



Identification and marketing of Marantaceae in the Ndjolé area, in central Gabon

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Abstract

The forests of the Congo Basin cover an area of 200 million hectares, of which just over 10% is in Gabon. In this country, crop products and non-timber forest products (NTFPs) are abundant because of its favourable climate. There is significant biodiversity and great potential for non-timber forest products. This study is interested in the identification and the supply chain of the *Marantaceae*, one of these NTFPs of plant origin in central Gabon, whose exploitation is national. Through a survey of the main actors in the sector and field visits in the locality of Bifoun, it emerges the existence of three large groups of exploited *marantaceae*, whose harvest and transport are mainly done by women, in various containers. The storage of this NTFPs does not exceed four days, with the risk of losing its commercial value due to drying out. The uses of this resource are multiple: processing cassava, cooking food, making handicrafts, etc. The income it provides to producers is mainly use towards small family expenses but helps to monetize the rural world. The difficulties inherent in the distance from harvesting points, the low price of the product and the impossibility of long-term storage of the *marantaceae* leaves constitute a brake on the development of this activity. It would therefore be wise to envisage the domestication of the species listed for a sustainable use of this plant genetic resource.

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Introduction

Non-timber forest products (NTFPs), through their multiple uses, contribute to the subsistence of populations and provide them with income (Shankar *et al.*, 2001; Walter, 2001; Mbolo *et al.*, 2002; Biloso & Lejoly, 2006; Vermeulen *et al.*, 2009). The use of various categories of non-timber forest products is sometimes the only source of income for some rural populations (Nguenang *et al.*, 2010; Thiombiano *et al.*, 2010; Ngoya-Kessy, 2011). In recent years, NTFPs have considerably aroused interest worldwide as its contribution to household economy and food security is increasingly recognized (Lescuyer, 2010; Loubelo, 2012), as well as to the achievement of environmental objectives such as the conservation of plant biodiversity (Arnold & Ruiz, 2001; Doucet, 2006; Tchatat & Ndoye, 2006). According to the above-mentioned authors and Lehoux and Chakib (2012), these products play a role in terms of food, economic value and their usage for diverse purposes (Sunderland *et al.*, 2003; Tchiegang & Mbougoung, 2005; Betti & Lejoly, 2010; Priso *et al.*, 2011).

According to Tchatat and Ndoye (2006), the question of reasonable management of NTFPs is of great importance in meeting sustainable development objective. Vermeulen *et al.* (2009) point out the need to know the techniques used for the exploitation of plant genetic resources on the one hand, and the promotion of the domestication of these resources in their different regions, on the other hand. Plants of the *Marantaceae* family are mainly distributed across the ecologies of tropical America and Africa (Cabezas *et al.*, 2005; Tchatat & Ndoye, 2006).

These are monocotyledons with fairly significant genetic variability, which offers many uses to the populations. For example, the use of *Haumania liebrechtsiana* (De Wild. & T. Durand) is preferred over other *Marantaceae* because of its flexible stem used for building huts, basketwork and making fishing vessels. The bevelled pieces of internodes are also used to build cages for rat traps. The stem rings can be made and used to hold bundles of wood and leaves (Tchatat & Ndoye, 2006). According to the same authors, the stems of *Hypselodelphys violacea* (Ridl.) are also used

for traps making. The rings formed with these stems are used to hold together bundles of wood and leaves. The strips detached from the petiole of *Marantochloa manii* (Benth.) are used in basketry, in cooking as ties for cassava sticks and various packets of food, as well as ties for bundles *Marantaceae* leaves.

According to Ndouano & Ada-Ntoutoume (2002), the leaves of *Megaphrynium macrostachyum* (Benth.) were used as vegetable roof tiles to cover huts or waterproof clothing. However, the most prominent use of those leaves is for food packaging (e.g., cassava sticks) as well as food storage and food cooking of various types of food products. The cortical strips of the petioles (free from the pith) are used for weaving fishing tools, but also as ties to fix the leaves on the roofs or consolidate bundles. The short leaves of *Sarcophrynium brachystachys* (Benth.) are widely used by women for wrapping short cassava sticks.

The aim of this present study is twofold: firstly, to identify the species of *Marantaceae* exploited by the peasants in the central Gabon, and secondly laying the foundations of the domestication of this perishable resource. This study is therefore of multiple interest, from a social, economic, ecological and scientific standpoint.

Materials and methods

Study zone

The study was conducted in the area of Ndjolé (0 ° 16'31.98'S, 10 ° 28'08.54'E Altitude 377 m) in central Gabon. The villages Weliga II, Darlo, Afock Bindzi and Ekorédo, located on National Road No. 2, 16 km from Bifoun and 40 km from Ndjolé were selected for the study (Fig. 1).

The climate is equatorial, marked by two dry seasons and two rainy seasons each year. Temperatures remain stable throughout the year and rainfall is around 2,500mm/year. The humidity of the air is always very high and saturated at night. The water network is dense. The soils are ferralitic in this region with clay texture. The forest presents a great diversity in domesticated, endemic and wild species.

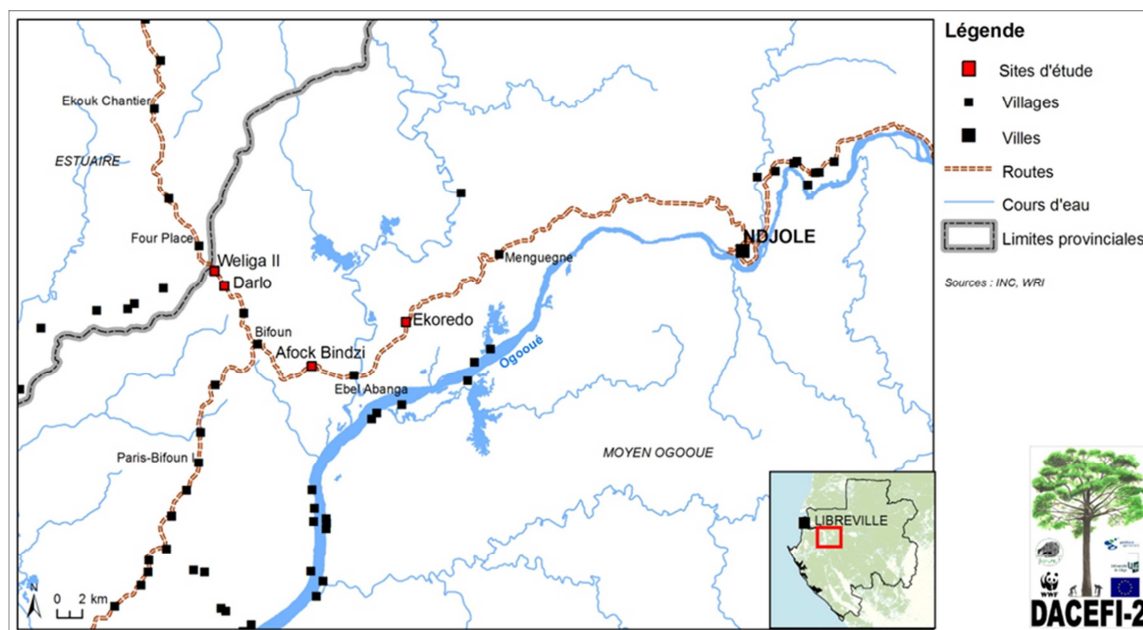


Fig. 1. Geographical location map of the study area (Source: INC.WRI GABON)

Equipment

The *Marantaceae* specimens collected by the populations were identified according to the *Marantaceae* determination keys described by Koechlin (1964) at the National Herbarium of Gabon.

Methodology

A survey; on field identification and bibliographical sources consulted were used to identify the species studied. The use of a semi-structured questionnaire submitted to collectors and retailers made it possible to identify the main species of *Marantaceae* collected by the population. For each species, an identification was made by referring to resource persons to have local names and the confirmation done based on the documentation available at the National Center for Scientific and Technological Research in Libreville.

The criteria which were chosen for the recognition of these species in the field are: the colour, the shape and the size of the leaves; then the diameter, shape and size of the stem or vine, at different stages of development (young stage and adult stage), finally the flowers and the colour of the fruits when they were present.

The study of the sector was carried out through interviews using a semi-structured questionnaire and observations made at the places of collection, storage

and sale. Furthermore, it was opportune to follow each stakeholder throughout their activity, from collection to marketing.

Results and discussion

Identification and uses of *Marantaceae* by populations

Identification

Fig. 2 illustrates the three species *Haumania liebrechtsiana* De Wild, *Hypselodelphys violacea* Ridl and *Marantochloa manii* Benth in their habitat.

The species *Haumania liebrechtsiana* (Fig. 2A) and *Hypselodelphys violacea* (Fig. 2B) are *Marantaceae* with twining stems capable of forming a bushy cluster reaching several meters in height, without however strangling its stake. At the base, the stem can reach a diameter of 16mm and the internodes are around 72mm. In their aerial course, the stems of these *Marantaceae* ramify, then become climbing, with a bushy shape. While the species *Marantochloa manii* (Fig. 2C) has erect, simple stems.

Finally, it has also been identified a last group of *Marantaceae* with long and upright petioles, constituted by *Megaphrynium macrostachium* Benth., *Sarcophrynium brachystachys* K. Schum. and *Halopegia azurea* K. Schum.



(A)



(B)



(C)

Fig. 2. Pictures of *Haumania liebrechtsiana* De Wild species (A), *Hypselodelphys violacea* Ridl (B) and *Marantochloa manii* Benth (C) species in their habitat.

Uses of Marantaceae

Figs 3 and 4 provide information on two uses of *Marantaceae* leaves and petioles among many others. The use of *Marantaceae* leaves relates to processing cassava tubers into sticks, cooking food in packet form, use as a lid for cooking pots and any other packaging of food or ordinary packaging. The parts used are the lamina for packaging foodstuffs, while the peeled petiole serves as a link, and as a material for making various craft tools (traps, mats, baskets, etc.). These results corroborate with the work of

Ndouano and Ada-Ntoutoume (2002), and fit into the general description made by Lompo *et al.* (2007) in Kaboré Tambi National Park, Burkina-Faso on the one hand and by Loubelo (2012) on the use of NTFPs in the Congo Basin on the other. The consumption of *Marantaceae* leaves is unique, but they can be recycled for other uses.

Study of the sector field and economic overview

The harvest is mainly done by women (59%) and children (35%), while men are little involved (6%) in this activity. The harvesting tools used are knives and machetes, but with a preference for knives (68%) over machetes. Once harvest was completed, baskets (55%), recycled industrial bags (25%) and textiles (20%) were used to carry bulk of *Marantaceae* leaves from the field to the villages, on the back (80%) and on the head and/or shoulders (20%) of harvesters.

These leaves were stored in the village under trees (47%) but also in kitchens (34%) and between banana trees (19%). The leaves are stored in these places to keep them in the shade and avoid drying out. In the majority of cases (73%), the leaves were stored, packed in bundles, after sorting and grading. Depending on the species and size: twenty leaves for the large *Megaphrynium* called "long", forty leaves for small *Megaphrynium* and *Sarcophrynium*, called "small long" and "false short", respectively. Leaves can be left unsorted and still stored in bundles (27%). In both cases, the leaves are placed on the ground and covered either by palm branch or previously cut grass.

The leaves can be cut for 5 days and then stored as you go. However, their conservation does not exceed 8 days, because after this time the stems started going red and the leaves were no longer in good commercial condition due to drying out. No long-term conservation method yet exists for these NTFPs.

Marantaceae leaves were sold once a week. The weekly quantity of cut leaves varied between 1000 and 5000 leaves per village, with a quantity sold varying between 2000 and 4000 leaves. Like Priso *et al.* (2011), the quantities sold reflect the pressure of demand for this resource by urban populations.

In the village, wholesaling was the most common type of sale (99%), as producers of *maranthaceae* leaves felt that they did not have a profit margin with retail sale, in accordance with the observations of Schackleton *et al.* (2007) about local markets for Non-Timber Forest Products.

Indeed, the leaves are almost exclusively sold following orders placed by resellers from cities. However, at their final destination (Libreville), the *Marantaceae* leaves are sold only in retail: each leaf was given a price according to its size and its species. Fig. 5 details the end uses of income from the sale of *Marantaceae* leaves by the harvesters.

Income from the sale of *Marantaceae* leaves is used to support the family at 58.6%. This money is also invested in the purchase of school kits (21.2%), in tontines (14.1%), entertainment (4%), and for the construction of houses (2%). As already noticed by several authors like Loubelo (2012), Nguenang *et al.* (2010) and Nyare *et al.* (2012) on the households' economy in Cameroon, Congo and Gabon, the exploitation of this NTFP also contributes to the improvement of the income of the Gabonese inhabitants of the villages concerned by this study.



Fig. 3. Use of *Marantaceae* leaves for making cassava sticks.



Fig.4. Fishing tools made from peeled petioles of *Marantaceae* leaves.

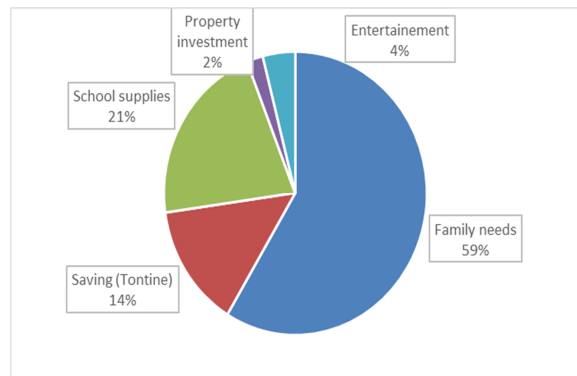


Fig. 5. Use of income by harvesters.

Conclusion

The exploitation of NTFPs by the populations of central Gabon is important because of the abundance of the resource on the one hand and the high demand of urban populations on the other hand. To this end, PNFL of plant origin occupy an important place in their activities. This is the framework for the production and collection of *Marantaceae* organs. However, current exploitation, although justified by multiple uses and the existence of income, does not take into account the regeneration of the resource. It is therefore imperative to use techniques for collecting *Marantaceae* that guarantee sustainable development and to design methods for the domestication of useful plants of this family. This approach would greatly contribute to avoiding the risk of encountering dangerous animals (reptiles, scorpions, elephants, etc.) in old fallows and in secondary forests where *Marantaceae* spontaneously

vegetate and to limit the arduousness of this activity, whether for the collection, transport and storage. Finally, the prices offered to producers for the purchase of *Marantaceae* leaves will be revalued compared to the current situation.

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