranthus, Pancovia* and *Synsepalum*. The number of genera having 2 species is 9 and 124 genera have 1 species each.

Genus	**Number of species**
Ficus	14
Drypetes	7
Diospyros	5
Campylospermum	4

Table 1: The number of species per genus for the 4 genera with more than 4 species

The number of families with more than 4 species is 18, all of them Spermatophyta. Moraceae is the most speciose family. Table 2 shows the number of species per family.

Family	**Number of species**
Moraceae	20
Leguminosae	13
Malvaceae	12
Annonaceae	11
Sapindaceae	10
Acanthaceae and Apocynaceae	8
Sapotaceae	7
Marantaceae and Putranjivaceae	6
Commelinaceae; Ebenaceae and Melastomaceae	5
Connaraceae; Euphorbiaceae; Meliaceae; Ochnaceae and Phyllanthaceae	4

Table 2: Family with at least 4 species.

4.2. List of new records to the Sangha Trinational area

PTERIDOPHYTA		
Family	**Number of species**	**Species name**
Selaginellaceae	1	*Selaginella soyauxii*
Tectariaceae	2	*Arthropteris orientalis; Tectaria angelicifolia*
Thelypteridaceae	1	*Cyclosorus dentatus*

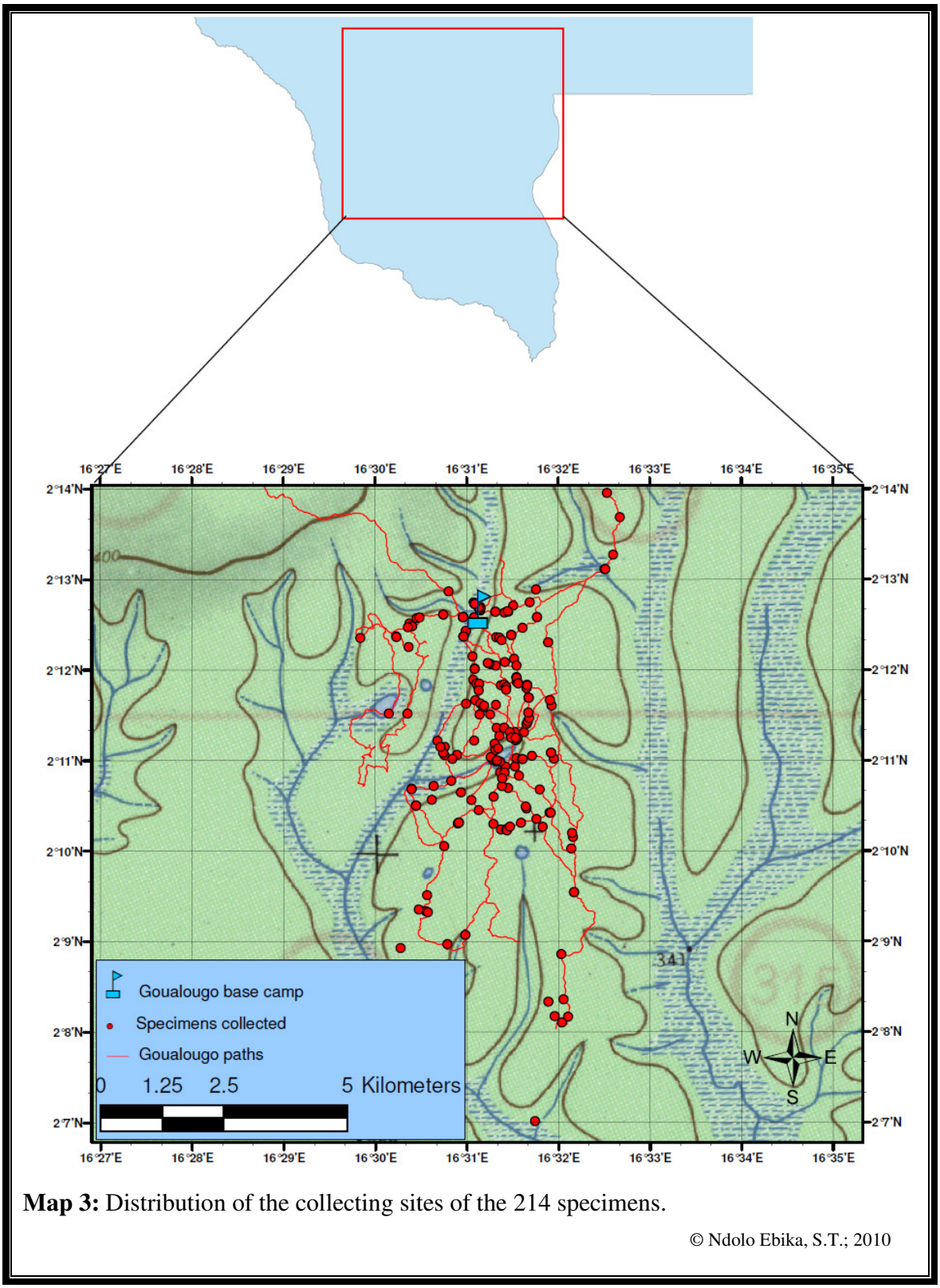
Table 3: New records of Pteridophyta in the Sangha Trinational area.

SPERMATOPHYTA		
Family	**Number of species**	**Species name**
Acanthaceae	1	*Barleria brownii*
Amaranthaceae	1	*Cyathula prostrata* var. *prostrata*
Apocynaceae	2	*Anisopus efulensis ; Cynanchum adalinae* subsp. *adalinae*
Araceae	1	*Cercestis kamerunianus*
Balsaminaceae	1	*Impatiens hians*
Begoniaceae	1	*Begonia mannii*
Celastraceae	1	*Salacia zenkeri*
Dichapetalaceae	2	*Dichapetalum congoense; Tapura fischeri*
Lamiaceae	1	*Plectranthus occidentalis*
Lecythidaceae	1	*Napoleonaea septentrionalis*
Leguminosae-Papillionoideae	1	*Ostryocarpus riparius*
Loganiaceae	1	*Strychnos dale*
Malvaceae	1	*Leptonychia multiflora*
Melastomataceae	1	*Tristemma leiocalyx*
Moraceae	8	*Dorstenia poinsettifolia* var. *angusta, D. psilurus; Ficus adolfi-friderici, F. ardisioides* subsp**.** *ardisioides, F. craterostoma, F. natalensis* subsp. *natalensis, F. preussii, F. variifolia*
Ruscaceae	1	*Dracaena phrynioides*

Table 4: New records of Spermatophyta in the Sangha Trinational area

4.3. Geographic cover

The 214 specimens covered about 9% of the whole area of the Goualougo Traingle. They were collected opportuinistically and mostly along the paths used in the forest for the monitoring in study site. See Map 3 for the distribution of the collecting sites.



Map 3: Distribution of the collecting sites of the 214 specimens.

4.4. Family arrangement and circumscription

The families in the following checklist are alphabetically arranged for the two major plant groups (Spermatophyta and Pteridophyta). The circumscription of the Angiosperm families is done following the *APG III (2009).* Pteridophyta are circumscribed following *Fern classification (Smith et al., 2006).*

4.5. Headings used in the checklist

For each species, the following headings are used:

Ref.: containing authors, year and page of the literature I found information related to the species. I used two types of citing references:

- For books, journals or bulletins, I used the format "Author 1, year: page"; "Author 2, year: page"; …
- For floras, I used the format "Author 1, standard abbreviation of the flora **volume**, year: page"; "Author 2, standard abbreviation of the flora **volume**, year: page"; …

Synonym: I only used synomyns when two names of the same species which are synonyms were used in the previous work in the area.

Description: A summary note including vegetative and reproductive characters. The vegetative characters treated are: habit, height, slash, sap and leaves. The reproductive characters include inflorescences, flowers, fruits and seeds. This summary can be a combined summary when the species has 2 or more specimens.

Habitat: Place (s) where the specimen(s) was/ were collected.

I recognized 9 habitat types in this study; most of them are fully detailed in Harris (2002). These habitats are:

(1) **Mixed species terra firma forest:**

Habitat characterized by a mixture of species without dominance of one species.

(2) **Seasonally flooded forest:**

Habitat temporally flooded by high water from the nearest water source.

***(3) Gilbertiodendron dewevrei* forest on terra firma:**

Terra firma forest characterized by the dominance of one species: *Gilbertiodendron dewevrei.*

***(4)* Seasonally flooded *Gilbertiodendron dewevrei* forest:**

Gilbertiodendron dewevrei forest which is temporally flooded.

***(5)* Seasonally flooded *Lophira alata* forest:**

A temporally flooded habitat dominated by one species: *Lophira alata.*

***(6)* Swamp:**

Muddy habitat with permanent water.

***(7)* Forest alongside stream:**

Forest located within 2 m from the stream.

***(8)* Cyperaceae dominated meadows along stream *"Baï"*:**

Open clearing habitat with permanent water and dominated by sedges. Occasionally a group of *Alstonia congoensis* trees can be found in this habitat. This habitat is called "Baï" in Mbendzélé language.

***(9)* Wet place:**

Habitat characterized by a small temporary pool in Terra firma forest or in *Gilbertiodendron dewevrei* forest.

Specimen (s): Material collected in the Goualougo triangle and used to get the species name.

5. Discussion

According to Hall *et al.* (2002), the number of species in the Goualougo Triangle will increase when more specimens are identified. This hypothesis is confirmed by the results of this study, not only for the Goualougo Triangle but the whole area covered by previous studies, the Sangha Trinational landscape. There are 27 species which were not recorded in the previous studies in the Sangha Trinational area.

The most speciose family in the Sangha Trinational area, according to Harris (2002), is Rubiaceae with 140 species but in this study, Moraceae has the highest species number as shown on table 2. The overestimation in species number of Moraceae is due to the particular interest of the author in studying figs. Despite the biais, both studies have shown that *Ficus* is the most speciose genus in the Sangha Trinational area.

Unlike Moutsamboté *et al.* (1994), Hall *et al.* (2002) and Harris (2002), this study was not an independent and special botanical research but the author of this thesis was working for a great apes project and made collections as extra work on top of studying great apes. This may explain the lowest number of specimens, species, genera and families found in the results of this study in comparison to the the previous botanical studies, *see table 5 below*.

Parameters / **Studies**	**Period of study**	**Number of specimens**	**Number of species**	**Number of genera**	**Number of families**
Moutsamboté *et al.,* 1994	1988-1992	-	400	278	86
Harris, 2002	1987-2000	4000	1090	577	122
Ndolo Ebika, 2010	2006-2008	214	194	143	58

Table 5: Comparison of the results of two previous studies against this study.

Breuer-Ndoundou Hockemba (2002) produced a dichotomous key to Zingiberales and *Palisota* species to help people working in the Sangha Trinational area to easily identify species belonging to the above taxa. The same idea was followed in this study to produce a key to *Ficus* in order to help identifying fig species. However, all of the two works mentioned in this paragraph are still not complete yet. Futher collections and identification of specimens of each taxon must be done to improve both keys and have a complete identification tools for each taxon for the area.

Despite these works which have been done recently, more botanical studies still to be done to help future generations of botanists in central Africa region in general, and the Nouabalé-Ndoki National Park in particular, to identify plants.

6. Conclusion and future studies

Future botanical research should improve information which accompany species. This can be done by collecting and identifying more specimens and providing tools such as keys, illustrations; descriptions of species. In addition, a particular attention must be paid on training young botanists in order to transmit knowledge to future botanists. By training people, we will build the capacity and increase the number of people who will contribute to the study of the Flora of Congo.

Chapter Four: The genus *Ficus* in the Goualougo Triangle, Nouabalé-Ndoki National Park, Republic of Congo.

1. Introduction

Ficus is the genus with the highest species number in the area (Harris, 2002) and one of the most important food sources for chimpanzees (Tweheyo & Lye, 2003).

When writing the dichotomous key and descriptions, I examined specimens from other collectors in order to include variation of leaves, fig size and habitat in this work. These additional specimens (not Ndolo Ebika, S.T.) are listed under each species and not included in the list exsiccatae at the end of the thesis. The description of each fig species among the 15 I identified is made according to the examined specimens.

2. Morphology of *Ficus*

This section describes terms related to life-form (habit), leaf and fig characters which will be used in the dichotomous key and species description. In each subsection, illustrations will be provided for a better understanding of those terms.

2.1. Habit

I used two different habits to describe *Ficus* species: hemi-epiphyte and tree.

The *hemi-epiphytic life-form* is the most common habit of fig species found in the Goualougo Triangle. This habit accounts for 80% of the 15 fig species I recorded. The hemi-epiphytic habit of figs is most commonly known as strangler which starts growing on branches of the host and progressively sending its roots down (figure 3: 1) to the groung (figure 3: 2). Then, the strangler develops an important network of aerial roots which surround the host (figure 3: 3). This network of roots will often kill the host which may fall down with the strangler (figure 3: 4) or the strangler may remain standing. In the latter case, the strangler may remain a free standing life-form without any sign of the host (figure 3: 5). The fig species that I found with the hemi-epiphyte habit (figure 3: 2) are *F.*

craterostoma, F. kamerunensis, *F. preussi* and *F. wildemaniana*. Four fig species, *F. burretiana, F. elasticoides, F. lutea* and *F. recurvata*, reach the stage free standing strangler (figure 3: 5).

The *tree habit*, figure 3: 6, is used to describe free living fig species without any sign of a network of aerial roots or remains of the host tree. This habitat can be reached either through from the hemi-epiphytic habit or from the germination of the seed on the ground. Very few *Ficus* species have this habit in the Goualougo Triangle. Among the 15 species described below, only 3 (20%) can be trees: *Ficus polita* subsp. *polita, F. recurvata* and *F. variifolia*. Unlike *F. polita* subsp. *polita* and *F. recurvata*, *F. variifolia* does not reach the tree habit through the hemi-epiphytic process but through the germination of the seed on the ground.

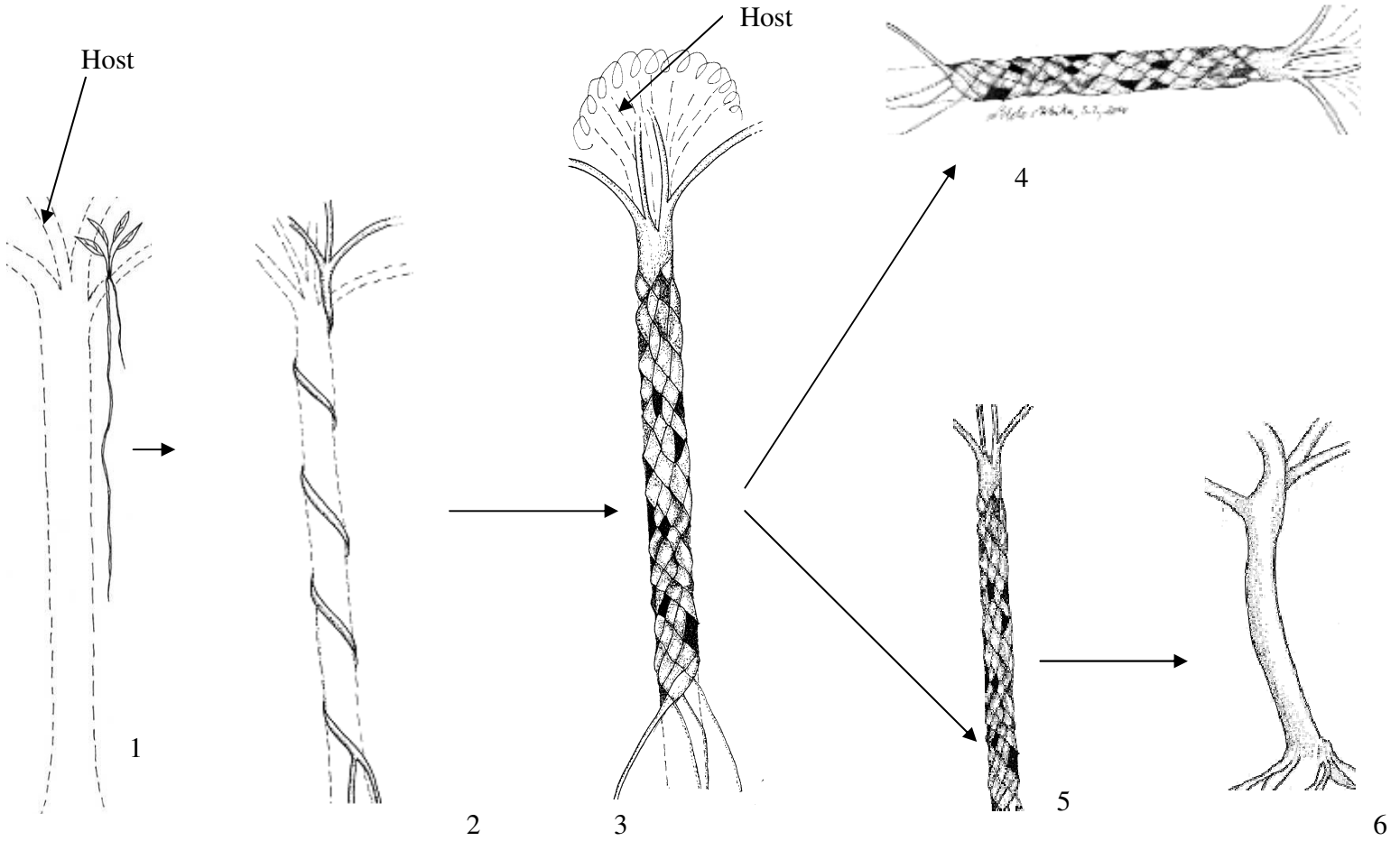


Figure 3: Transition between the hemi-epiphytic figs habit. **1.** Starting growth; **2.** Beginning of a strangler like a twining liana; **3.** Strangler with a root network surrounding the host; **4.** Strangler and host fallen down; **5.** Free standing strangler; **6.** Tree.

2.2. Glandular spots

Glandular spots are shiny oil-like marks which can be found on the petiole and also on the midrib of certain *Ficus* species. These spots occur either singly or in pairs. *They are very obvious on fresh material and less conspicuous on dried specimens where they appear as a darker area at the base of the midrib on the lower surface of the lamina* (see photograph 6). However, these glands may be inconspicuous or absent in *F. adolfi-friderici, F. burretiana, F. craterostoma* and *F. variifolia* even on fresh material.

1 2

Photograph 6: Glandular spot at the base of the midrib on fresh leaf (1) and dry leaf (2) of the same species (*Ficus lutea*).

2.2.1. Solitary glandular spot

A solitary glandular spot is usually located at the base of the midrib below (figure 4: 2-3) but in some *Ficus* species (*Ficus recurvata* for example) this gland spot is situated at the base of the petiole on lower surface the petiole (figure 4: 1) or at the base of the midrib on the upper surface of the lamina (case of *Ficus lutea,* Photograph 6). The solitary glands at the base of the midrib are found in *F. elasticoides, F. kamerunensis, F. lutea, F. mallotoides, F. polita* subsp. *polita, F. preussi and F. wildemaniana.*

2.2.2. Glandular spots in pairs

Two glandular spots can be seen either at the base of the midrib on the lower surface of the lamina (figure 4: 4) or in the axils of the basal pair of lateral veins on the lower surface (figure 4: 5). The former case is found in *F. polita* subsp. *polita.*

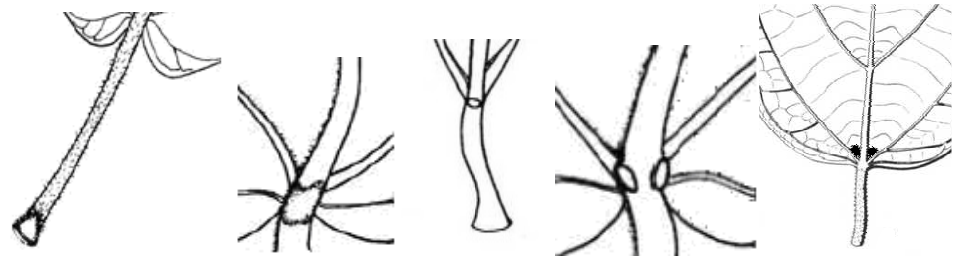


Figure 4: Location of glandular spots. ***1***. At the base of the petiole; ***2-3.*** At the base of the midrib; ***4.*** Two glands on the midrib; ***5.*** Two glands in axils of the basal pair of secondary veins.

2.3. Bracts of figs

Bracts of figs are appendages located either at the junction of the peduncule with the receptacle (***basal bracts***, figure: 5) or at the orifice of the receptacle (***ostiole***) and are called ***ostiolar bracts*** (figure 6).

The basal bracts may vary from 2-4, may be persistent (figure 5: 1-3) or caducous (figure 5: 4).

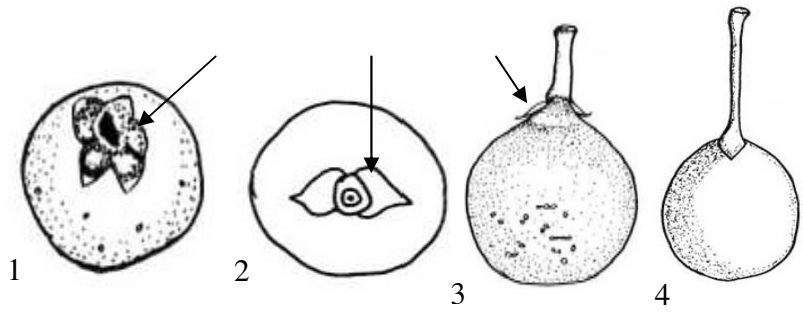
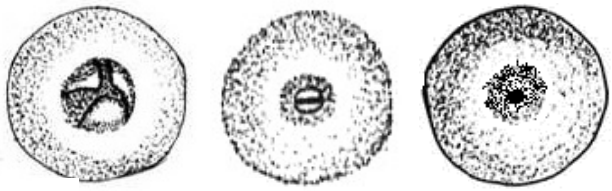


Figure 5: Basal bracts. ***1-3***. Persistent; ***4.*** Caducous.

The ostiolar bracts are either 3 (figure 6: 1) or absent (figure 6: 2-3).

2.4. Ostiole shape

The ostiole can be circular with bracts (figure 6: 1), slit-shaped without bracts (figure 6: 2) or pore-like without bracts (figure 6: 3).



1 2 3

Figure 6: Ostiole shape and ostiolar bracts. **1.** Circular ostiole with 3 ostiolar bracts; **2.** Ostiole slit-shaped; **3**. Ostiole pore-like shaped.

3. Dichotomous key to 15 *Ficus* species in the Goualougo Triangle.

1a. Lamina cordiform 2

1b. Lamina not cordiform… .....……..3

2a. Quaternary veins branched, ending in a Y shape inside of the network of the tertiary veins below. Glandular spot at the base of the midrib below. Figs in the leaf axils, sessile ……..…… 4. ***F. calyptrata***

2b. Quaternary veins forming very small network. Glandular spots either in pairs or single at the base of the midrib on the lower surface of the lamina. Figs on spurs on the trunk and on leafless branches, pedunculate .....11. ***F. polita*** Vahl subsp. ***polita***

3a. Base cordate 4

3b. Base rounded, cuneate or asymmetric 12

4a. Petiole pubescent to puberulent, lamina sometimes scabrous 5

4b. Petiole glabrous, lamina never scabrous.....7

5a. Petiole up to 0.2 cm wide; glandular spot absent; ostiolar bracts 3..... 14. ***F. variifolia***

5b. Petiole at least 0.3 cm wide; glandular spot either at the basal of the midrib or at the base of the petiole; ostiolar bracts absent.....6

6a. Lamina pubescent on both surfaces or at least on the venation on the lower surface; figs pedunculate; glandular spot at the base of the petiole on the inferior surface..... ..... 13. ***F. recurvata***

6b. Lamina glabrous on both surfaces; figs sessile; glandular spot at the base of the midrib on both surfaces .....9. ***F. lutea***

7a. Lateral veins 5-7 pairs; lamina drying grey above and brownish below; stipules persistent ..... ……12. ***F. preussii***

7b. Lateral veins at least 8 pairs; lamina not drying grey above and brownish below; stipules caducous …….....…….8

8a. Figs on spurs on leafless branches ……. 9

8b. Figs in the leaf axils 10

9a. Lamina cordiform……. .....11. ***F. polita*** Vahl subsp. ***polita***

9b. Lamina oblong to broadly elliptic..... ……..6. ***F. dryepondtiana***

10a. Midrib not reaching the apex or stopping at almost 1-2 mm from the apex; lamina oblanceolate (sometimes lanceolate) .....9. ***F. lutea***

10b. Midrib reaching the apex; lamina elliptic to oblong.....11

11a. Petiole up to 0.2 cm wide; figs up to 1 cm in diameter .....8. ***F. kamerunensis***

11b. Petiole at least 0.4 cm wide; figs 1.5-5.2 cm in diameter.....15. ***F. wildemaniana***

12a. Lamina ovate; figs on spurs on the trunk and on leafless branches .....

.....11. ***F. polita*** Vahl subsp. ***polita***

12b. Lamina not ovate; figs axillary 13

13a. Lateral veins 5 (-6) pairs .....2. ***F. ardisioides*** subsp. ***ardisioides***

13b. Lateral veins more than 6 pairs 14

14a. Midrib not reaching the apex or stopping at 1-2 mm from of the apex 15

14b. Midrib reaching the apex 16

15a. Lamina obtriangular (sometimes elliptic), up to 3.5 cm broad; glandular spot absent.....

..... 5. ***F. craterostoma***

15b. Lamina oblanceolate, at least 6 cm broad.....9. ***F. lutea***

16a. Lamina up to 4 cm wide.....17

16b. Lamina 4.5-12 cm wide 19

17a. Figs sessile, basal bracts persistent .....8. ***F. kamerunensis***

17b. Figs pedunculate, basal bracts caducous 18

18a. Lamina broadly elliptic; fig peduncle 0.8-1 cm long; glandular spot absent.....

.....…….. 3. ***F. burretiana***

18b. Lamina narrowly elliptic to oblanceolate; fig peduncle 0.3-0.5 cm long; glandular spot at the base of the midrib on the lower surface of the lamina .....

..... 10. ***F. natalensis*** Hochst. subsp. ***natalensis***

19a. Tertiary venation parallel to the lateral veins and sometimes less distinguishable; figs pedunculate .....7. ***F. elasticoides***

19b. Tertiary venation not parallel to the lateral veins; figs sessile.....20

20a. Glandular spot absent; figs up to 0.8 cm in diameter .....1. ***F. adolfi-friderici***

20b. Glandular spot at the base of the midrib on the lower surface of the lamina; figs 1.5-5.2 cm in diameter.....15. ***F. wildemaniana***

4. Description and illustration of the 15 *Ficus* species

1. ***Ficus adolfi-friderici*** Mildbr.; Figure 7, p.45.

Hemi-epiphyte with aerial roots at the base. Slash red with white latex. Leaves spirally arranged, entire. Petiole glabrous, canaliculate, (1.7-3.5 x 0.2-0.3 cm). Lamina elliptic (7.3-17.5 x 4.5-9 cm), coriaceous; base rounded; apex apiculate. Lateral veins 9 pairs, prominent above. Glandular spot absent. Figs in the leaf axils, sessile, subglobose (8 mm in diameter when fresh, 5 mm when dry), yellow when ripe. Basal bracts 2; ostiolar bracts absent. Ostiole slit-shaped.

Habitat: Terra firma forest.

Specimen: Ndolo Ebika, S.T. 208.

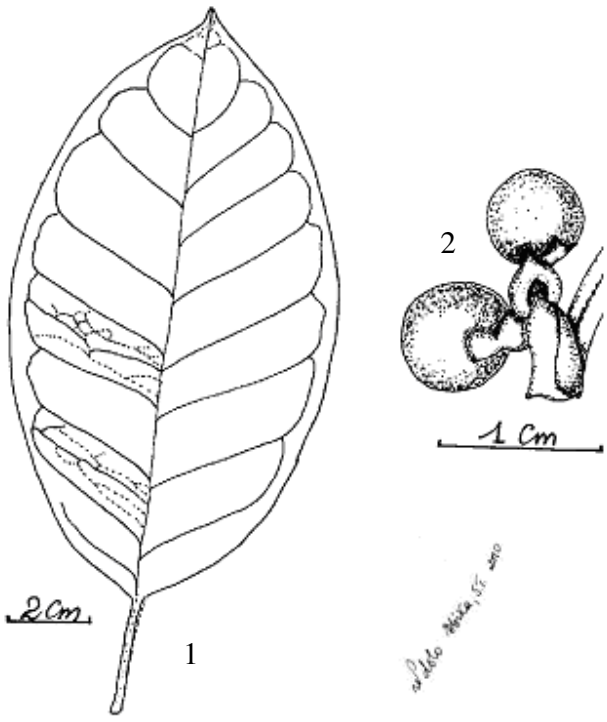


Figure 7: ***Ficus adolfi-friderici*** Mildbr. ***1.*** Leaf; ***2***. Figs.

2. *Ficus ardisioides* Warb. subsp. ***ardisioides***; Figure 8, p. 46.

Hemi-epiphyte 8 m high with aerial roots. Slash whitish oxidising to yellow; sap clear then yellow. Stipules caducous. Leaves alternate, entire. Petiole glabrous, (1.2 x 0.3 cm). Lamina variable: asymmetric, broadly elliptic or subovate (9.3-15 x 4.2-6.1 cm), coriaceous; base unequal or cuneate; apex acuminate. Lateral veins 5 pairs; tertiary veins less conspicuous below, reticulate with greenish spots in each network. Glandular spot at of the midrib on the lower surface of the lamina. Figs 2-3 in the leaf axils, puberulous, pedunculate (1.3 cm long), globose (7 mm in diameter when fresh, 5 mm when dry), yellow with red spots when ripe. Basal bracts 2; ostiolar bracts absent. Ostiole slit-shaped.

Habitat: Terra firma forest.

Specimen: Ndolo Ebika, S.T. 358.

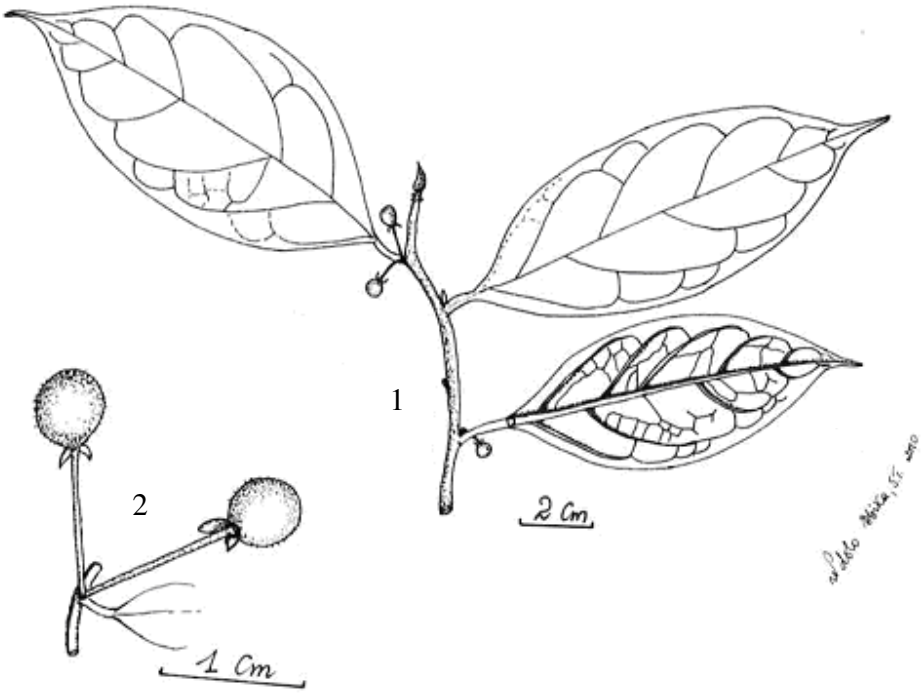


Figure 8: *Ficus ardisioides* subsp. ***ardisioides*** Warb. ***1***. Leaf and fig arrangement; ***2***. Figs.

3. *Ficus burretiana* Hutch.; Figure 9, p. 47.

Hemi-epiphyte becoming a free standing stangler 25 m high. Base with buttress. "Trunk" with red lenticels and aerial roots. Slash whitish to yellowish with white latex. Stipules

caducous. Leaves entire, alternate to spirally arranged. Petiole glabrous, canaliculated above, 1.8-3.5 cm long. Lamina elliptic (5-8.5 x 2.4-4 cm), glabrous; base rounded to cuneate, slightly cordate or faintly asymmetric; apex shortly acuminate; ***margin sometimes drying pale yellow***. Lateral veins 11-12 pairs, looping at 1 mm from the margin. Tertiary veins parallel to the lateral. Glandular spot absent. Figs in the leaf axils, pedunculate (0.8-1 cm long), in pairs, globose (0.6-1.2 cm diameter when dry). Basal bracts 2, caducous; ostiolar bracts absent. Ostiole slit-shaped.

Note: Ficus burretiana looks like *F. elasticoides* in shape and venation but the leaves are smaller and there are no glandular spots at all.

Habitat: Terra firma forest.

Specimens: Fay, M. & Harris, D.J. 8637; Harris, D.J. & Fay, M. 714, 7007; Ndolo Ebika, S.T. 20, 293; Nzolani Silaho, F.O. 2618.

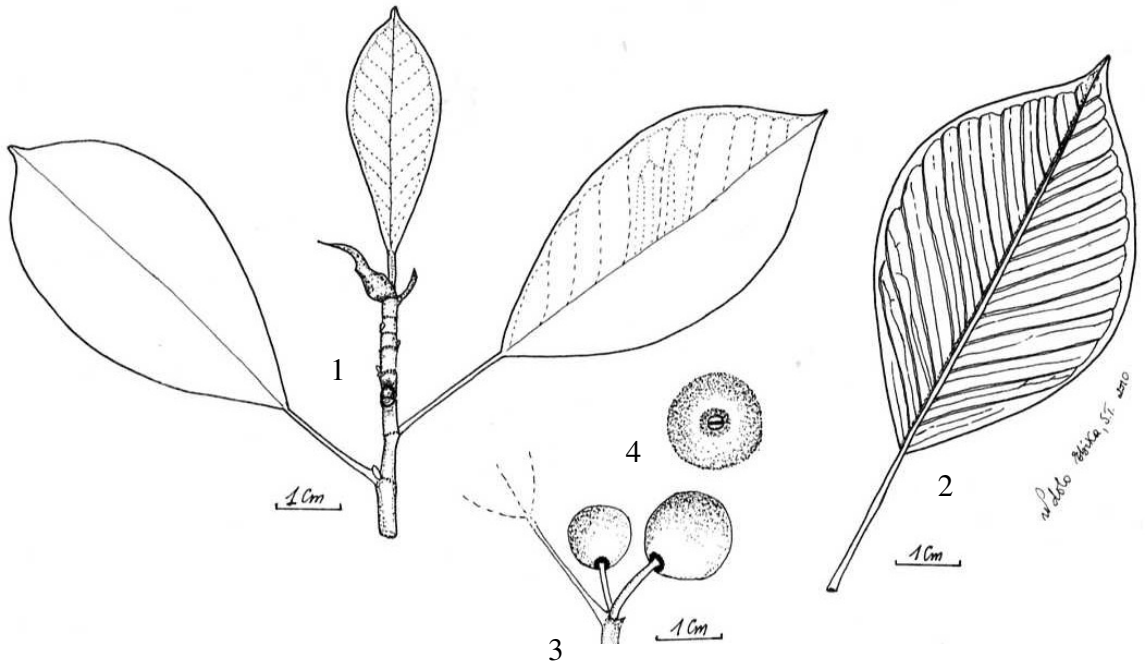


Figure 9: ***Ficus burretiana*** Hutch. ***1-2***: Leaf arrangement (1) and lower surface (2); ***3***: Fig arrangement; ***4***: Ostiole slit-shaped.

4. ***Ficus calyptrata*** Vahl; Figure 10, p. 48.

Synonym: Ficus mallotoides Mildbr. & Hutch. (Berg & Wiebes 1992: 116).

Hemi-epiphyte 20 m high. Slash pink with white latex. Stipules 1.5 cm long, puberulous, persistent to caducous. Leaves entire, spirally arranged. Petiole glabrous, (3.4-5 x 0.3-0.5 cm). Lamina cordiform to ovate (8.2-13.3 x 7.8-12.7 cm); base cordate, apex rounded. Midrib reaching or not reaching the apex of the lamina. Lateral veins more obvious above than below, 6-9 pairs including the basal pair, looping at 4 mm from the margin. Tertiary veins reticulate. ***Quaternary veins branched, ending into a Y shape inside of the network of the tertiary veins.*** Glandular spot at the base of the midrib below. Figs in the leaf axils, sessile, in pairs or more than two, subglobose (1-1.7 cm in diameter), yellowish when unripe and orange to red with red spots when ripe, puberulous. Basal bracts 2, persistent; ostiolar bracts not visible. Ostiole slit-shaped.

Habitat: Terra firma forest, Edge of marshy clearing and Riparian forest.

Specimens: Harris, D.J.: 4861, 7529, 9292.

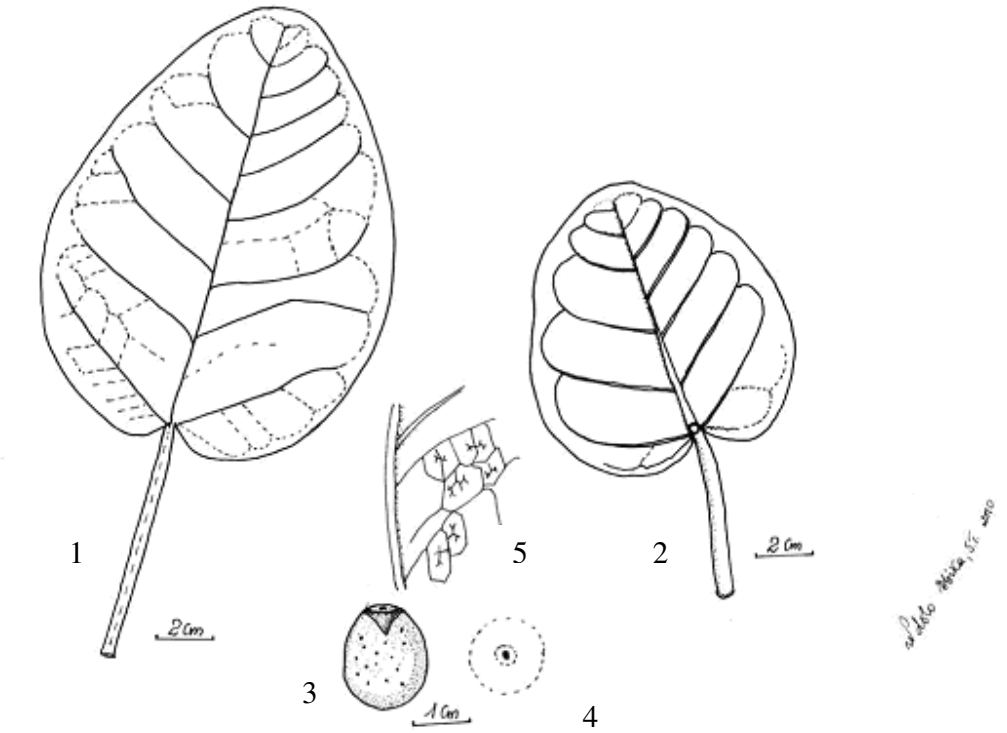


Figure 10: ***Ficus calyptrata*** Vahl ***1-2***: Leaves, upper surface (1) and lower surface (2); ***3***: Fig and basal bract; ***4***: Ostiole pore-like shaped; ***5.*** Quaternary veins.

5. ***Ficus craterostoma*** Warb. ex Mildbr. & Burret; Figure 11, p. 49.

Hemi-epiphyte 20 m high. Slash pinkish, more or less fibrous, with white latex. Stipules persistent, pubescent. Leaves spirally arranged, entire. Petiole glabrous, canaliculate, (1-1.8 x 0.1 cm). ***Lamina obtriangular sometimes elliptic*** (3.8-8.9 x 2.5-3.2 cm); base cuneate; apex emarginate to apiculate. ***Midrib not reaching the apex of the lamina***. Lateral veins 8-14 pairs, flattened on both surfaces of the lamina, looping at 2-3 mm from the margin. Glandular spot not at all visible. Figs in the leaf axils, sessile, in pairs, subglobose (up to 0.6 cm diameter, creased when dry), puberulent, green when unripe with yellow spots, colour when ripe unknown. Basal bracts 3, puberulent, 8 mm long; ostiolar bracts absent. Ostiole prominent and slit-shaped.

Habitat: Terra firma forest.

Specimen: Ndolo Ebika, S.T. 312

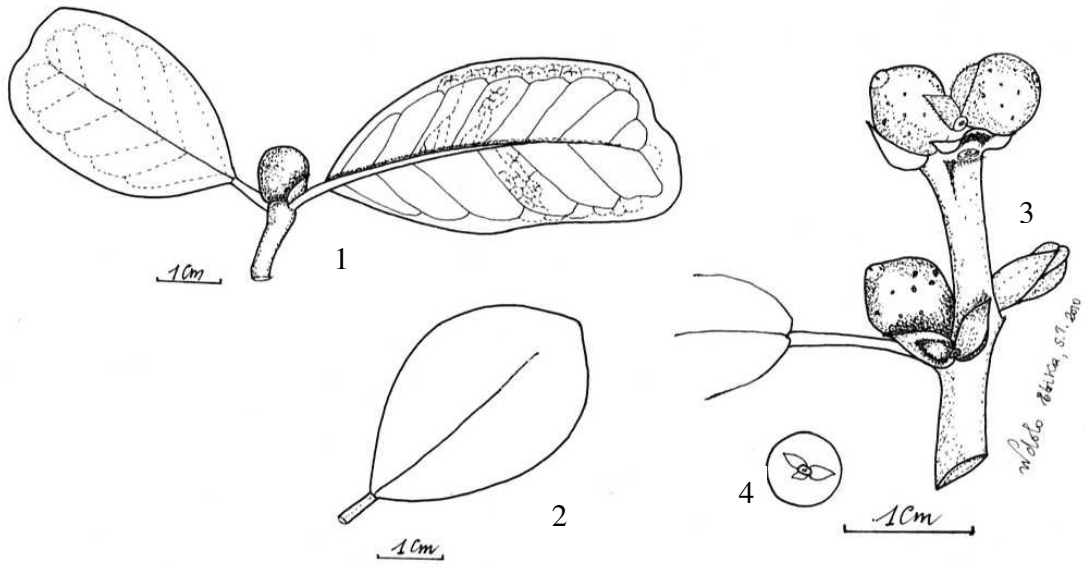


Figure 11: ***Ficus craterostoma*** Warb. ex Mildbr. & Burret. ***1-2***: Leaves shape; ***3***: Fig arrangement on the twig; ***4***: Basal bracts of the fig.

6. ***Ficus dryepondtiana*** De Wild.; Figure 12, p. 50.

Hemi-epiphyte 12 m high. Slash yellow with orange fibres. Latex yellowish, translucent. Stipules caducous. Leaves spirally arranged, entire. Petiole glabrous, canaliculate above, (3-6.3 x 0.1-0.2 cm). Lamina oblong to broadly elliptic (8.2-15.7 x 3.5-7.2 cm), glabrous; base cordate; apex with acumen c. 6 mm long. Lateral veins prominent on both surfaces of the

lamina, 8-14 pairs including the basal pair, looping at 2-5 mm from the margin. Glandular spot at the base of the midrib below. Figs on spurs on leafless branches, in groups of at least 4, pedunculate (up to 2 cm long), oblong (3.5 x 2.5 cm when fresh, 2-2.5 cm in diameter when dry), glabrous, yellow with red spots when ripe. Basal bracts caducous, leaving an oblique scar at the base of the fig; ostiolar bracts absent. Ostiole slit-shaped and located in a depression.

Habitat: Terra firma forest and Riparian forest.

Specimens: Harris, D.J. 1297, Ndolo Ebika, S.T. 360.

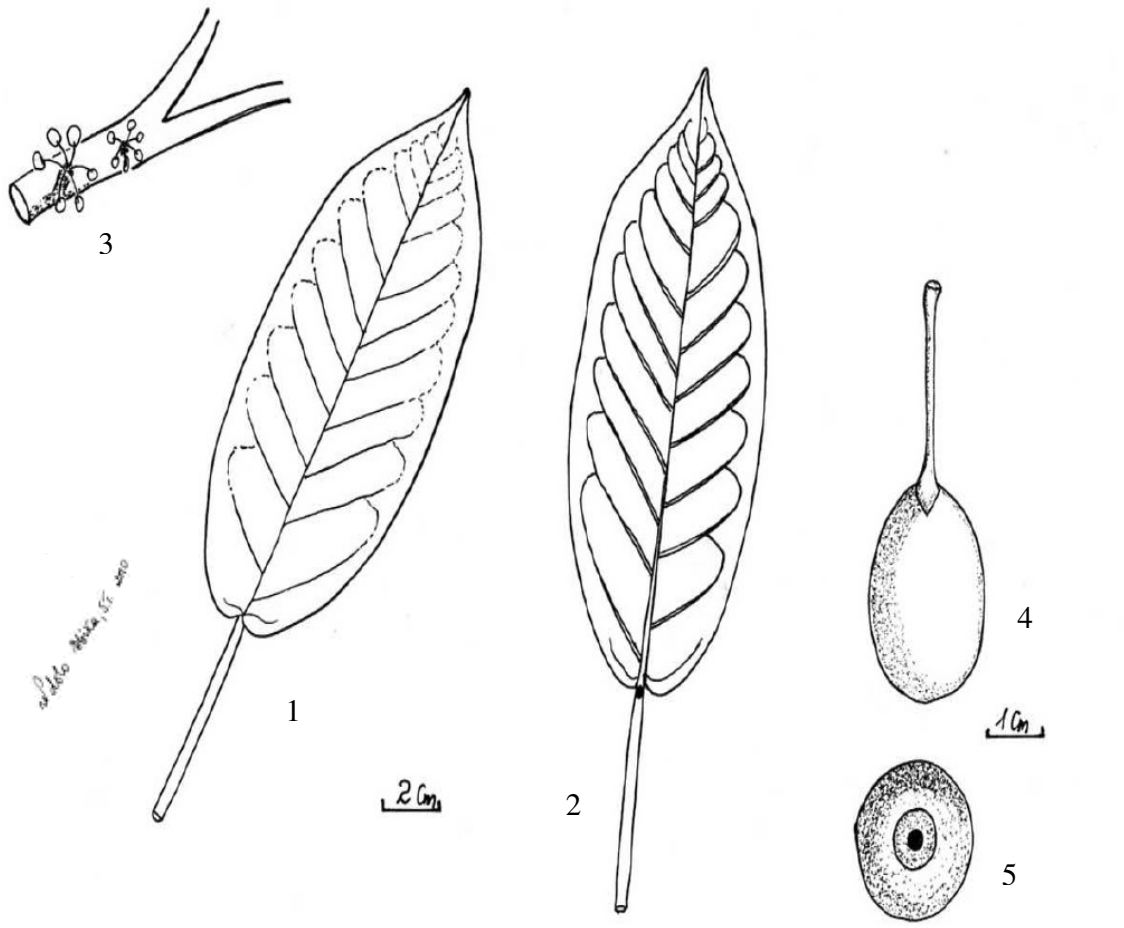


Figure 12: ***Ficus dryepondtiana*** De Wild. ***1-2***: Leaves, upper surface (1) and lower surface (2); ***3***: Fig arrangement on the branch; ***4***: Fig shape when fresh; ***5***: Ostiole pore-like shaped.

7. *Ficus elasticoides* De Wild.; Figure 13, p. 51.

Hemi-epiphyte becoming a free standing strangler 25 m high. Base often with small buttress. Slash greenish to yellowish, latex white oxidising to yellowish. Axillary stipules caducous; terminal stipule pointed, glabrous. Leaves in spirals, entire. Petiole glabrous, 2-4 cm long, 4 mm broad. Lamina elliptic (8.2-22 x 4.7-9.5 cm), drying reddish, the youngest drying pale green; base rounded to cuneate; apex with acumen c. 6 mm long. Lateral veins 16-21 pairs, looping at 2 mm from the margin. Tertiary veins parallel to the lateral and sometimes less distinguishable from the lateral. Glandular spot at the base of the midrib below, sometimes this spot may be less conspicuous. Figs in the leaf axils, pedunculate (0.8-1.2 cm long), in pairs, globose (3 cm diameter when fresh and 1.4-2.5 cm when dry), green when unripe and yellowish to reddish with yellow spots when ripe. Basal bracts 3, persistent; ostiolar bracts absent. Ostiole prominent, slit-shaped.

Habitat: Terra firma forest, Stream.

Specimens: Harris, D.J. 4612, 4778, 5837, 6101, 6692; Moukassa, G. 1579; Ndolo Ebika, S.T. 11, 297; Nzolani Silaho, F.O. 3305, 3464.

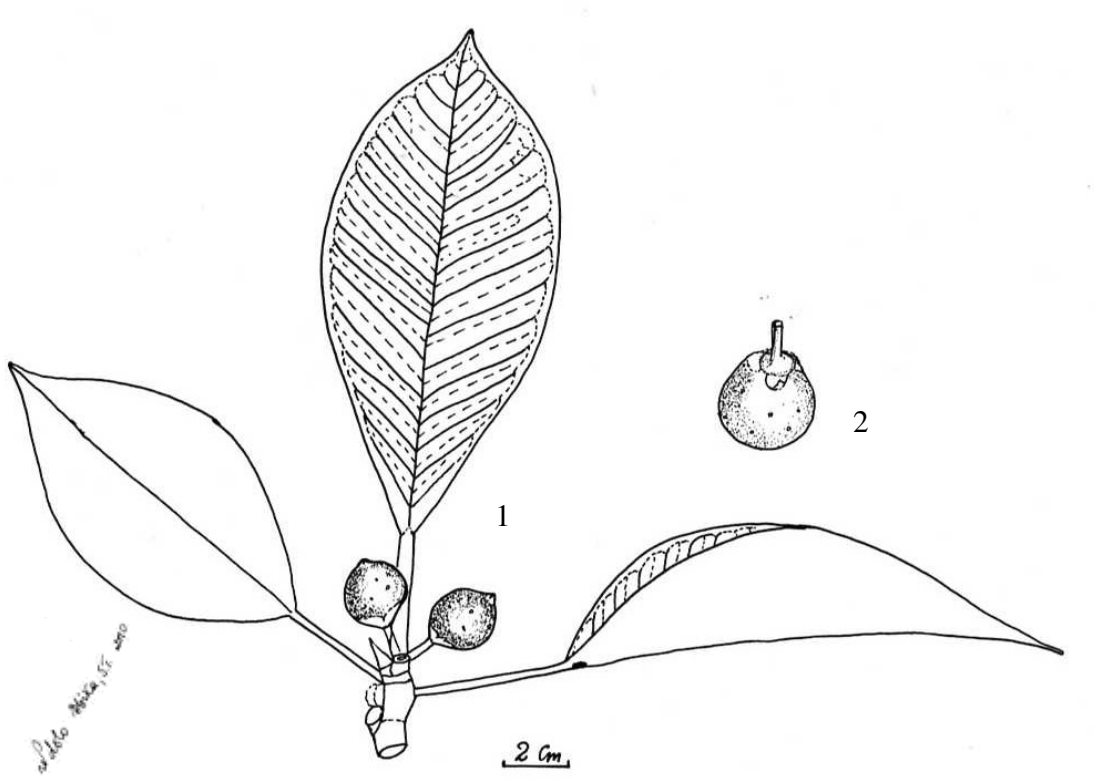


Figure 13: *Ficus elasticoides* De Wild. ***1***: Leaf and Fig arrangement; ***2***: Fig shape.

8. ***Ficus kamerunensis*** Warb. ex Mildbr. & Burret; Figure 14, p. 52.

Hemi-epiphyte 12 m high with aerial roots at the base. Slash pink with white latex. Stipules caducous. Leaves entire, alternate. Petiole glabrous, (1-2 x 0.1 cm). Lamina oblong (5.5-12.5 x 2-3.5 cm), glabrous; base rounded or slightly cordate; apex shortly acuminate (c. 4 mm long). Lateral veins pinnate, parallel between them and almost perpendicular to the midrib, 12-18 pairs looping at 2 mm from the margin. Tertiary veins parallel to the lateral. Glandular spot at the base of the midrib below. Figs in the leaf axils, sessile, solitary, globose (0.4-0.9 cm diameter), green when unripe and yellow with orange spots when ripe. Basal bracts 2, fused into a crown; ostiolar bracts absent. Ostiole slit-shaped.

Habitat: Terra firma forest.

Specimens: Harris, D.J. 4559; Ndolo Ebika, S.T. 345.

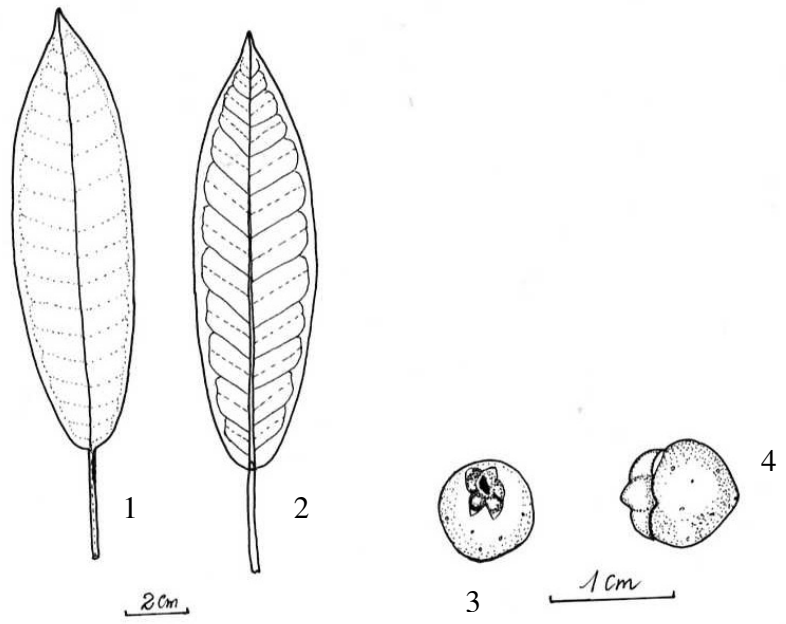


Figure 14: ***Ficus kamerunensis*** Warb. ex Mildbr. & Burret ***1-2***: Leaves, upper surface (1) and lower surface (2); ***3***: Fig and basal bracts seen from above; ***4***: Fig, basal bracts and ostiole (pore-like) in profile.

9. *Ficus lutea* Vahl; Figure 15, p. 54.

Hemi-epiphyte becoming a free standing stangler 20 m height. Base with buttress extending at the ground level on snake-like roots. Slash whitish to orange with white latex. Stipules caducous. Leaves entire, spirally arranged. Petiole puberulent to glabrous, (2.5-10.9 x 0.3-0.4 cm). Lamina coriaceous, lanceolate to oblanceolate (10.5-23.5 x 6.5-12 cm), glabrous; base rounded to cordate; apex rounded to apiculate. ***Midrib not reaching the apex or stopping at 1-2 mm from the apex***. Lateral veins prominent below, yellowish, 7-13 pairs, looping at 2 mm from the margin. Tertiary veins reticulate. ***Glandular spot solitary, present on both surfaces of the midrib***: triangular at the base of the midrib above; green and shiny below. Figs in the leaf axils, sessile, in pairs, oblong (2 x 1.5-2 cm when fresh and 0.6-1.9 cm in diameter when dry), green when unripe and yellow when ripe. Basal bracts 4, fused; ostiolar bracts absent. Ostiole slit-shaped.

Habitat: Terra firma forest; Stream.

Specimens: Begemder 875 (E); Harris, D.J. 1529, 5301, 5331; Ndolo Ebika, S.T. 308.

10. *Ficus natalensis* Hochst. subsp. ***natalensis***; Figure 16, p. 55.

Hemi-epiphyte 25 m high with aerial roots. Slash pink with white latex. Stipules caducous. Leaves spirally arranged. Petiole glabrous, canaliculate above (1.6-3 x 0.2 cm). Lamina elliptic to oblanceolate, (6.8-9.5 x 2.4-3.6 cm); base cuneate to slightly cordate; apex rounded to acuminate. Lateral veins flattened on both surfaces of the lamina, c. 12 pairs, looping near to the margin. Glandular spot at the base of the midrib below. Figs in the leaf axils, pedunculate (0.3-0.5 cm long), globose (1.2-1.5 cm diameter). Basal bracts 3 and soon caducous; ostiolar bracts absent. Ostiole slit-shaped.

Habitat: Terra firma forest.

Specimens: Ndolo Ebika, S.T. 80, 285.

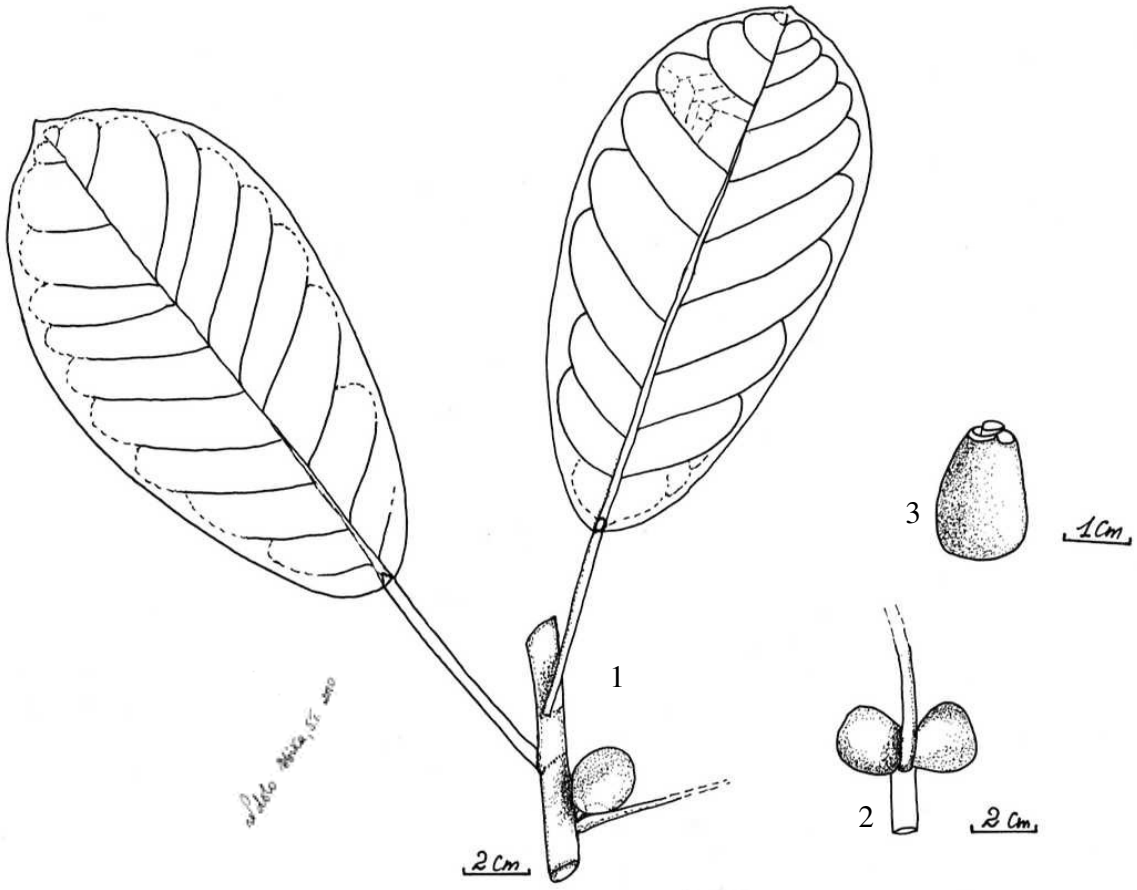


Figure 15: ***Ficus lutea*** Vahl ***1***: Leaf arrangement ; ***2***: Fig arrangement; ***3***: Fig shape and basal bracts.

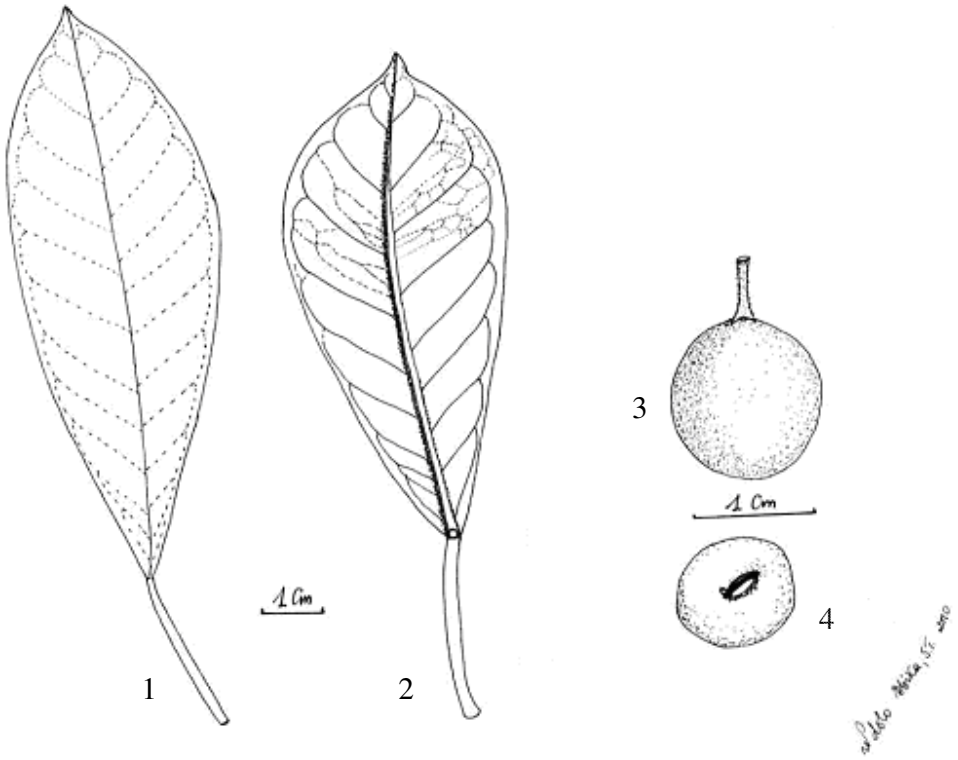


Figure 16: ***Ficus natalensis*** Hochst. subsp. ***natalensis*** ***1-2.*** Leaf : upper surface (1) and lower surface (2); ***3.*** Fig; ***4.*** Ostiole.

11. ***Ficus polita*** Vahl subsp. ***polita***; Figure 17, p. 56.

Hemi-epiphyte becoming a tree 20 m high. Base with buttress and aerial roots. Slash white with white latex. Stipules caducous. Leaves entire to waved, spirally arranged. Petiole glabrous, (2.8-8.5 x 0.2-0.3 cm). Lamina cordiform to ovate, (8-16 x 4.6-11.5 cm), glabrous; base cordate to rounded; apex shortly acuminate (5 mm long). Lateral veins prominent below, 5-8 pairs including the basal pair, looping at 3 mm from the margin. ***Tertiary veins of two types: those located between the lateral veins are parallel between them and almost perpendicular to the laterals whereas those situated out of the basal lateral pair, 4-6 pairs including the basal, are looping at 1 mm from the margin. Quaternary veins forming very small network of very small aureole.*** Glandular spots either in pairs or single at the base of the midrib on the lower surface of the lamina. Figs on spurs on the trunk and on leafless branches, in groups of up to 6, pedunculate (4.5 x 0.8 cm), puberulous, globose (6 cm diameter when fresh, 2-2.5 cm when dry and creased) with a cuneate at the base when fresh.

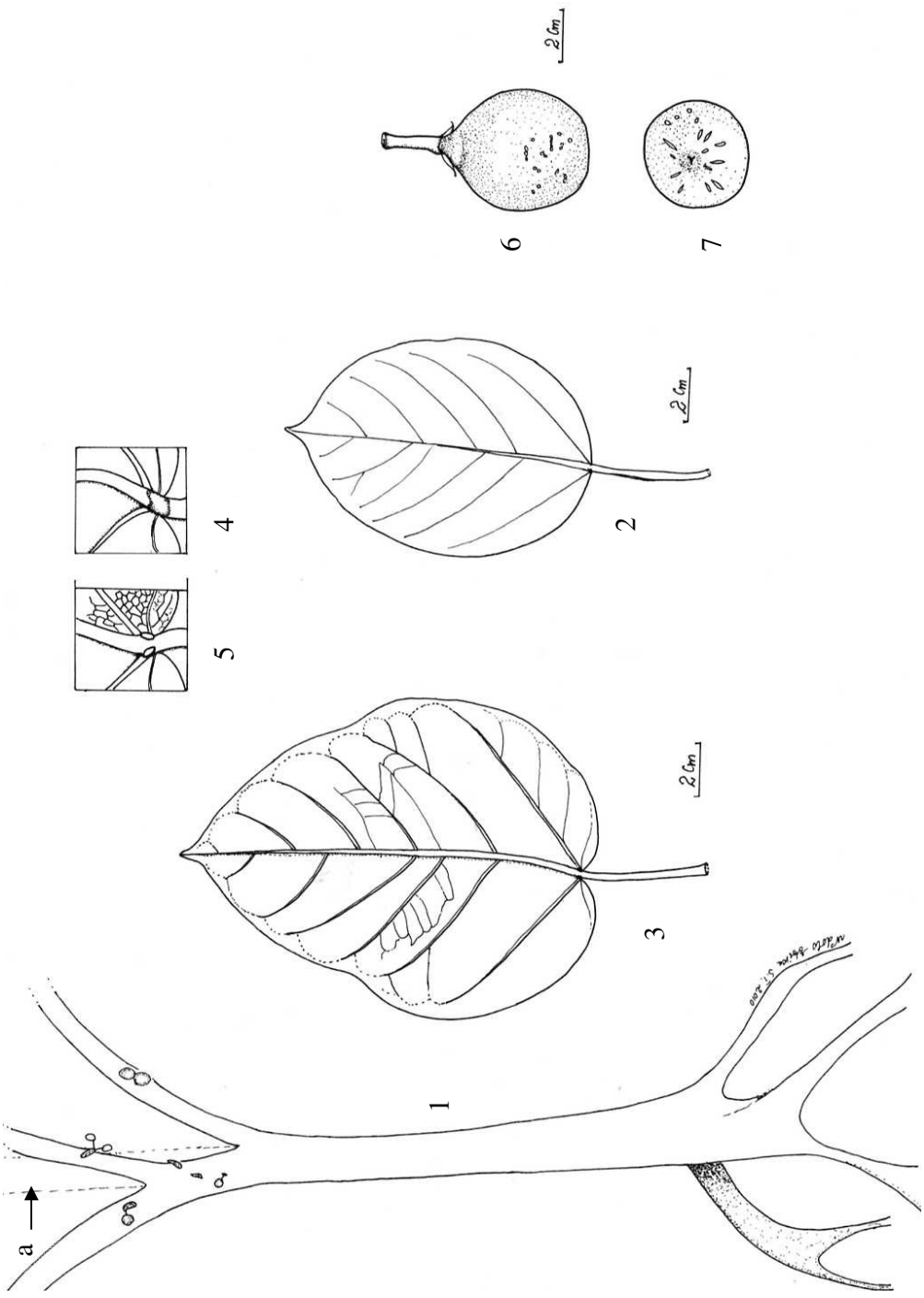


Figure 17: ***Ficus polita*** Vahl subsp. ***polita*** ***1***: Fig habit with the host (**a**); ***2-3***: Leaves, upper surface (2) and lower surface (3); ***4-5***: Glandular spots on the midrib: one (4) and in pairs (5); ***6***: Fig shape when fresh; ***7***: Ostiole pore-like shaped.

Basal bracts 2; ostiolar bracts absent. Ostiole slit-shaped and located in a depression.
Habitat: Terra firma forest, Riparian forest, Stream.
Specimens: Harris, D.J. 1429, 1886, 5359, 8022; Irvine, F.R. 1985 (E), Ndolo Ebika, S.T. 105.

12. *Ficus preussii* Warb.; Figure 18, p. 59.
Hemi-epiphyte 10 m high with aerial roots. Slash hard, pink with white latex. Stipules persistent, (2.9-4 x 0.8-1 cm). Leaves entire, spirally arranged. Petiole glabrous, (1.3-4.8 x 0.4-0.6 cm), ***red once the periderm flakes off when dry***. Lamina oblanceolate (11.3-34 x 4.8-12.8 cm), glabrous, coriaceous, ***drying darker green to grey above and brownish below***; base cordate; apex acuminate. Lateral veins pinnate, 5-7 pairs including 1 basal pair, looping at 2 mm from the margin. Figs in the leaf axils, sessile, in pairs, globoses (5 cm in diameter when fresh and at least 3 cm when dry), pubescent, green with prominent yellow dots when unripe and ripe. Basal bracts 2 (3?), fused; ostiolar bracts not visible. Ostiole slit-shaped.
Note: Ficus preussii Warb. is close to *F. subsagittifolia* C.C.Berg in shape. I took the following notes to distinguish them from Berg & Wiebes (1992): 142 and 150 respectively. ***F. preussii:*** petiole 2.5-8.5 cm long; lateral veins 6-8 (-9) pairs; figs globose with yellow spots, 2.5-5 cm in diameter when fresh and 2-3 cm when dry, apex up to 5 mm protruding. ***F. subsagittifolia:*** petiole 1-5.5 cm long; lateral veins 9-15 pairs; figs ± depressed globose with white spots, 2.5-3.5 cm when dry, wall often wrinkled, apex flat.
Habitat: Terra firma forest; Sangha River.
Specimens: Harris, D.J. 5537, 7743, 7744, 7747; Ndolo Ebika, S.T. 325.

13. *Ficus recurvata* De Wild.; Figure 19, p. 60.
Hemi-epiphyte becoming a tree 20 m high. Base with buttress extending at the ground level on snake-like roots. Slash brownish with white latex. Stipules caducous. Leaves entire, spirally arranged at the end of twigs. Petiole pubescent, (4.5-11 x 0.3-0.4 cm). Lamina broadly elliptic (10.5-22 x 7.5-11cm), pubescent on both surface but becoming

glabrous above on old leaves; base cordate; apex rounded. Lateral veins prominent below, 11 pairs including 2 basal pairs, looping at 1 mm from the margin. Tertiary veins of two types: those located between the lateral veins are parallel between them and almost perpendicular to the laterals whereas those situated out of the basal lateral pair, 4 pairs including the two basal, are looping at 1 mm from the margin. Glandular spot at the base of the petiole below. Figs in the leaf axils, in pairs, pedunculate (peduncle pubescent, 1.5-2.2 x 0.2 cm), globose (2-3 cm in diameter), pubescent or glabrous. Basal bracts 3 (4); ostiolar bracts absent. Ostiole slit-shaped.

Habitat: Gilbertiodendron dewevrei on terra firma; Terra firma forest; Swamp forest.

Specimens: Fangounda, J. 509; Harris, D.J. 4792, 6546; Ndolo Ebika, S.T. 13, 17

14. ***Ficus variifolia*** Warb.; Figure 20, p. 61.

Tree 25 m high. Base with buttress. Slash yellow; sap clear. Stipules caducous. Leaves entire, alternate. Petiole scabrous, canaliculate above, (0.9-2.3 x 0.1 cm). Lamina broadly elliptic to oblong (5.5-13.5 x 2.8-6.6 cm), scabrous; base cordate; apex acuminate (acumen c. 5-7 mm long). Lateral veins 8-15 pairs including 1-2 basal pair(s). Glandular spots not at all visible. Figs in the leaf axils, in pairs, puberulous, globose (1 cm in diameter when fresh and 0.6-0.7 cm when dry), pedunculate (peduncle puberulous, 3 mm long), yellow to brown with green dots when ripe. Basal bracts 3, persistent; ostiolar bracts 3. Ostiole prominent, circular.

Habitat: Terra firma forest.

Specimens: McDonald, K. 037 (E); Ndolo Ebika, S.T. 309.

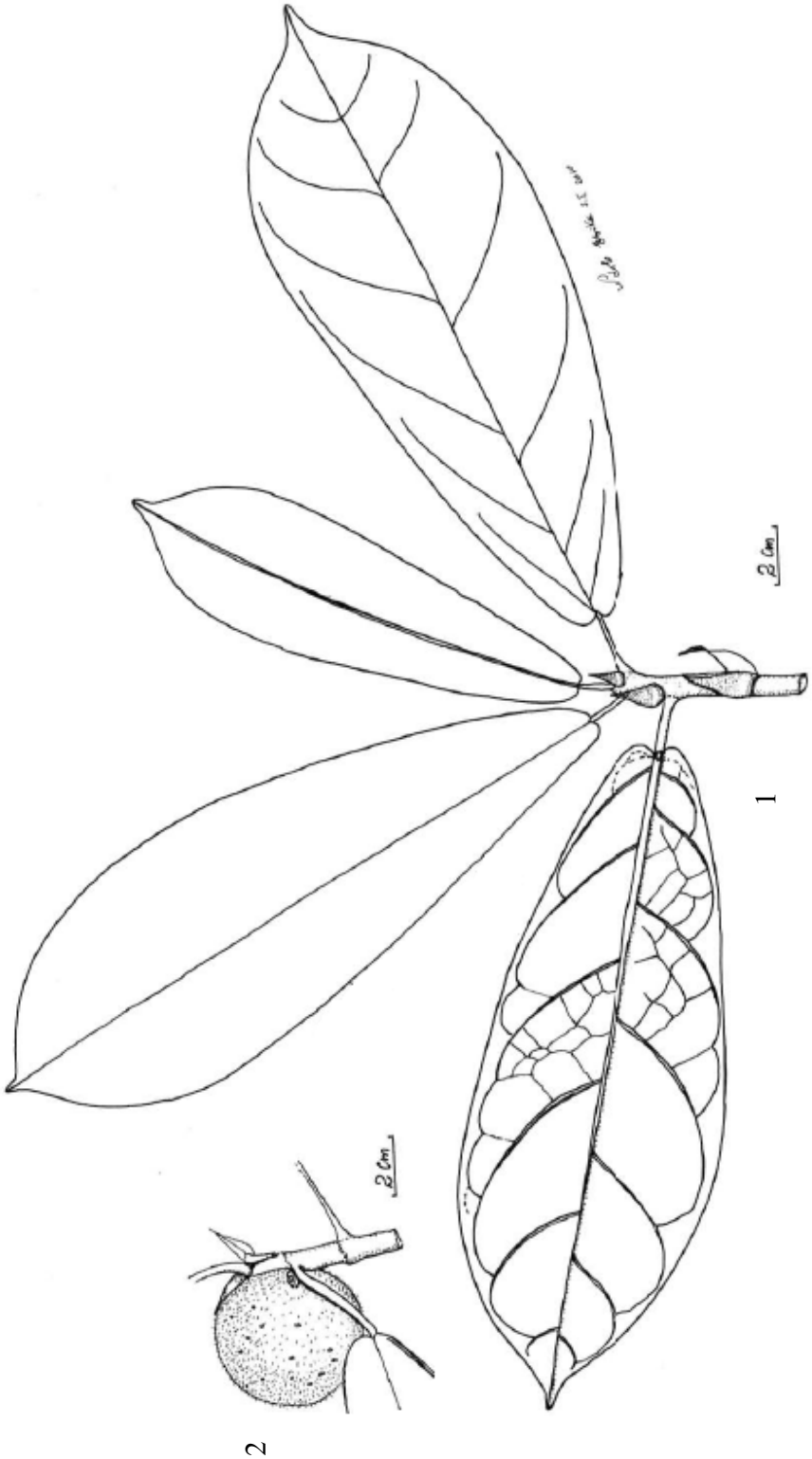


Figure 18: ***Ficus preussii*** Warb. ***1***: Leaves arrangement; **2**: Fig (s) arrangement (Figs are pairs but only one is drawn).

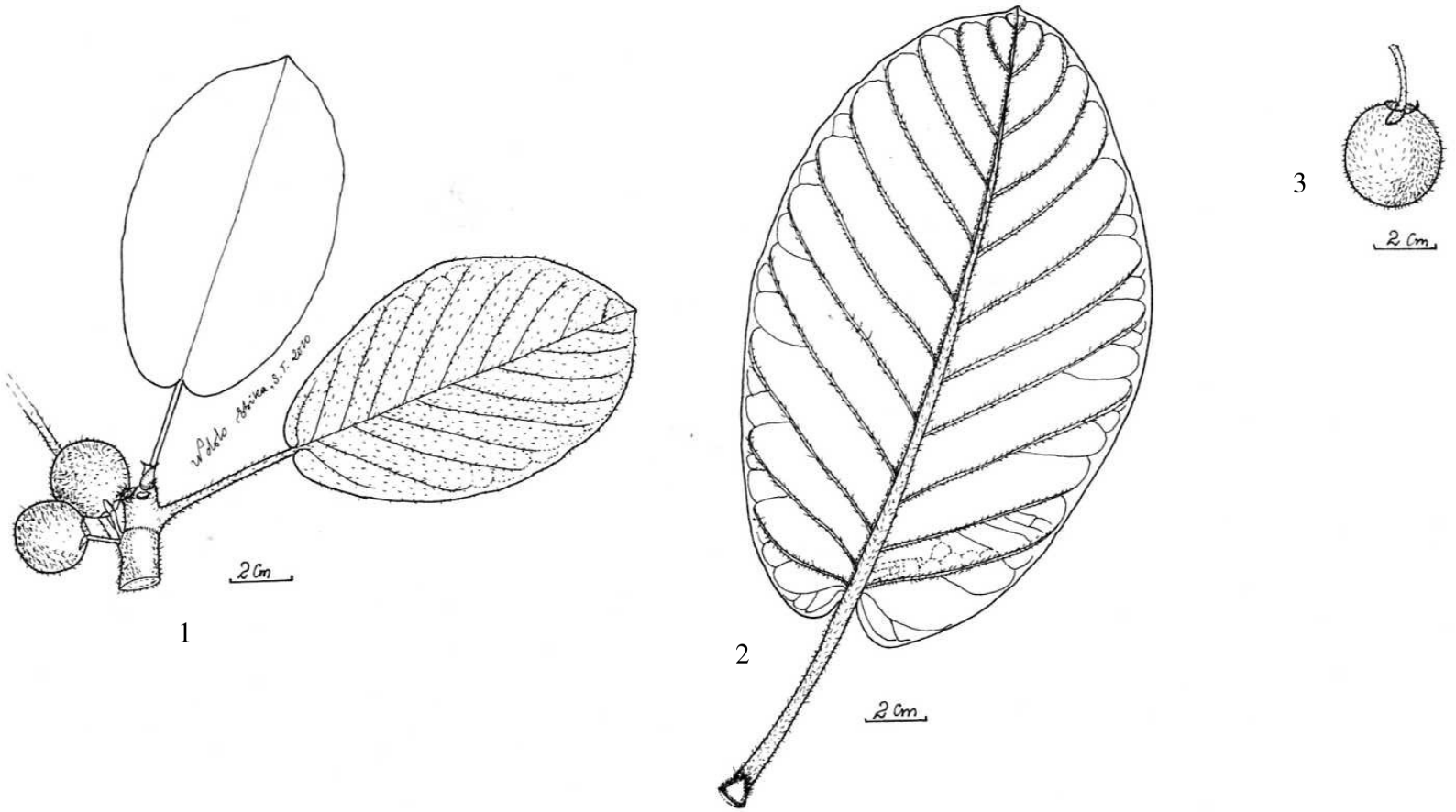


Figure 19: ***Ficus recurvata*** De Wild. ***1***: Leaves and Fig arrangement; ***2***: Leaf with a glandular spot at the base of the petiole.

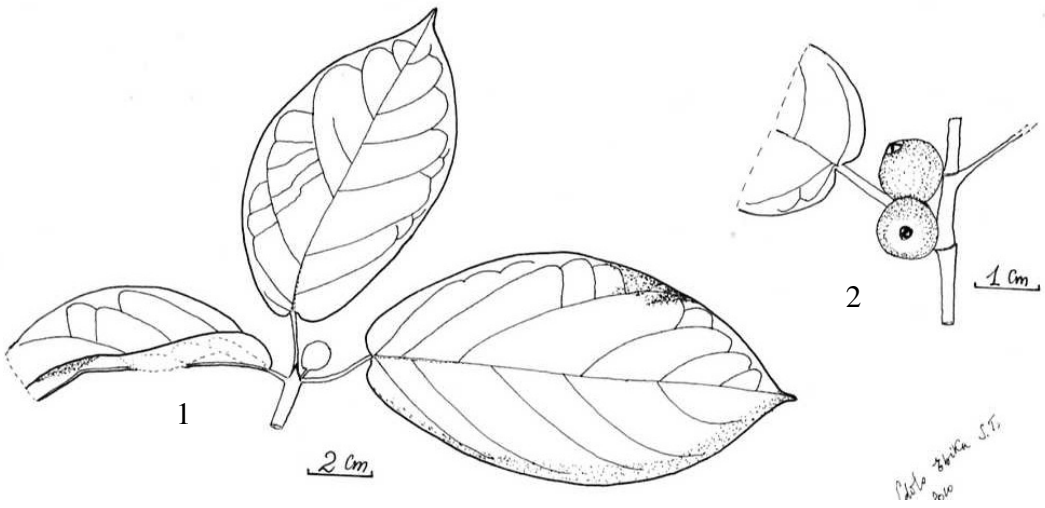


Figure 20: ***Ficus variifolia*** Warb. ***1***: Leaf arrangement; ***2***: Fig arrangement.

15. ***Ficus wildemaniana*** De Wild. & T.Durand; Figure 21, p. 62.

Hemi-epiphyte 10 m high with aerial roots. Slash pink with white latex oxidizing to yellowish. Stipules caducous. Leaves entire, spirally arranged at the end of twigs. Petiole glabrous, (0.5-8 x 0.4-0.9 cm). Lamina elliptic (11.3-45 x 4-15 cm), glabrous, coriaceous, waved; base cuneate; apex shortly acuminate. Lateral veins 8-14 pairs. Figs in the leaf axils, sessile, in pairs, subglobose (1.5-5.2 cm in diameter), pubescent, dark green with red dots when unripe and red when ripe. Basal bracts 2, persistent; ostiolar bracts not visible. Ostiole pore-shaped.

Habitat: Terra firma forest.

Specimens: Harris, D.J. 1982, 4284, 6108, 7531, 7723; Ndolo Ebika, S.T. 12, 14.

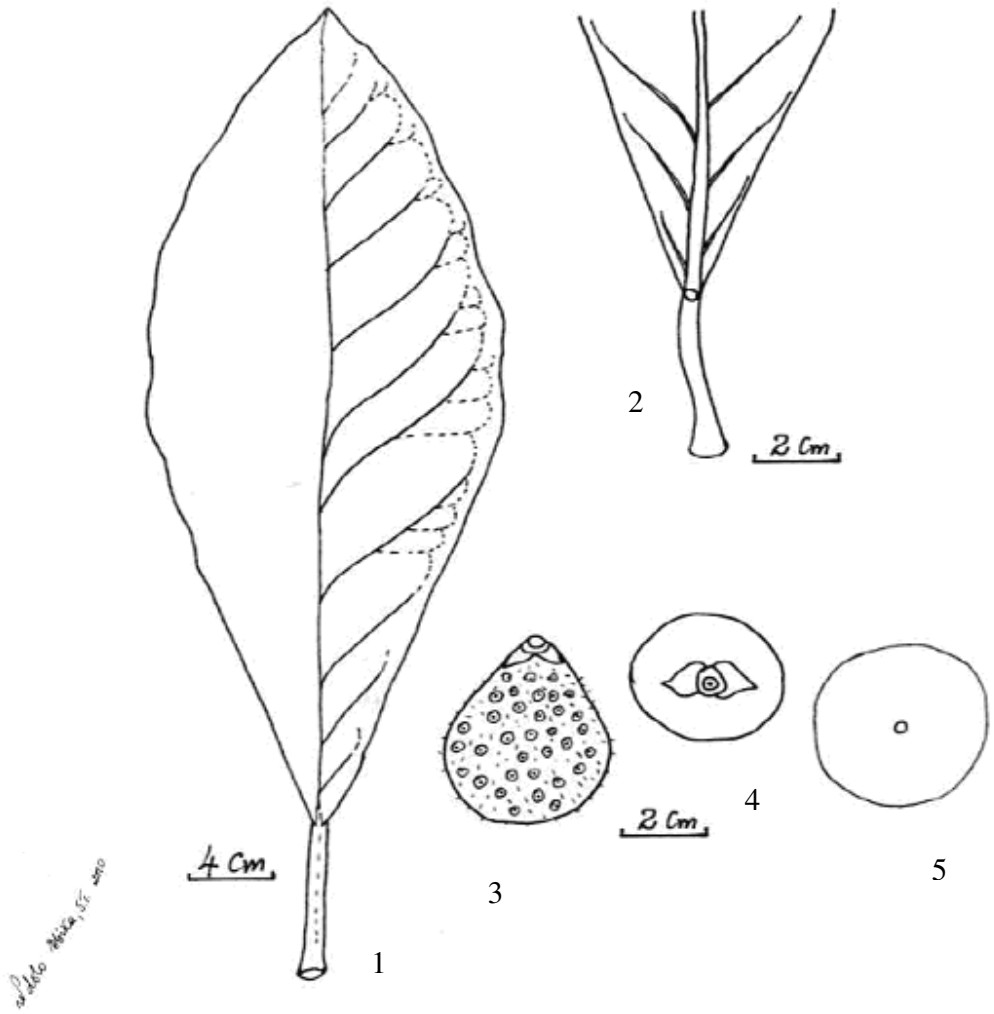


Figure 21: ***Ficus wildemaniana*** De Wild. & T.Durand ***1-2***: Leaves, upper surface (1) and lower surface with glandular spot at the base of the midrib (2); ***3***: Fig shape; ***4***: Basal bracts; ***5***: Ostiole pore-like shaped.

5. Writing and testing a dichotomous key

The above key is a result of several attempts of writing and testing. The key is the sixth version resulting from different feedback from 13 people who tested it.

The first version of the key was based on the glandular spots which are a good character for fresh material but I did not realise that these spots may be less obvious on dried

material. Therefore, it was very difficult for the users to find the first character of the first draft of key in order to carry on. I changed the first character of the key from glandular spots to the lamina shape which sped up the testing process. Each time during the testing process, I changed the wording and characters in couplets to address problems the users encountered and the feedback they provided me with.

I decided that this sixth version was the final when the 13 users keyed out the 15 species without any problems.

6. Conclusion

Identification of *Ficus* species from Goualougo is possible using this key on herbarium specimens. Although the 15 fig species described in this chapter are only a sample of the fig diversity in the Goualougo Triangle area, I think that this key will help researchers to identify *Ficus* specimens. More collections will raise this number and improve the understanding in fig diversity in central Africa.

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Appendix 1: A preliminary checklist of vascular plants of the Goualougo Triangle

PTERIDOPHYTA

Dennstaedtiaceae

Microlepia speluncae (L.) Moore

Ref.: Tardieu-Blot, Fl. Cam. **3**, 1964: 94; Tardieu-Blot, Fl. Gabon **8**, 1964: 68; Harris, 2002: 30; Smith *et al*., 2006: 714.

Description: Herb. Fronds arranged into a bunch. No dimorphism between sterile and fertile fronds.

Habitat: Gilbertiodendron dewevrei forest on terra firma.

Specimen(s): Ndolo Ebika, S.T. 229

Lomariopsidaceae

Nephrolepis biserrata (Swartz) Schott

Ref.: Tardieu-Blot, Fl. Cam. **3**, 1964: 110; Tardieu-Blot, Fl. Gabon **8**, 1964: 86; Moutsamboté et al., 1994: 280; Smith et al., 2006: 718.

Description: Herb growing at 2 m on dead wood. No dimorphism between sterile and fertile fronds. Sorii circular, darkish then orangeish.

Habitat: Gilbertiodendron dewevrei forest on terra firma.

Specimen(s): Ndolo Ebika, S.T. 386

Schizaeaceae

Lygodium microphyllum (Cav.) R.Brown

Ref.: Tardieu-Blot, Fl. Cam. **3**, 1964: 62; Tardieu-Blot, Fl. Gabon **8**, 1964: 45; Harris, 2002: 33.

Description: Vine of 1 m high. Sorii whitish.

Habitat: Alongside stream.

Specimen(s): Ndolo Ebika, S.T. 408

Selaginellaceae

Selaginella soyauxii Hieron.

Ref.: Tardieu-Blot, Fl. Cam. **3**, 1964: 33; Tardieu-Blot, Fl. Gabon **8**, 1964: 21.

Description: Vine of 1 m high. Sporangia in spike.

Habitat: Alongside stream.

Specimen(s): Ndolo Ebika, S.T. 409

Tectariaceae

Arthropteris orientalis (J.F.Gmel.) Posthumus

Ref.: Tardieu-Blot, Fl. Cam. **3**, 1964: 116; Tardieu-Blot, Fl. Gabon **8**, 1964: 90; Smith *et al*, 2006: 718.

Description: Rhizomatous herb growing on dead wood. No dimorphism between sterile and fertile fronds. Grey glands on the lobes of the frond above. Sorii orangeish, rounded, on the lower surface of the frond.

Habitat: Gilbertiodendron dewevrei forest on terra firma.

Specimen(s): Ndolo Ebika, S.T. 204

Tectaria angelicifolia (K.Schum.) Copel.

Ref.: Tardieu-Blot, Fl. Cam. **3**, 1964: 289; Tardieu-Blot, Fl. Gabon **8**, 1964: 174; Smith *et al*, 2006: 718.

Description: Rhizomatous herb of 40 cm high. No dimorphism between sterile and fertile fronds. Sorii rust spots like.

Habitat: Mixed species terra firma forest.

Specimen(s): Ndolo Ebika, S.T. 249

Thelypteridaceae

Cyclosorus dentatus (Forssk.) Ching

Ref.: Tardieu-Blot, Fl. Cam. **3**, 1964: 248; Tardieu-Blot, Fl. Gabon **8**, 1964: 150; Smith *et al*, 2006: 716.

Description: Herb. Fronds arranged into a bunch. No dimorphism between sterile and

fertile fronds. Sorii circular with a pore in the centre.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 228.

SPERMATOPHYTA

Acanthaceae

Anisotes macrophyllus (Lindau) Heine
Ref.: Heine, Fl. Gabon **13**, 1966: 189; Harris, 2002: 35.
Description: Herb "woody below" 1 m high. Flowers orange, zygomorphic with 2 elongated lips, ± plastic.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 58.

Barleria brownii S.Moore
Ref.: Heine, Fl. Gabon **13**, 1966: 166.
Description: Liana. Inflorescences axilly. Flowers purple.
Habitat: Seasonally flooded forest.
Specimen(s): Ndolo Ebika, S.T. 269.

Justicia extensa T.Anderson
Ref.: Heine, F.W.T.A. **2**, 1963: 428; Heine, Fl. Gabon **13**, 1966: 224; Harris, 2002: 36.
Description: Liana 2 m high. Inflorescences axillary to terminal.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 245.

Lankesteria elegans (P.Beauv.) T.Anderson
Ref.: Heine, F.W.T.A. **2**, 1963: 407; Heine, Fl. Gabon **13**, 1966: 96; Harris, 2002: 36.
Description: Shrub 1 m high. Inflorescences terminal and/ or axillary. Flowers orange.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 415.

Mendoncia gilgiana (Lindau) Benoist
Ref.: Heine, F.W.T.A. **2**, 1963: 403; Heine, Fl. Gabon **13**, 1966: 70; Harris, 2002: 36.
Description: Twining liana. Drupe axillary, solitary or in groups of up to 3, enclosed in 2 white bracts, green when unripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 198.

Pseuderanthemum ludovicianum (Büttn.) Lindau
Ref.: Heine, F.W.T.A. **2**, 1963: 421; Heine, Fl. Gabon **13**, 1966: 170; Harris, 2002: 37.
Description: Liana 3 m high. Inflorescences terminal. Flowers numerous, white.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 281.

Thunbergia erecta (Benth.) T.Anderson
Ref.: Heine, Fl. Gabon **13**, 1966: 60; Harris, 2002: 38.
Description: Herb 1 m high. Flowers purple blue.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 388.

Whitfieldia elongata (P.Beauv.) De Wild. & T.Durand
Ref.: Heine, F.W.T.A. **2**, 1963: 398; Heine, Fl. Gabon **13**, 1966: 34; Moutsamboté *et al.*, 1994: 280; Harris, 2002: 39.
Description: Lianescent shrub 3 m high. Inflorescences terminal. Flowers with 2 green bracteoles, calyx and corolla white.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 237.

Achariaceae

Caloncoba welwitschii (Oliv.) Gilg
Ref.: Moutsamboté *et al.*, 1994: 283; Harris & Wortley, 2008: 149.
Synonym: Oncoba welwitschii Oliv. (Harris, 2002: 96)
Description: Shrub 5 m high; d.b.h.: 16 cm. Slash whitish with red fibres. Leaves simple,

entire, spirally arranged. Lamina cordiform; stipules persistent to caducous. Flowers occurring on branches. Fruits, spiny capsules, globose (5 cm in diameter), solitary.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 97.

Lindackeria dentata (Oliv.) Gilg
Ref.: Moutsamboté *et al*., 1994: 283; Harris & Wortley, 2008: 151.
Synonym: Oncoba dentata Oliv. (Harris, 2002: 95)
Description: Shrub 3-8 m high; d.b.h.: 8 cm. Trunk green with grey spots. Slash yellow with orange fibres. Leaves simple, toothed and spirally arranged. Lamina broadly elliptic to ovate; stipules persistent to caducous. Flowers white. Infructescences axillary. Fruits, spiny capsules, globose (7 mm in diameter), solitary or in groups of up to 3, green when unripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 96, 347.

Scottellia klaineana Pierre
Ref.: Harris, 2002: 96; Harris & Wortley, 2008: 151.
Description: Tree 25 m high. Slash yellowish oxidising to red. Leaves alternate. Infructescences terminal and/ or axillary. Fruits: capsules. 2 seeds.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 217.

Amaranthaceae

Cyathula prostrata (L.) Blume var. ***prostrata***
Ref.: Cavaco, Fl. Cam. **17**, 1974: 45.
Description: Prostrate and erect herb. Inflorescences pubescent, terminal, up to 29 cm long. Flowers subsessile.
Habitat: Swamp.
Specimen(s): Ndolo Ebika, S.T. 317.

Anacardiaceae

Lannea welwitschii (Hiern) Engl. var. ***welwitschii***
Ref.: Letouzey: 283 (1982b); Moutsamboté *et al.*, 1994: 280; Harris, 2002: 40; Harris & Wortley, 2008: 163.
Description: Tree 25 m high. Slash red. Leaves compound, once pinnate, spirally arranged at the end of the twigs. Inflorescences axillary. Flowers small, green. Fruits drupaceous, juicy, shiny green when unripe and purple red when ripe. 1 seed enclosed in green and mucilagenous aril.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 342, 382.

Annonaceae

Anonidium mannii (Oliv.) Engl. & Diels
Ref.: Moutsamboté *et al.*, 1994: 280; Harris, 2002: 41; Harris & Wortley, 2008: 13.
Description: Tree 20 m high. Trunk green with grey spots. Slash with thin black ring and thick orange ring oxidising to red; typical smell of Annonacea; stringy bark flaking off. Inflorescences leafless branches, pendulous, occurring on the trunk and/ or on the branches. Flowers green then yellow, fleshy. Fruits compound, fleshy, green when unripe and yellow when ripe. Numerous seeds.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 57.

Artabotrys rufus De Wild.
Ref.: Le Thomas, Fl. Gabon **16**, 1969: 147; Harris, 2002: 41.
Description: Lianescent shrub. Slash with black and yellow rings, stringy bark flaking off; typical smell of Annonaceae. Hooks opposite to some leaves. Fruits: 5 mericarps on the hooks; sepals 3, persistent.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 78.

Cleistopholis patens (Benth.) Engl. & Diels
Ref.: Moutsamboté *et al.*, 1994: 280; Harris, 2002: 42; Harris & Wortley, 2008: 14.
Description: Tree of 10 m high. Slash wet and whitish. Flowers green, axillary, in pairs.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 287.

Greenwayodendron suaveolens (Engl. & Diels) Verdc.
Ref.: Harris, 2002: 43; Harris & Wortley, 2008: 15.
Synonym: Polyalthia suaveolens Engl. & Diels (Moutsamboté *et al.*, 1994: 280)
Description: Tree 12 m high. Trunk blackish to grey. Slash thin black and thick fibrous yellow layers. Typical smell of Annonaceae. Fruits, berries, green when unripe and black when ripe. 2 Seeds.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 47.

Isolona hexaloba (Pierre) Engl. & Diels
Ref.: Le Thomas, Fl. Gabon **16**, 1969: 355; Moutsamboté *et al.*, 1994: 280; Harris, 2002: 44 (2002); Harris & Wortley, 2008: 16.
Description: Shrub 8 m high. Slash with black layer followed by a fibrous orange layer; stringy bark flaking off. Flowers axillary, solitary or in pairs.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 357.

Monodora angolensis Welw.
Ref.: Verdcourt, F.T.E.A., 1971: 119; Le Thomas, Fl. Gabon **16**, 1969: 346; Moutsamboté *et al.*, 1994: 280; Harris, 2002: 44; Harris & Wortley, 2008: 17.
Description: Tree 12 m high; d.b.h.: 25 cm. Trunk blackish, rough. Slash orange; stringy bark flaking off.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 83.

Monodora myristica (Gaertn.) Dunal
Ref.: Le Thomas, Fl. Gabon **16**, 1969: 342; Harris, 2002: 45; Harris & Wortley, 2008: 17.

Description: Tree 15 m high. Base with small buttress. Trunk blackish. Slash with thin black ring and a fibrous and thick brown layer; stringy bark flaking off; typical smell of Annonaceae. Flowers pendulous, with three colour: white, greenish and yellow, appearing on leafy twing few centimeter before the first leaf of the twig.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 30.

Uvariastrum germainii Boutique
Ref.: Boutique, F.C.B. **2**, 1951: 367; Harris, 2002: 46; Harris & Wortley, 2008: 19.
Description: Shrub to tree 8-20 m high; d.b.h.: 40 cm. Slash red, fibrous; stringy bark flaking off. Flowers axillary, solitary, pendulous, yellow.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 311, 387.

Uvariastrum pierreanum Engl. & Diels
Ref.: Le Thomas, Fl. Gabon **16**, 1969: 292; Moutsamboté *et al.*, 1994: 281; Harris, 2002: 46; Harris & Wortley, 2008: 20.
Description: Tree 15 m high. Trunk ± fluted, blackish. Slash red, fibrous; stringy bark flafing off. Flowers appearing on branches. Flowers woody.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 344.

Uvariopsis solheidii (De Wild.) Robyns & Ghesq.
Ref.: Le Thomas, Fl. Gabon **16**, 1969: 298; Harris, 2002: 46; Harris & Wortley, 2008: 21.
Description: Shrub 2-3 m high; d.b.h.: 1.5 cm. Trunk green with black and white spots, marked with impacts of caducous branches. Slash yellowish; stringy bark flaking off; typical smell of Annonaceae. Flowers occurring on branches; sepals pinkish on the outer side, yellowish and red on the inner side. Fruits, numerous mericarps, brown when unripe and red when ripe. 5 seeds.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 32, 294.

Xylopia hypolampra Mildbr.

Ref.: Moutsamboté *et al.*; 1994: 281; Harris, 2002: 47 (2002); Harris & Wortley, 2008: 24.

Description: Tree 15 m high. Base with buttress. Trunk yellowish. Lamina with shiny silk on the lower surface. Fruits, mericarps with a red mesocarp when ripe.

Habitat: Gilbertiodendron dewevrei forest on terra firma.

Specimen(s): Ndolo Ebika, S.T. 22.

Apocynaceae

Anisopus efulensis (N.E.Br.) Goyder

Ref.: Goyder, 1994: 743.

Description: Twining vine; Sap clear and ± sticky. Fruits, bifollicles, axillary, solitary or in groups of up to 3.

Habitat: Mixed species terra firma forest.

Specimen(s): Ndolo Ebika, S.T. 55.

Cynanchum adalinae (K.Schum.) K.Schum. subsp. ***adalinae***

Ref.: Bullock, F.W.T.A. **2**, 1963: 89.

Description: Twining vine 1 m high. White latex. Inflorescences axillary. Flowers small. Fruits: follicles.

Habitat: Mixed species terra firma forest.

Specimen(s): Ndolo Ebika, S.T. 389.

Funtumia elastica (Preuss) Stapf

Ref.: Moutsamboté *et al.*, 1994: 281; Harris, 2002: 51; Harris & Wortley, 2008: 274.

Description: Tree 15 m high. Trunk greyish to brownish. Slash with white latex oxidising immediately to yellowish. Flowers axillary, white.

Habitat: Mixed species terra firma forest.

Specimen(s): Ndolo Ebika, S.T. 44.

Pleiocarpa pycnantha (K.Schum.) Stapf

Ref.: Huber, F.W.T.A. **2**, 1963: 63; Harris, 2002: 53; Harris & Wortley, 2008: 276.

Description: Shrub 4-6 m high, d.b.h.: 13 cm. Slash whitish to yellowish with orange fibres, oxidising to orangeish; white latex. Fruits, berries, axillary.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 338, 418.

Rauvolfia mannii Stapf
Ref.: Moutsamboté *et al.*, 1994: 281; Harris, 2002: 53.
Description: Shrub 60 cm high. Infrutescences terminal. Fruits, heart-shaped bifollicles, green when unripe and red when ripe.
Habitat: Wet place.
Specimen(s): Ndolo Ebika, S.T. 50.

Tabernaemontana crassa Benth.
Ref.: Moutsamboté *et al.*, 1994: 281; Harris, 2002: 54; Harris & Wortley, 2008: 277.
Description: Tree 10 m high. Trunk and slash yellow, white latex. Inflorescences terminal. Flowers with a white tubular corolla up to 8.5 cm de long.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 324.

Tabernaemontana penduliflora K.Schum.
Ref.: Huber, F.W.T.A. **2**, 1963: 65; Moutsamboté *et al.*, 1994: 281; Harris, 2002: 54; Harris & Wortley, 2008: 278.
Description: Shrub 6 m high; d.b.h.: 9 cm. Slash orange, white latex. Flowers axillary, with a white corolla up to 9 mm long.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 420.

Tabernanthe iboga Baill.
Ref.: Moutsamboté *et al.*, 1994: 281; Harris, 2002: 55.
Description: Shrub 90 cm high. White latex. Inflorescences axillary, pendulous. Fruits, berries, green when unripe and yellow orangeish when ripe.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 319.

Araceae

Cercestis kamerunianus (Engl.) N.E.Br.
Ref.: Hepper, F.W.T.A. **3**, 1968: 127.
Description: Creeping herb, hairy. Spadix green, in pairs at the end of the t wig.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 26.

Culcasia tenuifolia Engl.
Ref.: Ntépé-Nyame, Fl. Cam. **31**, 1988: 90; Harris, 2002: 221.
Description: Creeping liana with stud roots. Infructescences axillary, in pairs. Fruits, drupes, red when ripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 397.

Balsaminaceae

Impatiens hians Hook.f.
Ref.: Hutchinson & Dalziel, F.W.T.A. **1**, 1954: 162; Hallé, Fl. Gabon **4**, 1962: 19.
Description: Herb 2 m high. Inflorescences axillary. Flowers two-coloured: green and red. Fruits: capsules.
Habitat: Wet place.
Specimen(s): Ndolo Ebika, S.T. 242.

Begoniaceae

Begonia mannii Hook.
Ref.: Hutchinson & Dalziel, F.W.T.A. **1**, 1954: 220; Wilde, 2002: 162.
Description: Creeping herb. Stem redish and fleshy. Lamina two-coloured: green above and ± silver below. Male flowers and female flowers white, axillary. Fruits red.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 194.

Cannabaceae

Celtis adolfi-friderici Engl.
Ref.: Moutsamboté *et al.*, 1994: 287; Harris, 2002: 209; Harris & Wortley, 2008: 70.
Description: Tree 15 m high. Base with small buttress. Trunk rough. Slash white with brown fibres. Inflorescences axillary to terminal. Flowers very small, flower buds yellowish. Fruits scabrous, green, 1-seeded.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 247.

Celtis mildbraedii Engl.
Ref.: Moutsamboté *et al.*, 1994: 287; Harris, 2002: 209; Harris & Wortley, 2008: 70.
Description: Tree 15 m high. Base with buttress. Trunk surface with numerous concave marks. Slash yellow with red dots. Leaves alternate. Fruits smooth and glabrous, indehiscent, green, 1-seeded.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 233.

Celtis zenkeri Engl.
Ref.: Moutsamboté *et al.*, 1994: 287; Harris, 2002: 210; Harris & Wortley, 2008: 72.
Description: Tree 20 m high. Base with buttress. Trunk irregular, brown, flaking off, with numerous and small pustules. Slash yellow with orange fibers, oxidising to orange.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 340.

Capparaceae

Ritchiea aprevaliana (De Wild. & T.Durand) Wilczek
Ref.: Kers, Fl. Cam. **29**, 1986: 96; Harris, 2002: 61.
Description: Shrub 2 m high. Leaves whorled. Inflorescences axillary to terminal. Flowers actinomorphic, white or purple.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 298.

Celastraceae

Cuervea macrophylla (Vahl) Wilczek ex N. Hallé
Ref.: Hallé, Fl. Cam. **32**, 1990: 184; Harris, 2002: 63.
Description: Liana. Stem branched. Slash pink. Inflorescences, cymose, axillary. Flowers white.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 53.

Loeseneriella clematoides (Loes.) Wilczek ex N.Hallé
Ref.: Hallé, Fl. Cam. **32**, 1990: 196; Harris, 2002: 64.
Description: Liana. Leafy twigs reddish, bark granulous. Leaves simple, toothed, opposite, exstipulate. Infructescences axillary. Fruits dehiscents with 3 flattened and lanceolate mericarps. Seeds winged, with a long cotyledon exceeding the middle of the seed in lenght.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 282.

Salacia zenkeri Loes.
Ref.: Hallé, Fl. Cam. **32**, 1990: 32.
Description: Liana. Leafy twigs opposite. Flowers ± plastic, axillary, brown and ± flattened. Fruits, berries, subglobose (2 cm in diameter), axillary, pedonculate (peduncle 3 cm long); perianth persistent, with 6 parts.
Habitat: Alongside stream.
Specimen(s): Ndolo Ebika, S.T. 42, 76.

Clusiaceae

Allanblackia floribunda Oliv.
Ref.: Moutsamboté *et al.*, 1994: 283; Harris, 2002: 96; Harris & Wortley, 2008: 131.
Description: Tree 12 m high. Slash with a thiny red layer followed by a thick yellow layer oxidising to red; yellow latex. Leaves opposite. Fruits, berries, axillary, solitary, ellipsoïd (21 x 10 cm), brown.

Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 295.

Garcinia kola Heckel
Ref.: Moutsamboté *et al.*, 1994: 283; Harris, 2002: 97; Harris & Wortley, 2008: 132.
Description: Tree 15 m high; d.b.h.: 66 cm. Branches arranged like spokes in a wheel. Leaves opposite, yellow latex. Fruits, berries, green when unripe and red when ripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 77.

Garcinia smeathmannii (Planch. & Triana) Oliv.
Ref.: Harris, 2002: 98; Harris & Wortley, 2008: 134.
Description: Shrub; d.b.h.: 8 cm. Branches arranged like spokes in a wheel. Leaves opposite, junction of petioles on the twig V-shaped; yellow latex.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 79.

Commelinaceae

Aneilema beniniense (P.Beauv.) Kunth
Ref.: Brenan, F.W.T.A. **3**, 1968: 31; Harris, 2002: 222.
Description: Herb 1 m high. Stem with nodes, branched. Inflorescences terminal, in pairs. Flowers white.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 396.

Commelina capitata Benth.
Ref.: Brenan, F.W.T.A. **3**, 1968: 47; Harris, 2002: 223.
Description: Herb 1 m high. Stem erect, branched. Inflorescences terminal. Flowers in spathe. Fruits white.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 250.

Palisota thollonii Hua

Ref.: Harris, 2002: 224; Breuer-Ndoundou Hockemba, 2009: 37.

Description: Liana 5 m high. Infructescences terminal. Fruits, berries, purple.

Habitat: Mixed species terra firma forest.

Specimen(s): Ndolo Ebika, S.T. 384.

Polyspatha paniculata Benth.

Ref.: Brenan, F.W.T.A. **3**, 1968: 42; Harris, 2002: 225.

Description: Herb 40 cm high. Inflorescences terminal, solitary or in threes. Flowers in spathes, reddish.

Habitat: Mixed species terra firma forest.

Specimen(s): Ndolo Ebika, S.T. 248.

Stanfieldiella sp.

Description: Creeping and erect herb, 40 cm high. Stem purple red. Inflorescences terminal. Flowers white.

Habitat: Gilbertiodendron dewevrei forest on terra firma.

Specimen(s): Ndolo Ebika, S.T. 132.

Connaraceae

Agelaea paradoxa Gilg var. ***microcarpa*** Jongkind

Ref.: Breteler et al., Fl. Gabon **33**, 1992: 32; Harris, 2002: 70.

Description: Climbing or twining liana, 2 m high. Slash red, stringy bark flaking off. Leaves compound trifoliolate, exstipulate, glabrous. Inflorescences axillary. Flowers small, green. Infructescences solitary or in pairs. Fruits, ± spiny follicles, red when ripe.

Habitat: Mixed species terra firma forest.

Specimen(s): Ndolo Ebika, S.T. 266.

Agelaea poggeana Gilg

Ref.: Breteler *et al.*, Fl. Gabon **33**, 1992: 38; Harris, 2002: 71.

Description: Liana 6 m high. Leaves compund trifoliate, exstipulate, pubescent. Inflorescences pubescent, axillary, solitary or in pairs. Fruits, bifollicles, pubescent, red

when ripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 353.

Cnestis ferruginea Vahl ex DC.
Ref.: Breteler *et al.*, Fl. Gabon **33**, 1992: 50; Moutsamboté et al., 1994: 282; Harris, 2002: 71.
Description: Climbing liana; tendrils derived from some modified twigs. Leaves pinnate compound, pubescent. Lamina of the leaflets two-coloured: green above and silvery below.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 288.

Rourea obliquifoliolata Gilg
Ref.: Hepper, F.W.T.A. **1**, 1958: 740; Harris, 2002: 73.
Synonym: Roureopsis obliquifoliolata (Gilg) Schellenb. (Moutsamboté *et al.*, 1994: 282).
Description: Climbing liana; tendrils derived from some modified twings. Leaves pinnate compound, glabrous. Inflorescences terminal.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 241.

Cucurbitaceae

Coccinia barteri (Hook.f.) Keay
Ref.: Hutchinson & Dalziel, F.W.T.A. **1**, 1954: 215; Harris, 2002: 75.
Description: Vine climbing to height of 10 m; tendrils branched, lateral. Flowers pale yellow, densely pubescent on the inner surface, glabrous on the outer. Fruits, berries, green with whitish spots when unripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 401.

Cognauxia podoleana Baill.
Ref.: Keraudren, Fl. Cam. **6**, 1967: 95; Moutsamboté *et al.*, 1994: 282.

Description: Climbing vine; tendrils lateral. Flowers showy, yellow.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 236.

Dichapetalaceae

Dichapetalum congoense Engl. & Ruhland
Ref.: Breteler, Fl. Gabon **32**, 1991: 72.
Description: Lianescent shrub. Inflorescences axillary. Fruits green when unripe and yellow when ripe, 1-seeded. Leaves dry shiny red above.
Habitat: Swamp.
Specimen(s): Ndolo Ebika, S.T. 135.

Tapura fischeri Engl.
Ref.: Breteler, Fl. Gabon **32**, 1991: 206.
Description: Shrub 5 m high. Trunk greenish. Slash yellowish. Inflorescences either axillary or on the petiole. Flowers very small, sepals white, petals yellow.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 335.

Ebenaceae

Diospyros bipindensis Gürke
Ref.: Harris, 2002: 78; Harris & Wortley, 2008: 228.
Description: Shrub 5 m high. Trunk green. slash with black and yellow rings. Fruits, whithish drupes enclosed inside a green and persistent calyx, solitary, axillary.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 46.

Diospyros canaliculata De Wild.
Ref.: Harris, 2002: 78; Harris & Wortley, 2008: 228.
Description: Shrub 6 m high. Trunk green. Slash with black and yellow rings and white wood oxidising to yellow. Cauliflorous plant. Flowers whitish. Fruits enclosed into a red calyx.

Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 18A, 18B.

Diospyros crassiflora Hiern
Ref.: Moutsamboté *et al.*, 1994: 282; Harris, 2002: 78; Harris & Wortley, 2008: 229.
Description: Tree 12 m high. Trunk black. Bark flaking off in plates. Fruits occurring on branches. Fruits, berries, in groups of more than 4 on the branches, pink with black spots when ripe, mesocarp white and fleshy. 8-10 seeds surrounded by a ± plastic aril.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 85.

Diospyros mannii Hiern
Ref.: Harris, 2002: 79; Harris & Wortley, 2008: 231.
Description: Tree 12 m high. Slash with black, ± fibrous orange and yellow rings. Lamina two-coloured: green above and silvery below.Flowers on branches.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 323.

Diospyros monbuttensis Gürke
Ref.: Letouzey & White, Fl. Gabon **18**, 1970: 115; Harris & Wortley, 2008: 232.
Description: Shrub 5 m high. Slash pale yellow. Leafy twigs with lenticels. Inflorescences subaxillary (about 1 mm from the leaf axils), pubescent, pedunculate. 7 flowers at the end of the peduncle; flowers buds ellipsoid, pubescent.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 361.

Euphorbiaceae

Crotonogyne poggei Pax
Ref.: Léonard, F.C.R.B. **8** , 1962: 178; Harris, 2002: 83.
Description: Shrub 3 m high. Slash whitish; sap clear, sticky then oxidising to red. Leaves simples, entire, spirally arranged; stipules persistent. Lamina elliptic to oblanceolate with 2 prominent glands at the base on the upper surface. Inflorescences

axillary.
Habitat: Seasonally flooded *Gilbertiodendron dewevrei* forest.
Specimen(s): Ndolo Ebika, S.T. 199.

Dichostemma glaucescens Pierre
Ref.: Harris, 2002: 83; Harris & Wortley, 2008: 96.
Description: Shrub 6 m high. Slash with a thin red layer followed by a thick white layer; white latex. Inflorescences terminal.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 352.

Macaranga monandra Müll.Arg.
Ref.: Harris, 2002: 88; Harris & Wortley, 2008: 99.
Description: Tree 15 m high. Slash ± wet, yellowish oxidisind to brown. Leaves coarsely toothed; petiole covered by duvets; lamina triangular to lanceolate, with 2 glandular spots (not prominent) at the base, base faintly cordate. No black spots on the lower surface of the lamina. Inflorescences axillary, solitary.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 320.

Mallotus oppositifolius (Geiseler) Müll.Arg.
Ref.: Letouzey, 1982b: 165; Harris, 2002: 88; Harris & Wortley, 2008: 100.
Description: Shrub 5 m high; d.b.h.: 5 cm. Trunk greyish, stringy bark flaking off. Leaves simple, toothed, opposite; interpetiolar stipules persistent to caducous. Lamina cordiform with small lemon-green glands in the crests of the margin. Inflorescences axillary. Fruits 3-lobed.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 126.

Huaceae

Afrostyrax lepidophyllus Mildbr.
Ref.: Moutsamboté *et al.*, 1994: 287; Harris, 2002: 99; Harris & Wortley, 2008: 88.

Description: Tree 24 m high; d.b.h.: 40 cm. Trunk green, scaly. Slash with garlic smell and successive layers: white, spongy and rusty external layer; internal layer yellow, fibrous and thick. Fruits, capsules, axillary. 1 seed per fruit totally enclosed by a white fleshy aril and with garlic smell.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 81.

Ixonanthaceae

Phyllocosmus africanus (Hook.f.) Klotzsch
Ref.: Badré, Fl. Cam. **14**, 1972: 62; Harris, 2002: 102; Harris & Wortley, 2008: 130.
Description: Tree 15 m high; d.b.h.: 40 cm. Base with small buttress. Slash with red and ± fibrous yellow layers. Lamina coriaceous, asymetric or elliptic, ± shiny on both surfaces; margin toothed, apex often ended by a 2-toothed acumen. Infructescences axillary. Fruits, capsules, in pairs.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 392.

Lamiaceae

Vitex sp.1
Description: Tree 10 m high. Base and trunk fluted, twisted. Leafy twigs square-shaped. Leaves compound digitate, opposite, pubescence yellow; 5-6 leaflets mucronate at the tip. Inflorescences axillary. Flowers purple.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 334.

Lecythidaceae

Napoleonaea septentrionalis Liben
Ref.: Liben, F.C.R.B., 1971: 6.
Description: Shrub 1 m high. Stem with a rythmic growth. Leaves elliptic, oblong or oblanceolate, up to 20 cm long. Fruits sessile, yellow.

Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 104.

Petersianthus macrocarpum (P.Beauv.) Liben
Ref.: Harris, 2002: 104; Harris & Wortley, 2008: 216.
Synonym: Combretum macrocarpum P.Beauv. (Moutsamboté *et al.*, 1994: 283)
Description: Tree 25 m high; d.b.h.: 60 cm. Trunk brownish. Leaves spirally arranged at the end of the twigs; lamina broadly elliptic, crenate, domatia in the lateral veins axils on the lower surface of the lamina but prominent on the upper surface. Inflorescences terminal. Flowers hook-like. Fruits: 4-winged samara, each wing 5 cm long and 2.5 cm broad.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 100.

Leguminosae-Caesalpinioideae

Dialium zenkeri Harms
Ref.: Harris, 2002: 108; Harris & Wortley, 2008: 45.
Description: Tree 15 m high; d.b.h.: 45 cm. Base with buttress. Slash with a thick orangeish layer oxidizind to red and a red layer; red latex. Lamina two-coloured: green above and yellowish to grey below; lamina revolute at the base of the lower surface. Inflorescences axillary. Fruits covered by a black carpet.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 193

Dialium tessmannii Harms
Ref.: Moutsamboté *et al.*, 1994: 281; Harris, 2002: 108; Harris & Wortley, 2008: 44.
Description: Tree 30 m high. Base irregular. Slash reddish oxidising to dark red; red latex. Leaves pinnate compound, imparipinnate, pubescent; 13 leaflets arranged into 6 pairs opposite and 1 leaflet terminal, subsessile. Inflorescences axillary, solitary or in pairs. Fruits covered by a black carpet.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 200.

Erythrophleum suaveolens (Guill. & Perr.) Brenan
Ref.: Brenan, F.T.E.A., 1967: 18; Harris & Wortley, 2008: 45.
Description: Tree 25 m high. Base with buttress. Trunk with green, grey and brown spots. Inflorescences longitudinal, axillary. Fruits: legume.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 23.

Gilbertiodendron dewevrei (De Wild.) J.Léonard
Ref.: Moutsamboté *et al.*, 1994: 282; Harris, 2002: 108; Harris & Wortley, 2008: 46.
Description: Tree 20 m high. Inflorescences axillary. Flowers with 2 greenish to yellowish bracts; sepals milky white; standard inside of the other perianth parts, red.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 25.

Stemonocoleus micranthus Harms
Ref.: Harris, 2002: 109; Harris & Wortley, 2008: 48.
Description: Tree 25 m high; d.b.h.: 120 cm. Slash with a thick red fibrous layer, wet. Leaves spirally arranged. Fruits papery, twisted, 1-seeded in the middle.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 414.

Tessmannia africana Harms
Ref.: Harris, 2002: 110; Harris & Wortley, 2008: 49.
Description: Tree 20 m high. Slash brown, 5 cm thick. Fruits, legume, green, flattened, with spines releasing a translucent yellow sap with typical Burseraceae smell.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 15.

Leguminosae-Mimosoideae

Albizzia ferruginea (Guill. & Perr.) Benth.
Ref.: Moutsamboté *et al.*, 1994: 284; Harris, 2002: 111; Harris & Wortley, 2008: 51.
Description: Tree 25 m high. Slash ± soft, orange, sap whitish. Leaves alternes. Flowers

with milky white petals and stamens.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 238.

Leguminosae-Papillionoideae

Angylocalyx pynaertii De Wild.
Ref.: Moutsamboté *et al.*, 1994: 285; Harris, 2002: 115; Harris & Wortley, 2008: 58.
Description: Tree 25 m high. Slash yellow. Leaves alternate. Cauliflorous.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 331.

Dalhousiea africana S.Moore
Ref.: Harris, 2002: 118.
Description: Liana. Leaves unifoliolate; stipules auricular, persistent. Fruits: woody legume.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 109.

Millettia vermoesenii De Wild.
Ref.: Harris, 2002: 122.
Description: Twining liana with yellow pubescence. Inflorescences terminal. Flowers with blackish standard on the outer surface and reddish on the inner. Fruits: legume green.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 322.

Ormocarpum sennoides (Willd.) DC. subsp. ***hispidum*** (Willd.) Brenan
Ref.: Léonard, F.C.B. **5**, 1954: 244; Harris, 2002: 122.
Description: Shrub 2 m high. Slash greenish. Infrutescences axillary. Fruits, elongatated and lobed legume, in threes, pendulous.
Habitat: Seasonally flooded *Gilbertiodendron dewevrei* forest.
Specimen(s): Ndolo Ebika, S.T. 289.

Ostryocarpus riparius Hook.f.

Ref.: Hauman, F.C.B. **6**, 1954: 13.

Description: Lianescent shrub. Infrutescences axillary. Fruits: legume.

Habitat: Swamp.

Specimen(s): Ndolo Ebika, S.T. 137.

Pterocarpus soyauxii Taub.

Ref.: Moutsamboté *et al.*, 1994: 285; Harris, 2002: 123; Harris & Wortley, 2008: 66.

Description: Tree 25 m high. Base with buttress. Slash with red latex. Leaves pinnate compound, alternate, stipulate. Fruits: ± circular, flattened and waved samara.

Habitat: Mixed species terra firma forest.

Specimen(s): Ndolo Ebika, S.T. 86.

Lepidobotryaceae

Lepidobotrys staudtii Engl.

Ref.: Badré, Fl. Cam. **14**, 1972: 44; Harris, 2002: 125; Harris & Wortley, 2008: 87.

Description: Shrub 8 m high. Trunk reddish, scaly. Slash pinkish. Leaves unifoliolate, alternate; stipules caducous. Petiole swollen at both ends. Fruits ellipsoid, lateral.

Habitat: Mixed species terra firma forest.

Specimen(s): Ndolo Ebika, S.T. 348.

Loganiaceae

Strychnos dale De Wild.

Ref.: Leeuwenberg, Fl. Gabon **19**, 1972: 75.

Description: Liana 10 m high; hooks not branched. Inflorescences axillary, solitary. Flowers with yellowish sepals.

Habitat: Mixed species terra firma forest.

Specimen(s): Ndolo Ebika, S.T. 300.

Strychnos longicaudata Gilg

Ref.: Leeuwenberg, Fl. Gabon **19**, 1972: 92; Harris, 2002: 127.

Description: Climbing liana; hooks and inflorescences axillary.

Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 330.

Malvaceae

Ceiba pentandra (L.) Gaertn.
Ref.: Robyns, F.C.R.B. **10**, 1963: 203; Harris, 2002: 59; Harris & Wortley, 2008: 194.
Description: Tree 35 m high. Base with buttress. Trunk greyish, spines persistent or caducous, with pustules. Slash yellowish oxidising to orangeish.Inflorescences sessile, gathered at the end of twigs.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 302.

Clappertonia ficifolia (Willd.) Decne.
Ref.: Wilczek, F.C.R.B. **10**, 1963: 78; Harris, 2002: 206.
Description: Shrub 2 m high. Leaves simple, lobed. Inflorescences axillary. Flowers purple. Fruits: capsules.
Habitat: Cyperaceae dominated meadows along stream "Baï".
Specimen(s): Ndolo Ebika, S.T. 394.

Cola altissima Engl.
Ref.: Germain, F.C.R.B. **10**, 1963: 285; Hallé; Fl. Gabon **2**, 1961: 63; Harris: 203 (2002); Harris & Wortley, 2008: 196.
Description: Tree 15 m high. Leaves spirally arranged at the end of twigs. Flowers axillary.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 313.

Cola chlamydantha K.Schum.
Ref.: Harris, 2002: 202; Harris & Wortley, 2008: 197.
Description: Palm-like shrub 8 m high. Trunk grey with bumps when fertile. Cauliflorous plant. Flowers with fleshy sepals, brilliant red on the outer surface and pink on the inner surface, releasing a sticky liquid when broken up.

Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 40.

Cola urceolata K.Schum.
Ref.: Germain, F.C.R.B. **10**, 1963: 293; Hallé; Fl. Gabon **2**, 1961: 54; Harris, 2002: 203.
Description: Shrub 2 m high. Flowers axillary.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 307.

Desplatsia chrysochlamys (Mildbr. & Burret) & Mildbr. & Burret
Ref.: Hutchinson & Dalziel, F.W.T.A. **1**, 1958: 307; Wilczek, F.C.R.B. **10**, 1963: 41; Whitehouse *et al.*, F.T.E.A., 2001: 64; Harris, 2002: 206; Harris & Wortley, 2008: 198.
Description: Shrub 5 m high. Slash fibrous, whitish, oxidising to orange. Inflorescences axillary to terminal. Flowers white.
Habitat: Seasonally flooded forest.
Specimen(s): Ndolo Ebika, S.T. 270.

Grewia pinnatifida Mast.
Ref.: Wilczek, F.C.R.B. **10**, 1963: 10; Harris, 2002: 208; Harris & Wortley, 2008: 203.
Description: Shrub 2 m high. Slash red. Infructescences terminal. Fruits, drupes, with a juicy, fibrous and spongious mesocarp. 1 seed per fruit.
Habitat: Seasonally flooded *Gilbertiodendron dewevrei* forest.
Specimen(s): Ndolo Ebika, S.T. 284.

Hibiscus surattensis L.
Ref.: Hutchinson & Dalziel, F.W.T.A. **1**, 1958: 346; Hauman, F.C.R.B. **10**, 1963: 121; Harris, 2002: 131; Verdcourt & Mwachala, F.T.E.A., 2009: 38.
Description: Creeping and erect herb, 40 cm high. Stem greenish, spiny. Inflorescences axillary.
Habitat: Cyperaceae dominated meadows along stream "Baï".
Specimen(s): Ndolo Ebika, S.T. 393.

Leptonychia multiflora K.Schum.
Ref.: Germain, F.C.R.B. **10**, 1963: 234; Hutchinson & Dalziel, F.W.T.A. **1**, 1958: 316.
Description: Shrub 2-3 m high. Slash whitish oxidising to red. Inflorescences axillary, in threes. Flowers: sepals green on the outer surface and milky white on the inner; petals white, much reduced. Fruits, capsules, green.
Habitat: Forest alongside stream and Seasonally flooded *Gilbertiodendron dewevrei* forest.
Specimen(s): Ndolo Ebika, S.T. 280, 413.

Pterygota bequaertii De Wild.
Ref.: Germain, F.C.R.B. **10**, 1963: 264; Harris, 2002: 204; Harris & Wortley, 2008: 205.
Description: Tree 20 m high. Base with buttress. Trunk greyish with a longitudinal crests network. Leaves in spirals. Fruits, follicles, "duck's head" shaped.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 279.

Sida rhombifolia L.
Ref.: Hauman, F.C.R.B. **10**, 1963: 172; Harris, 2002: 131; Verdcourt & Mwachala, F.T.E.A., 2009: 157.
Description: Shrub 2 m high. Slash greenish; stringy bark flaking off. Flowers solitary, axillary. Fruits: schizocarps with 12 mericarps.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 274.

Sterculia oblonga Mast.
Ref.: Harris, 2002: 204; Harris & Wortley, 2008: 206.
Description: Tree 20 m high. Base with buttress. Bark flaking off in ± rectangular plates. Slash whitish. Leaves alternate to spirally arranged. Inflorescences axillary. Flowers small, yellow.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 230.

Marantaceae

Ataenidia conferta (Benth.) Milne-Redh.
Ref.: Letouzey, 1982b: 389; Breuer-Ndoundou Hockemba, 2009: 30.
Description: Rhizomatous herb. Inflorescence red, basket-shaped, occurring on the petiole.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 129.

Halopegia azurea (K.Schum.) K.Schum.
Ref.: Letouzey, 1982b: 389; Breuer-Ndoundou Hockemba, 2009: 31.
Description: Rhizomatous herb, stemless, without nodes, 1 m high. Flowers blue occurring in the middle of the leaves bunch.
Habitat: Wet place.
Specimen(s): Ndolo Ebika, S.T. 48.

Hypselodelphys scandes Louis & Mullend.
Ref.: Harris, 2002: 233; Breuer-Ndoundou Hockemba, 2009: 28.
Description: Rhizomatous, lianescent and ± "woody below" herb. Aerial stem branched, with nodes and lenticelles. Fruits spiny, whitish when unripe.
Habitat: Swamp.
Specimen(s): Ndolo Ebika, S.T. 74.

Marantochloa filipes (Benth.) Hutch.
Ref.: Moutsamboté *et al.*, 1994: 288; Harris, 2002: 233; Breuer-Ndoundou Hockemba, 2009: 26.
Description: Rhizomatous herb, stem 2 m high. Inflorescences at the nodes, opposite to the leaf. Flowers and fruits red. 2 seeds per fruit with red aril.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 292.

Marantochloa purpurea (Ridley) M.-Redh.
Ref.: Letouzey, 1982b: 388; Breuer-Ndoundou Hockemba, 2009: 26.

Description: Rhizomatous herb, stem branched, with nodes, 2 m high. Lamina two-coloured: green above and silvery with one greenish band below. Inflorescences axillary and at the base of the sheath of the terminal leaf. Flowers whitish. Fruits, berries, red when ripe. 3 seeds per fruit.
Habitat: Wet place.
Specimen(s): Ndolo Ebika, S.T. 49.

Sarcophrynium schweinfurthianum (Kuntze) Milne-Redh.
Ref.: Breuer-Ndoundou Hockemba, 2009: 34.
Description: Herb. Fruits globose, red, indehiscent.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 106.

Melastomataceae

Dissotis hensii Cogn.
Ref.: Jacques-Félix, Fl. Gabon **25**, 1983: 12; Jacques-Félix, Fl. Cam. **24**, 1983: 19; Moutsamboté *et al.*, 1994: 284; Harris, 2002: 132.
Description: Shrub 1 m high. Inflorescences terminal. Flowers pink.
Habitat: Seasonally flooded forest.
Specimen(s): Ndolo Ebika, S.T. 404.

Ochthocharis dicellandroides (Gilg) C.Hansen & Wickens
Ref.: Jacques-Félix, Fl. Gabon **25**, 1983: 108; Jacques-Félix, Fl. Cam. **24**, 1983: 118; Harris, 2002: 133.
Description: Shrub 80 cm high. Inflorescences terminal. Flowers pink.
Habitat: Cyperaceae and *Alstonia congensis* dominated meadows along stream "Baï".
Specimen(s): Ndolo Ebika, S.T. 290.

Tristemma leiocalyx Cogn.
Ref.: Jacques-Félix, Fl. Gabon **25**, 1983: 46; Jacques-Félix, Fl. Cam. **24**, 1983: 62.
Description: Herb "woody below", 60 cm high. Stem quandrangular, scabrous, sometimes with roots at the nodes. Lamina pale green on the lower surface.

Inflorescences terminal. Flowers pink, in groups of 4. Fruits: berries.
Habitat: Swamp.
Specimen(s): Ndolo Ebika, S.T. 316.

Tristemma mauritianum J.F.Gmel.
Ref.: Jacques-Félix, Fl. Cam. **24**, 1983: 64; Jacques-Félix, Fl. Gabon **25**, 1983: 48; Harris, 2002: 134.
Description: Herb 1 m high. Stem quandrangular, branched. Lamina red on the lower surface. Inflorescences terminal. Fruits, red berries.
Habitat: Swamp.
Specimen(s): Ndolo Ebika, S.T. 412.

Warneckea jasminoides (Gilg) Jacq.-Fél.
Ref.: Jacques-Félix, Fl. Cam. **24**, 1983: 169; Harris, 2002: 134; Harris & Wortley, 2008: 36.
Description: Shrub 2 m high. Trunk green. Flowers purples, axiilary. Fruits, berries, green when unripe and bleu when ripe. 1 black seed.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 51.

Meliaceae

Carapa procera DC.
Ref.: Harris & Wortley, 2008: 180.
Description: Palm-like shrub, 8 m high. Slash pinkish. Leaves pinnate compound, spirally arranged at the end of the stem. Inflorescences pendulous, axillary.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 326.

Entandrophragma angolense (Welw.) C.DC.
Ref.: Letouzey, 1982b: 271; Harris & Wortley, 2008: 180.
Description: Tree 25 m high. Base with buttress. Trunk greyish, with red pustules and irregular cracks. Slash and latex red. Leaves arranged into a bunch at the end of twigs.

Inflorescences axillary. Flowers greenish.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 277.

Lovoa trichilioides Harms
Ref.: Harris & Wortley, 2008: 184.
Description: Tree 30 m high. Base with buttress extending at the ground into snack-like roots. Bark flaking off into plates leaving cracks on the trunk. Slash and latex red. Leaves pinnate compound, in spirals. Rachis with 4 pairs of subopposite leaflets.Infructescences terminal. Fruits, capsules, with 4 lips and a culmella. Seeds winged, 20 per fruits.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 220.

Trichilia rubescens Oliv.
Ref.: Hutchinson & Dalziel, F.W.T.A. **1**, 1958: 704; Harris & Wortley, 2008: 186.
Description: Tree 10 m high. Trunk green with grey and brown spots. Slash with a thick red or pink layer oxidising to orange when pink. Inflorescences just above the leaf axils. Flowers actinomorphic. Infructescences axillary. Fruits, capsules, 3-lobed, pale green when unripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 45, 350.

Menispermaceae

Penianthus longifolius Miers
Ref.: Troupin, F.C.B. **2**, 1951: 253; Harris, 2002: 139.
Description: Shrub 80 cm high. Infructescences axillary. Fruits, ovoid berries, green when unripe and orange when ripe. 1 seed enclosed in a yellow mucilage.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 82.

Tiliacora sp.1
Description: Liana 8 m high. Slash yellowish. Leaves entire, alternate, exstipulate.

Petiole swollen at both ends. Lamina lanceolate (16.1 x 9.8 cm), coriaceous. Lateral veins prominent on the lower surface of the lamina, 5 pairs including 2 basal. Cauliflorous. Infructescence up to 20 cm long. Drupes asymetrically obvoid, 1.5 cm long and 0.6-0.8 cm broad.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 303.

Tiliacora sp.2
Description: Twining liana. Slash yellow oxidising to orange. Leaves entire, alternate, exstipulate. Petiole swollen at the both ends. Lamina elliptic, oblong to lanceolate(19.3 x 8 cm). Base cuneate, apex acuminate up to 2 cm long. Lateral veins prominemt on the lower surface, 4-5 pairs inclunding 1 thiny basal pair and 1 subbasal, alternating at 1 cm from the base of the lamina. Cauliflorous. Infrutescence branched. Drupes globose (2 cm indiamter), green when unripe and yellow when ripe.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 354.

Moraceae

Antiaris toxicaria Lesch. subsp. ***welwitschii*** (Engl.) C.C.Berg var. ***welwitschii***
Ref.: Harris, 2002: 141; Harris & Wortley, 2008: 73.
Description: Tree 20 m high. Base with buttress. Trunk yellowish and grey, with pustules. Slash yellow; latex white oxidising to yellowish. Leaves alternate. Inflorescences green, solitary, on twigs.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 278.

Dorstenia kameruniana Engl.
Ref.: Berg *et al.*, Fl. Gabon **26**, 1984: 34; Harris, 2002: 141.
Description: Shrub 1 m high. Slash greenish. Inflorescences solitary or in pairs, axillary.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 296.

Dorstenia poinsettifolia Engl. var. ***angusta*** (Engl.) Hijman & C.C.Berg
Ref.: Berg *et al.*, Fl. Gabon **26**, 1984: 84.
Description: Herb "woody below" at the base, creeping then erect, 50 cm high. Stem reddish, swollen at the nodes; latex white. Inflorescences axillary, reddish; bracts reddish and greenish. Flowers whitish, yellowish and greenish.
Habitat: Gilbertiodendron dewevrei forest on terra firma and Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 71, 112.

Dorstenia psilurus Welw.
Ref.: Berg *et al.*, Fl. Gabon **26**, 1984: 77.
Description: Herb 1 m high. Inflorescences solitary, axillary.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 399.

Ficus adolfi-friderici Mildbr.
Ref.: Berg & Wiebes, 1992: 137.
Description: Hemi-epiphyte. Slash red, latex white. Leaves in spirals. Figs axillary, sessiles, yellowish with red spots when ripe. Basal baracts 2; ostiolar bracts absent. Ostiole slit-shaped.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 208.

Ficus ardisioides Warb. subsp. ***ardisioides***
Ref.: Berg & Wiebes, 1992: 141.
Description: Hemi-epiphyte, 8 m high with aerial roots. Slash whitish oxidising to yellow; sap clear then yellow. Figs 2-3 in the leaf axils, yellow with red spots when ripe. Basal bracts 2; ostiolar bracts absent. Ostiole slit-shaped.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 358.

Ficus burretiana Hutch.
Ref.: Berg & Wiebes, 1992: 134.

Description: Hemi-epiphyte becoming a free standing strangler, 25 m high, with buttress. Slash whitish to yellowish, white latex. Leaves in spirals; stipules caducous. Figs axillary, in pairs. Basal and ostiolar bracts absent; Ostiole slit-shaped.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 20, 293.

Ficus craterostoma Warb. ex Mildbr. & Burret
Ref.: Berg *et al.*, Fl. Gabon **26**, 1984: 170.
Description: Hemi-epiphyte, 20 m high. Salsh fibrous, pinkish; latex white. Leaves in spirals; stipules caducous. Figs sessile, axillary, in pairs, green with yellow spots when unripe. Basal bracts 3, ostiolar bracts absent. Ostiole slit-shaped.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 312.

Ficus dryepondtiana De Wild.
Ref.: Berg *et al.*, Fl. Cam. **28**, 1985: 222; Berg & Wiebes, 1992: 163; Harris, 2002: 142.
Description: Hemi-epiphyte. Slash yellow with orange fibres. Leaves in spirals; stipules caducous. Figs pedunculate, on spurs on branches, in groups of up to at least 4, yellow with red spots when ripe. Basal bracts caducous, ostiolar bracts absent. Ostiole pore-like shaped.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 360.

Ficus elasticoides De Wild.
Ref.: Hutchinson & Dalziel, F.W.T.A. **1**, 1958: 610; Berg *et al.*, Fl. Cam. **28**, 1985: 202; Berg & Wiebes, 1992: 133; Harris, 2002: 142; Harris & Wortley, 2008: 75.
Description: Hemi-epiphyte becoming a free standing strangler, 25 m high. Base with small buttress. Trunk greensih to yellowish, latex white oxidising to milky white. Leaves in spirals; stipules caducous. Glandular spot ath the base of the midrib on the lower surface of the lamina. Figs pedunculate, in pairs, axillary, green when unripe and red with yellow dots when ripe. Basal bracts 3, ostiolar bracts absent. Ostiole prominet and slit-shaped.

Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 11, 297.

Ficus kamerunensis Mildbr. & Burret
Ref.: Berg *et al.*, Fl. Gabon **26**, 1984: 165; Harris, 2002: 142; Harris & Wortley, 2008: 76.
Description: Hemi-epiphyte, 12 m high. Slash pink, white latex. Leaves alternates; stipules caducous. Figs sessile, axillary. Basal bracts 2, ostiolar bracts absent. Ostiole slit-shaped.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 345.

Ficus lutea Vahl
Ref.: Berg *et al.*, Fl. Gabon **26**, 1984: 193; Berg & Wiebes, 1992: 99; Harris, 2002: 143; Harris & Wortley, 2008: 77.
Description: Hemi-epiphyte becoming a free standing strangler, 20 m high. Base with snacke-like buttress. Slash whitish to orangeish, white latex. Leaves in spirals, stipules caducous. Figs sessile, axillary, in pairs, green when unripe and yellow when ripe. Basal bracts 4; ostiolar bracts absent.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 308.

Ficus natalensis Hochst. subsp. ***natalensis***
Ref.: Berg & Wiebes, 1992: 121.
Description: Hemi-epiphyte, 25 m high. Slash pink, white and sticky latex. Leaves alternate to spirally arranged; stipules caducous. Figs pedunculate, axillary and on twigs, numerous. Basal bracts 3 and soon caducous; ostiolar bracts absent. Ostiole slit-shaped.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 80, 285.

Ficus polita Vahl subsp. ***polita***
Ref.: Berg & Wiebes, 1992: 159; Harris, 2002: 144; Harris & Wortley, 2008: 79.
Description: Hemi-epiphyte becoming a tree 20 m high. Base with buttress. Trunk yellow

with thiny scars and numerous reddish pustules. Slash and latex white. Leaves in spirals; stipules caducous. Figs pedunculate, on spurs on the trunk and branches, surface crack-like with greenish spots. Basal bracts 2; ostiolar bracts absent. Ostiole slit-shaped surrounded by a black wrinkled area.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 105.

Ficus preussii Warb.
Ref.: Berg *et al.*, Fl. Gabon **26**, 1984: 229.
Description: Hemi-epiphyte 10 m high. Slash pink, white latex. Figs sessile, axillary, in pairs, green with yellow dots. Basal bracts 2-3; ostiolar bracts absent. Ostiole slit-shaped.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 325.

Ficus recurvata De Wild.
Ref.: Berg *et al.*, Fl. Gabon **26**, 1984: 158; Berg & Wiebes, 1992: 103; Harris, 2002: 144; Harris & Wortley, 2008: 80.
Description: Hemi-epiphyte becoming a tree 20 m high. Base with small buttress extending at the ground level into snacke-like roots. Slash brownish, white latex. Leaves spirally arranged at the end of the twigs; terminal stipules persistent. Figs pedunculate, axillary, green with pale green dots. Basal bracts 2; ostiolar bracts absent. Ostiole slit-shaped.
Habitat: Mixed species terra firma forest and *Gilbertiodendron dewevrei* forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 13, 17.

Ficus variifolia Warb.
Ref.: Berg *et al.*, Fl. Gabon **26**, 1984: 143; Berg & Wiebes, 1992: 85.
Description: Tree, 25 m high. Base with buttress. Slash yellow, sap clear. Leaves alternate; stipules caducous. Figs pedunculate, axillary, in pairs, brown when unripe and yellowish with greenish dots when ripe. Basal bracts 3; ostiolar bracts 3. Ostiole circular.

Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 309.

Ficus wildemaniana De Wild. & T.Durand
Ref.: Berg *et al.*, Fl. Gabon **26**, 1984: 246; Berg & Wiebes, 1992: 150; Harris, 2002: 145; Harris & Wortley, 2008: 82.
Description: Hemi-epiphyte, 15 m high. Slash pink to reddish; white latex oxidising immediately to clear yellow. Leaves in spirals. Figs sessile, axillary, solitary or in pairs, green with red spots. Basal bracts 2, black; ostiolar bracts absent. Ostiole pore-like.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 12, 14.

Milicia excelsa (Welw.) C.C.Berg
Ref.: Harris, 2002: 145; Harris & Wortley, 2008: 83.
Description: Tree 30 m high. Trunk with showy yellow pustules. Bark flaking off into plates. Slash fibrous, pinkish to reddish; white wood. Leaves alternate. Male inflorescences caterpillar-like, axillary, green.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 301.

Ochnaceae

Campylospermum elongatum (Oliv.) Tieg.
Ref.: Farron, 1985: 67; Harris, 2002: 148.
Description: Shrub 1 m high. Slash yellow to orange. Leaves spirally arranged at the end of twigs; stipules scaly, persistent to subpersistent. Lamina oblanceolate up to 58 cm long, 13 cm broad, toothed, slightly cordate at the base, apex with a long acumen. Lateral veins curved, up to 40 pairs. Inflorescences axillary, pendulous, up to 60 cm long. Flowers solitary or in groups of up to 3, yellow. Fruits: drupes.
Habitat: Seasonally flooded forest.
Specimen(s): Ndolo Ebika, S.T. 268.

Campylospermum strictum (Tieg.) Farron
Ref.: Farron, F.C.R.B., 1967: 49; Farron, 1985: 71; Harris, 2002: 148.
Description: Shrub 2 m high. Trunk smooth, greyish. Leaves alternate; stipules persistent to caducous. Lamina narrowly elliptic, toothed, rounded at the base. Lateral veins c. 16 pairs. Inflorescences axillary, solitary or in pairs, up to 20 cm long. Flowers yellow. Fruits, 1-2 drupes, red then black when ripe.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 36.

Campylospermum vel sp. aff. glaberrimum (P.Beauv.) Farron
Ref.: Farron, 1985: 71.
Description: Shrub 3 m high. Slash greenish. Leaves alternate; stipules caducous. Lamina oblong to elliptic, up to 21.5 cm long, 6.5 cm broad, toothed, rounded at the base, apiculate at the tip. Lateral veins 10 pairs. Flowers axillary, in pairs, yellow.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 306.

Campylospermum vel sp. aff. squamosum (DC.) Farron
Ref.: Farron, 1985: 71.
Description: Shrub 6 m high. Slash reddish, wet. Leaves alternate; stipules caducous. Lamina narrowly elliptic to oblong, up to 24.2 cm long, 7.4 cm broad, toothed, rounded at the base, acuminate and toothed at the apex. Lateral veins 12 pairs. Inflorescences terminal, up to 11 cm long. Flowers yellow.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 314.

Olacaceae

Aptandra zenkeri Engl.
Ref.: Letouzey, 1982b: 245; Harris & Wortley, 2008: 210.
Description: Shrub 4 m high. Trunk greenish with white spots. Lamina two-coloured: dark green above, ± silvery below. Fruits, black drupes, with an orangeish disc at the base, surrounded by a persistent calyx and expanded in a thick and pink waxy large

collorette up to 8 cm in diameter.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 28.

Heisteria parvifolia Sm.
Ref.: Letouzey, 1982b: 245; Harris & Wortley, 2008: 210.
Description: Shrub 2 m high. Trunk ± smooth, green. Slash with thin brown, greenish and yellow layers. Fruits, drupes, milky white, axillary, surrounded by a milky white to pink 5-part star like perianth.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 29.

Olax gambecola Baill.
Ref.: Villiers, Fl. Gabon **20**, 1973: 111.
Description: Shrub 50 cm high. Fruits, berries, solitary, terminal or axillary, red when ripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 232.

Pandaceae

Microdesmis puberula Hook.f. ex Planch.
Ref.: Harris, 2002: 154; Harris & Wortley, 2008: 90.
Description: Shrub 2 m high. Trunk smooth, green to darkish. Fruits, drupes, axillary, in group of up to 5, green when unripe and orangeish to reddish when ripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 31.

Microdesmis sp.
Description: Shrub 2 m high. Trunk green with white, black and sometimes brown spots. Flowers axillary, in pairs, pink. Fruits, drupes, in groups of up to 3, axillary, green when unripe.

Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 33.

Phyllanthaceae

Antidesma laciniatum Müll.Arg.
Ref.: Harris, 2002: 80; Harris & Wortley, 2008: 107.
Description: Shrub 3 m high. Trunk yellowish, ± smooth. Fruits green when unripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 43.

Bridelia atroviridis Müll.Arg.
Ref.: Harris, 2002: 81; Harris & Wortley, 2008: 108.
Description: Shrub 7 m high. Slash pink on yellow background. Flowers very small, axillary.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 351.

Maesobotrya longipes Hutch.
Ref.: Harris 2002: 88; Harris & Wortley, 2008: 112.
Description: Shrub 5 m high. Trunk and slash yellowish; stringy bark flaking off. Cauliflorous. Inflorescences green then purple.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 321.

Mareya brevipes Pax
Ref.: Harris, 2002: 89; Harris & Wortley, 2008: 101.
Description: Shrub 3 m high. Slash yellowish.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 336.

Phytolaccaceae

Hilleria latifolia (Lam.) H. Walter
Ref.: Polhill, F.T.E.A., 1971: 6; Harris, 2002: 156.
Description: Herb 60 cm high. Inflorescences terminal. Flowers white, solitary. Fruits green.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 291.

Piperaceae

Piper umbrellatum L.
Ref.: Hutchinson & Dalziel, F.W.T.A. **1**, 1954: 84; Moutsamboté *et al.*, 1994: 285; Harris, 2002: 156.
Description: Herb 60 cm high. Inflorescences axillary. Flowers very small, white and numerous.
Habitat: Seasonally flooded *Gilbertiodendron dewevrei* forest.
Specimen(s): Ndolo Ebika, S.T. 403.

Poaceae

Leptaspis zeylanica Nees
Ref.: Letouzey, 1982b: 428; van der Zon, 1992: 41.
Synonym: Leptaspis cochleata Thw. (Koechlin, Fl. Gabon **5**, 1962: 273)
Description: Herb 50 cm high. Inflorescences terminal. Flowers red. Fruits: achenes.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 305.

Polygalaceae

Carpolobia alba G.Don
Ref.: Hutchinson & Dalziel, F.W.T.A. **1**, 1954: 108; Moutsamboté *et al.*, 1994: 285.
Description: Shrub 3 m high. Trunk yellow. Fruits, berries, axillary, solitary or in pairs, orange when ripe.

Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 34.

Putranjivaceae

Drypetes capillipes (Pax) Pax & K.Hoffm.
Ref.: Harris, 2002: 84; Harris & Wortley, 2008: 137.
Description: Shrub 2 m high. Trunk and slash yellowish. Fruits, berries, axillary, solitary, green when unripe and yellow when ripe. 2 green seeds enclosed into a whitish mucilage.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 276.

Drypetes cinnabarina Pax & K.Hoffm.
Ref.: Harris, 2002: 84; Harris & Wortley, 2008: 137.
Description: Shrub 6 m high. Slash orange on a thin pinkish layer. Fruits, berries, axillary, solitary, green when unripe and yellow then red when ripe. 2 seeds.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 201.

Drypetes laciniata (Pax) Hutch.
Ref.: Harris, 2002: 85; Harris & Wortley, 2008: 139.
Description: Shrub 5-7 m high. Branches ± horizontal. Young twigs ± angular and pubescent (red hairs). Slash yellowish oxidising to orange. Flowers gathered together on twigs in ± compact masse. Fruits, berries, covered by a shiny black velvet.
Habitat: Gilbertiodendron dewevrei terra firma and Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 75.

Drypetes occidentalis (Müll.Arg.) Hutch.
Ref.: Harris, 2002: 85; Harris & Wortley, 2008: 140.
Description: Tree 15-20 m high. Base with buttress. Trunk brown to greyish. Slash yellowish with orangeish fibres, oxidising to orange. Fruits, berries, axillary, in pairs, green when unripe and yellow when ripe.

Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 310.

Drypetes polyantha Pax & K.Hoffm.
Ref.: Harris, 2002: 85; Harris & Wortley, 2008: 141.
Description: Shrub 3 m high. Trunk green, smooth with black and grey spots. Flowres on the trunk and on the branches. Fruits, berries, green when unripe and orange when ripe. 2-3 seeds per fruit.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 39.

Drypetes vel sp. aff. principum (Müll.Arg.) Hutch.
Ref.: Harris, 2002: 85; Harris & Wortley, 2008: 142.
Description: Shrub 5 m high. Slash yellow oxidising to orange. Cauliflorous.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 337.

Rhizophoraceae

Anopyxis klaineana (Pierre) Engl.
Ref.: Harris & Wortley, 2008: 91.
Description: Tree 30 m high; d.b.h.: 80 cm. Base with small buttress. Slash with a thin red layer and a thick orange layer wet. Fruits sessile, globose.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 131.

Ruscaceae

Dracaena phrynioides Hook.
Ref.: Boss, 1984: 97.
Description: Rhizomatous herb 20 cm high. Short rhizome court, with leaves arranged in bunch at the groung level. Leaves with long petiole (20 cm), lamina coriace, variegated or not. Lateral veins 3 pairs, parallel confluent. Infrutescences terminal, pedunculate (peduncle 3 cm de long). Fruits globose, sessile and grouped at the end of the peduncle,

red when ripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 246.

Salicaceae

Casearia barteri Mast.
Ref.: Breteler, 2008: 103; Harris & Wortley, 2008: 153.
Description: Tree 12 m high; d.b.h.: 30 cm. Base with small buttress. Trunk yellowish, rough, with numerous red pustules. Slash orange with red fibres oxidising to red. Fruits, capsules, axillary, subsessile, green when unripe, yellow when ripe, dehiscent by 3-parts. Seeds numerous, small, surrounded by a red and ± filamentous aril.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 84.

Sapindaceae

Chytranthus carneus Radlk.
Ref.: Fouilly & Hallé, Fl. Cam. **16**, 1973: 94; Harris & Wortley, 2008: 167.
Description: Palm-like shrub 6 m high. Base simple becoming bumped when fertile. Trunk green with black, grey and yellow spots. Leaves in spirals. Inflorescences at the base of the trunk, red. Flowers in group of up to 5, 5 red sepals, 5 pink petals. Fruits, berries, red when ripe, 3-lobed, mesocarp juicy. 1seed with two remains of the abvorted others.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 16.

Chytranthus macrobotrys (Gilg) Exell & Mendonça
Ref.: Fouilly & Hallé, Fl. Cam. **16**, 1973: 111; Harris, 2002: 190; Harris & Wortley, 2008: 168.
Description: Palm-like shrub 4-8 m high; d.b.h.: 5-8 cm. Trunk greenish with grey spots. Slash with red and yellow layers on white wood. Cauliflorous. Inflorescences, spike, with reddish flowers. Infructescences at 40 cm above the ground level. Fruits ribbed, green but

covered by a thin grey film when unripe.
Habitat: Gilbertiodendron dewevrei terra firma and Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 67, 70.

Chytranthus mortehanii (De Wild.) De Voldere ex Hauman
Ref.: Fouilly & Hallé, Fl. Cam. **16**, 1973: 96; Harris, 2002: 191; Harris & Wortley, 2008: 168.
Description: Palm-like shrub 2 m high. Slash whitish. Cauliflorous. Flowers with red stamens.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 202.

Eriocoelum microspermum Gilg ex Radlk.
Ref.: Harris, 2002: 192; Harris & Wortley, 2008: 171.
Description: Lianescent shrub 6 m high. Trunk greyish. Slash reddish. Inflorescences terminal and/ or axillary. Flowers with white petals, purple stamens. Fruits 3-lobed, brownish.
Habitat: Swamp.
Specimen(s): Ndolo Ebika, S.T. 134, 234.

Lecaniodiscus cupanioides Planch.
Ref.: Fouilly & Hallé, Fl. Cam. **16**, 1973: 143; Harris, 2002: 192; Harris & Wortley, 2008: 173.
Description: Tree 15 m high. Base with buttress. Slash red. Infructescences axillary. Fruits indehiscent, covered by a greenish to brownish duvets when unripe and yellow when ripe. 1 seed per fruit.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 359.

Majidea fosteri (Sprague) Radlk.
Ref.: Fouilly & Hallé, Fl. Cam. **16**, 1973: 195; Harris, 2002: 193; Harris & Wortley, 2008: 175.
Description: Tree 20 m high. Slash yellow. Leaves alternate. Fruits, capsules 3-lobed, red

inside.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 332.

Pancovia harmsiana Gilg
Ref.: Fouilly & Hallé, Fl. Cam. **16**, 1973: 116; Harris, 2002: 193.
Description: Shrub 5 m high. Trunk rough, greyish, blackish. Slash with a thin reddish ring and thick brownish ring on white wood. Leaflets 4 (6) pairs, subsessile. Flowers axillary, white. Fruits, berries, green when unripe and yellow when ripe, in groups of 3 at the end of the peduncle.
Habitat: Forest alongside stream and *Gilbertiodendron dewevrei* forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 24, 411.

Pancovia laurentii (De Wild.) Gilg ex De Wild.
Ref.: Fouilly & Hallé, Fl. Cam. **16**, 1973: 122; Harris, 2002: 193; Harris & Wortley, 2008: 175.
Description: Tree 12 m high. Trunk reddish, greyish, blackish and greenish. Slash with red and yellow rings on a white wood. Leaflets 8-12 pairs. Inflorescences on branches, axillary, up 20 cm long. Flowers milky white.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 21.

Pancovia pedicellaris Radlk. & Gilg
Ref.: Fouilly & Hallé, Fl. Cam. **16**, 1973: 118; Harris, 2002: 194; Harris & Wortley, 2008: 176.
Description: Shrub 6 m high. Leaflets 9-10 pairs. Inflorescences axillary. Flowers milky white.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 406.

Radlkofera calodendron Gilg
Ref.: Fouilly & Hallé, Fl. Cam. **16**, 1973: 79; Harris, 2002: 194; Harris & Wortley, 2008: 177.

Description: Palm-like shrub 10 m high; d.b.h.: 12 cm. Trunk greenish to yellowish, with pustules. Slash red. Leaves pinnate compound, in spirals, up to 1.45 m long. Cauliflorous, sometimes inflorescences axillary. Fruits, fleshy, covered by a thin silver film when unripe and yellowsih when ripe. 3-5 seeds per fruit.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 127.

Sapotaceae

Chrysophyllum pruniforme Pierre & Engl.
Ref.: Harris & Wortley, 2008: 220.
Description: Tree 25 m high. Slash with a thin red layer and a thick yellow layer; white latex. Lamina with red hairs on the midrib on the lower. Fruits, berries, axillary. 2 seeds per fruit.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 343.

Chrysophyllum ubangiense (De Wild.) D.J. Harris
Ref.: Harris & Wortley, 2008: 220.
Description: Tree 30 m high; d.b.h.: 80 cm. Base with buttress. Trunk yellowish, greyish with vertical crests network. Slash with a thin red layer, a fibrous orange layer and a thick white inner layer; latex white. Leaves alternate. Fruits, berries, globose (12 cm de diameter), sessile, in groups of up to 3 just near to the leaves, yellowish, mesocarp white. 2-5 seeeds (7 x 5 cm) ± yellowish with a lateral scarce.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 89.

Omphalocarpum elatum Miers
Ref.: Aubréville, Fl. Cam. **2**, 1964: 60; Moutsamboté *et al.*, 1994: 286; Harris, 2002: 197.
Description: Shrub 3 m high. Slash red with white latex. Leaves ± in whorls. Flowers on the trunk, white.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 286.

Synsepalum laurentii (De Wild.) D.J. Harris
Ref.: Harris, 2002: 198, Harris & Wortley, 2008: 226.
Description: Lianescent shrub. White latex. Flowers axillary. Fruits green when unripe and yellow when ripe.
Habitat: Swamp.
Specimen(s): Ndolo Ebika, S.T. 136.

Synsepalum longecuneatum De Wild.
Ref.: Harris & Wortley, 2008: 226.
Description: Tree 15 m high. Trunk fluted, blackish. Slash pinkish to reddish, fibrous; white latex. Fruits axillary, up to 4 together.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 327.

Synsepalum subcordatum De Wild.
Ref.: Harris, 2002: 199; Harris & Wortley, 2008: 227.
Description: Tree 12 m high. Trunk blackish. Slash whitish; white latex. Fruits axillary, covered by blackish silk.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 349.

Tridesmotemon omphalocarpoides Engl.
Ref.: Harris & Wortley, 2008: 227.
Description: Tree 20 m high. Trunk greenish, fluted. Bark flaking off in small plates. White latex. Leaves spirally arranged at the end of twigs. Fruits, berries, globose, up to 10 cm in diameter, solitary, sessile on leafless twigs, green when unripe and yellow when ripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 19.

Solanaceae

Solanum terminale Forssk. subsp. ***vel sp. aff. inconstans*** (C. H.Wright) Heine
Ref.: Heine, F.W.T.A. **2**, 1963: 331.
Description: Climbing and twining liana, stem twisted and spongious. Inflorescences, raceme, occurring at the ground level and on old and leafless parts of the stem. Flowers purple; stamens yellow. Fruits, ellipsoid berries, green when unripe and red when ripe.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 52.

Solanum terminale Forssk. subsp. ***welwitschii*** (C. H.Wright) Heine
Ref.: Heine, F.W.T.A. **2**, 1963: 331.
Description: Twining liana to height of 10 m. Leaves with aubergine smell when crumple. Inflorescences terminal. Flowers purple blue to pink. Fruits, globose berries, green when unripe.
Habitat: Swamp.
Specimen(s): Ndolo Ebika, S.T. 196, 410.

Thomandersiaceae

Thomandersia hensii De Wild. & T.Durand
Ref.: Harris & Wortley, 2008: 286.
Description: Shrub 4 m high. Inflorescences terminal. Flowers white, cross-shaped.
Habitat: Gilbertiodendron dewevrei forest on terra firma.
Specimen(s): Ndolo Ebika, S.T. 405.

Violaceae

Rinorea brachypetala (Turcz.) Kuntze
Ref.: Grey-Wilson, F.T.E.A., 1986: 7.
Description: Shrub 1 m high. Slash whitish. Inflorescences terminal. Flowers milky white.
Habitat: Mixed species terra firma forest.
Specimen(s): Ndolo Ebika, S.T. 240.

Rinorea welwitschii (Oliv.) Kuntze

Ref.: Grey-Wilson, F.T.E.A., 1986: 7.

Description: Shrub 3-5 m high. Slash whitish to yellowish with orangeish fibres. Numerous black dots on the lower surface of the lamina. Inflorescences terminal. Flowers with yellow sepals and whith petals. Infructescences terminal. Fruits ± 3-lobed, pale green. 6 seeds per fruit.

Habitat: Mixed species terra firma forest and *Gilbertiodendron dewevrei* forest on terra firma.

Specimen(s): Ndolo Ebika, S.T. 299, 341, 395A.

Zingiberaceae

Renealmia cincinnata (K.Schum.) Baker

Ref.: Koechlin, Fl. Cam. **4**, 1965: 30; Harris, 2002: 248.

Description: Rhizomatous and aromatic herb 80 cm high. Plant dense at base. Leaves with long sheath fitting together. Lamina purple below. Inflorescences basal, up to 75 cm long. Fruits bottle-like shaped.

Habitat: Mixed species terra firma forest.

Specimen(s): Ndolo Ebika, S.T. 128.

Appendix 2: List of exsiccatae

Ndolo Ebika, S.T. 11 *Ficus elasticoides* De Wild.

Ndolo Ebika, S.T. 13 *Ficus recurvata* De Wild.

Ndolo Ebika, S.T. 14 *Ficus wildemaniana* De Wild. & T.Durand

Ndolo Ebika, S.T. 15 *Tessmannia africana* Harms

Ndolo Ebika, S.T. 16 *Chytranthus carneus* Radlk.

Ndolo Ebika, S.T. 17 *Ficus recurvata* De Wild.

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