

**INVENTORY AND BIODIVERSITY OF SPECIES EDIBLE WILD FRUITS SOLD IN THE
MARKETS OF DOUALA, CAMEROON****Dibong SD^{*1,2,3}, Mpondo Mpondo E^{1,2}, Ngoye Alfred⁴ and Priso RJ¹³**

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ABSTRACT : In total 24 species of wild fruits listed in 18 genera and 15 families were identified and inventoried in four markets in Douala (Cameroon). The Sterculiaceae and Zingiberaceae are best represented. The dominant fruit are berries and drupes with 16 species (66.67%). The frequency of these fruits in the markets is related to dietary habits of ethnic consumers and varies with the seasons. The strategies proposed in the use of these fruits, concern methods of sustainable use and conservation of forest ecosystems.

Key words: Wild Fruits, markets of Douala, eating habits, consumers

INTRODUCTION

Worldwide, many wild fruits are eaten raw and used as a vegetable and condiment in the preparation of various meals. Some are used in whole or some parts only come in the food composition or in the preparation of traditional medicines.

In general, edible fruits contain different nutrients which are represented by the major mineral constituents (water, minerals), organic components (carbohydrates, organic acids, tannins, pigments, proteins and lipids) odorous components (species) the diastase (enzyme), vitamins (especially vitamin C in some fruit) and growth substances in seed (seed).

Given their intake in the diet and the medicinal, edible wild fruits in particular are central to several activities related to forest products (NTFPs). NWFP are products other than timber used in forest ecosystems. Given the fact that, under Cameroonian law, the concept of forest covers "the land covered by vegetation cover in which the predominant trees, shrubs and other species may provide non-agricultural products, we can say that the NWFP are products other than timber which is collected from the wild (wild). These products are very diverse and can be grouped into two major groups namely NWFP animal (trophy animals, game ...) and plants (firewood, leaves, bark, roots, fruits ...). In Cameroon, edible wild fruits are appreciated and regularly sold in markets (Betti, 2002) in different seasons of the year. They feed on small local business and generate income needed for survival in many households.

The objectives of this study is to inventory the wild edible fruits sold in the markets of Douala, to promote sustainable exploitation of renewable resources of the biosphere.

MATERIALS AND METHODS

Study site

Douala (latitude 03 ° 40'-04 ° 11 'N, longitude 09 ° 16'-09 ° 52' E, altitude 13 m) has a climate that belongs to the equatorial domain of a particular type called "Cameroonians" characterized by two seasons with a long rainy season (at least 9 months), heavy rainfall (about 4000 mm per year), high temperatures (26.7 ° C) and stable. The average minimum temperature in Douala for 30 years (1961-1990) is 22.6 ° C in July and the average maximum temperature of 32.3 ° C in February. The relative humidity of the air remains high throughout the year and close to 100% (Dibong et al., 2010).

Methodology

The work proceeded in three stages.

First in the office, we prepared a frame of inquiry, materials for note taking, digital cameras and equipment for storing samples.

Then, in the different markets of Douala surveyed (Central Market, Madagascar, New Deido, Nkololoun), where we went during the period from August to September 2010 to meet with sales of wild fruits. This meeting was based on dialogue in local languages, sometimes with the purchase of edible wild fruits sold by them. The botanical descriptions and the different uses of fruits were identified and inventoried enriched by information collected from vendors and the work of authors such as Letouzey (1970), Troupin (1971), Lejoly et al. (1988), Belle (1992), Thirakul (1995), Betti (2002).

Moreover, for further information ethnobiological investigation was conducted in the outlying communities (PK 17, PK 21, PK 27) to collect data on medical and dietary habits inherent (Weber, 1995). The choice is justified by their villages near the city of Douala and their situation in full coastal forest where many practice harvesting and collection of these fruits. The frames of inquiry met and the pictures taken were also collected.

Finally at the office, we resorted to botanists (Drs Betti Dibong, Din and Priso) to confirm the scientific names of plant species, their gender and family. Data were entered and analyzed using Excel software. The samples were collected and stored in the laboratory of Plant Biology of Organisms (Faculty of Science, University of Douala) according to the techniques and methods of Schnell (1960).

RESULTS

In total, 24 species of edible wild fruits listed in 18 genera and 15 families were identified and inventoried in four markets surveyed in the city of Douala. Field data collected and analyzed are summarized in Figures 1, 2, 3, 4, 5, 6 and 7 and in Tables 1 and 2.

DISCUSSION

Edible wild fruits belong to 15 families whose largest are the Sterculiaceae and Zingiberaceae. Species belonging to these families are widely used by consumers, either as spices for their multiple uses (Table 1). The types of fruit are the most popular berries and drupes because of their sweet and juicy pulp (EMPA et al., 2010). Follicles and the pods are not appreciated and these fruits are eaten in their natural state while others are used as condiments or fall into the cosmetic and pharmacy popular. These perishable products do not benefit from conservation devices and small modern transformations to make more profitable, competitive and profitable in order to ensure sustainable exploitation (EMPA et al., 2010). Their forest habitat in most cases, their sale period spread throughout the year (Table 2) requires sound operating procedures for better conservation of various ecosystems. Vendors markets surveyed belong to different regions of Cameroon (Fig. 1).

Table 1. Species of edible wild fruits sold in 04 markets of Douala: Central, Madagascar, New Deido, Nkololoun.

Scientific name	Family	Commercial name	Fruit description	Usages			
				Food	Pharmacopoeia	Cosmetic	Cultural
<i>Aframomum daniellii</i> (Hook. f.) K. Schum.	Zingiberaceae	Jujube	Bay green or red when ripe spindle-shaped	Spices			Traditional ceremonies in west
<i>Aframomum exscapum</i> (Sims) Hepper Hepper	Zingiberaceae	Mbongo shank	Bay red or green when ripe	Spices			
<i>Aframomum granum-paradisi</i> (Sm.) Hepper	Zingiberaceae	Bakim	Bay red or green when ripe, contains many seeds	Spices	Crisis stomach		
<i>Aframomum melegueta</i> (Rosc.) K. Schum.	Zingiberaceae	Ndong	Bay green or red when ripe containing seeds eaten raw	Spices	Processing fontanelle, sore belly, excessive crying of child		Support in family snack with palm wine and kola
<i>Beilschmiedia obscura</i>	Lauraceae	Kadan/ovan (nga tchoue) in bamiléké	Bay black when dry. The seeds are very small and also black dark brown	Spices			
<i>Cassia camerunensis</i> Gupta et Gupta	Caesalpiniaceae	Rabbit ears	Pod shaped ears	Spices			
<i>Cola acuminata</i> (P. Beauv.) Schott et Endl.	Sterculiaceae	Cola bafia	Follicle brown, red seeds with 2-4 pieces				Support in family snack with palm wine and kola
<i>Cola ballayi</i> Schott	Sterculiaceae	West cola	Follicle brown, re seeds with 6 pieces and lines in a point				Support in family snack with palm wine and kola

Scientific name	Family	Commercial name	Fruit description	Usages			
				Food	Pharmacopoeia	Cosmetic	Cultural
<i>Cola nitida</i> (Vent) Schott et Endl.	Sterculiaceae	Goro	Follicle reddish color and rough. The seed has a spicy taste	Eat raw	Aphrodisiac, exciting, IST Treatment		
<i>Cola</i> sp.	Sterculiaceae	Lion cola	Follicle yellow		Antidote, stomach pain, aphrodisiac		
<i>Cola urceolata</i> K. Schum.	Sterculiaceae	Monkey cola	Follicle containing seeds white red, sometimes pink, they are elongated				Family snacks
<i>Dacryodes edulis</i> (G. Don.) H. J. Lam	Burseraceae	Safout	Drupe more or less elongated, purple or black when ripe Drupe red	Eat boiled, braised, fried, safout butter	Treatment of malaria, safout oil used for massage and nerves		
<i>Eleais guineensis</i> Jacq	Areaceae	Palm nuts	Drupe containing a nucleus from which we extract the almond or nut palms	Extraction of palm oil, yellow sauce with bassa		Palm nut oil and soap	
<i>Garcinia kola</i> Heckel	Clusiaceae	Bitter kola	Bay yellow orange containing 2-4 seeds white yellow		Aphrodisiac, flu treatment, constipation, nausea, stomach pain, stomach wash		Family snacks
<i>Irvingia gabonensis</i> Aubry Leconte	Irvingiaceae	Mango	Drupe green pulling the yellow, fleshy fibrous pulp, an almond kernel content flattened dividing into 2 equal parts white	Fruit eaten raw almonds used to thicken sauces			

Scientific name	Family	Commercial name	Fruit description	Usages			
				Food	Pharmacopoeia	Cosmetic	Cultural
<i>Monodora myristica</i> (Gaertner) Dunal	Annonaceae	Pèbè	Bay cylindrical, light brown with a hard seed coat	Preparation of « Nkui »			
<i>Olex subscorpioidea</i> Oliv.	Olacaceae	Washers	Drupe green, dried; it takes dark brown	Spices	Laxative used by women after childbirth		
<i>Parkia clappertoniana</i> Keay	Mimosaceae	Flat flat	Follicle containing seeds flattened, oval shape and black	Preparation of « Nkui »	Anti-malarial		
<i>Picralima nitida</i> (Stapf) T. Durand et H. Durand	Apocynaceae	Quinquelibà	Yellow bay		Treatment of malaria and typhoid		
<i>Piper guineensis</i> (Ketsu)	Piperaceae	Black pepper	Brown bay, the seeds are very smalls, rounds, black	Spices			
<i>Ficinodendron heudelotii</i> (Bail.)	Euphorbiaceae	Djansang	Bay with yellow seeds and rounded shape	Spices			
<i>Solanum aethiopicum</i> L.	Solanaceae	Eggplant	Green bay		Treatment of several diseases, babies fontanelle		
<i>Tetrapleura tetraptera</i> Schumacher et Thonn.	Mimosaceae	4 côtés	Pog with tetrahedral form, dark brown	Spices	Treatment of typhoid, women worms		
<i>Xylocarpus aethiopicus</i> (Dunal) A. Rich	Annonaceae	Ecola baba	Black bay when dried and grouped in clumps on the point of attachment to the trunk	Spices			

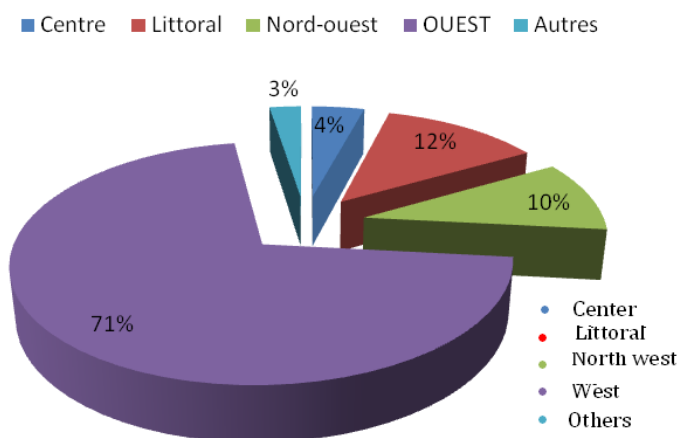


Figure 1. Distribution of vendors in markets visited by region of origin.

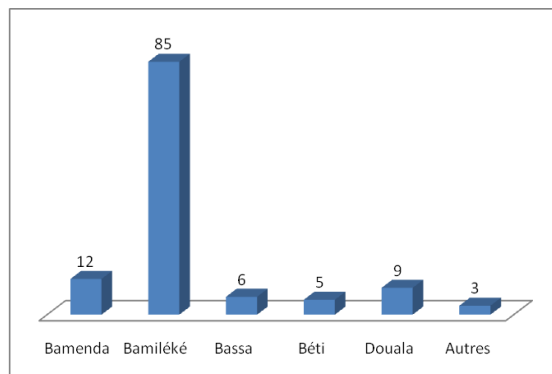


Figure 2. Distribution of vendors in markets visited by their ethnicity.

However, the western region (71%) including the Bamileke ethnic group (Fig. 2) is better represented and the other regions less represented (10%). The predominance of vendors belonging to the western region is justified by their majority in the population of the city and their affection for this type of activity. Although most products sold has a different origin (Central, East, Littoral, Northwest, Southwest and South) in this region (Table 2).

Table 2. Data of species wild edible fruits sold in some markets in Douala.

Scientific name	Period of collection	Period of sale	Origin	Habitat	Status	
					Common of markets	Exclude of markets
<i>Aframomum daniellii</i>	July-August	All year	South west, North west, West	Forest	No	Yes
<i>Aframomum excapum</i>	July-September	All year	Center, Littoral, South	Forest	No	Yes
<i>Aframomum granum-paradisi</i>	June -September	All year	Center, East	Forest	No	Yes
<i>Aframomum melegueta</i>	June-September	All year	Center, Littoral, West, South	Forest	No	Yes
<i>Beilschmiedia obscura</i>	September-october	All year	East, South	Forest	No	Yes
<i>Cassia camerunensis</i>	June-September	All year	North west, Center, West	Forest	No	Yes
<i>Cola acuminata</i>	July-October	All year	Center, Littoral, North west, South, West	Forêt	Yes	Yes
<i>Cola ballayi</i>	July-September	All year	West	Forest, Savanna	Yes	Yes
<i>Cola nitida</i>	July-October	All year	West, North west	Forêt	Yes	Yes
<i>Cola sp.</i>	July-October	All year	Center, South, North west, West	Forêt	No	Yes
<i>Cola urceolata</i>	July-September	All year	South	Forest	Yes	Yes
<i>Dacryodes edulis</i>	June-october	June-october	South	Forest, Savanna, planting	Yes	Yes
Nom scientifique	Period of collection	Period of sale	Origin	Habitat	Status	
					Common of markets	Exclusive of markets
<i>Elaeis guineensis</i>	All year	All year	South	Forest, savanna, planting	Yes	Yes
<i>Garcinia kola Heckel</i>	July-September	All year	Center, Littoral, South, East	Forest	Yes	Yes
<i>Iringia gabonensis</i>	June-August	All year	South, East, Littoral, Center	Forest	Yes	Yes
<i>Monodora myristica</i>	July-September	All year	West, North west, South west	Forest, Savanna	Yes	Yes
<i>Olax subscorpioidea</i>	June-September	All year	East	Forest	Yes	Yes
<i>Parkia clappertoniana</i>	July-September	All year	West, North West, South west	Forest	No	Yes
<i>Picralima nitida</i>	June-october	All year	Center, South, Littoral, East	Forest	Yes	Yes
<i>Piper guineensis</i>	June-october	All year	East, South, Center, Littoral	Forest	Yes	Yes
<i>Ricimodendron heudelotii</i>	September-october	All year	East, South, Center, Littoral	Forest	Yes	Yes
<i>Solanum aethiopicum</i>	All year	All year	South	Forest, Savanna, planting	No	Yes
<i>Tetrapleura tetraptera</i>	June-September	All year	East, center, Littoral, South	Forest	Yes	Yes
<i>Xylopiya aethiopica</i>	June-july	All year	West	Forest	Yes	Yes

Trade in wild fruit concerned is exercised by the vendors and is less by sellers (Fig. 3). Most vendors are adults (Fig. 4) with responsibilities of home that make this activity a permanent occupation and permanent compared with men who engage in these activities sporadically when women can not stand for themselves various family reasons.

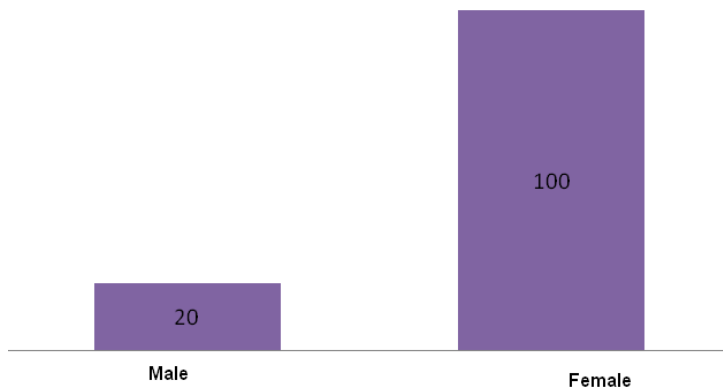


Figure 3. Distribution of vendors in the markets by gender.

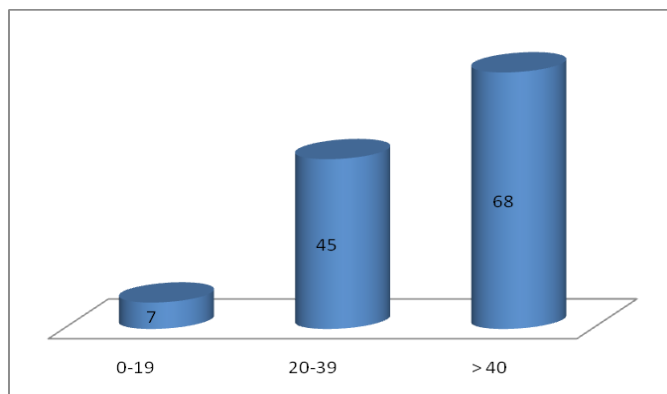


Figure 4. Distribution of vendors in markets by age.

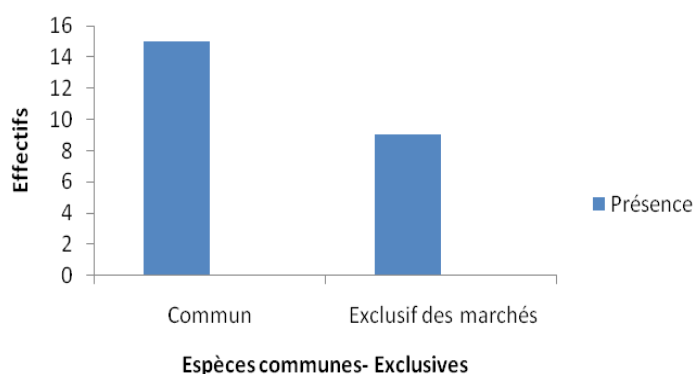


Figure 5. Common and exclusive species of the market visited.

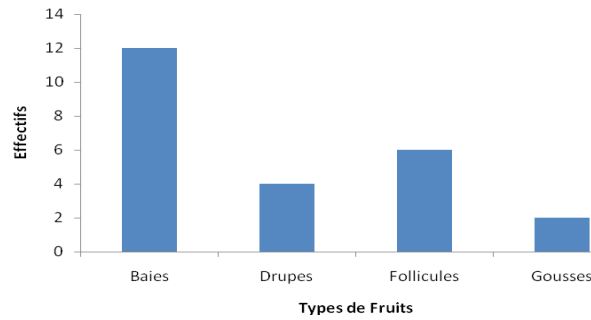


Figure 6. Distribution of types of wild fruits sold in some markets of Douala's city.

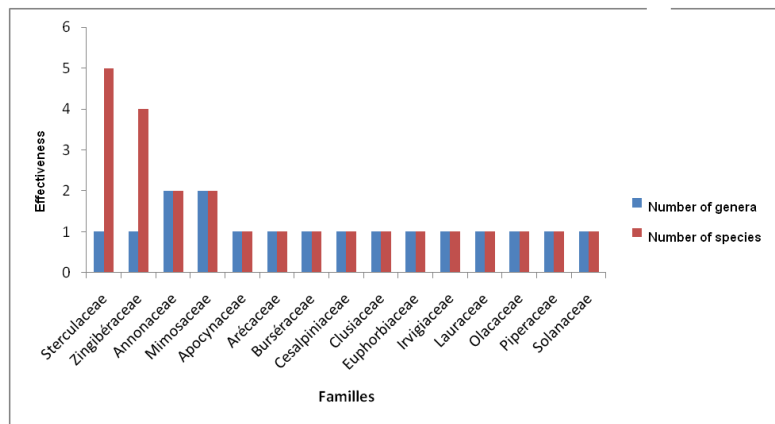


Figure 7. Distribution of families identified by genera and species.





Figure 8. Some species of wild fruit markets visited Douala.

The supply of these edible wild fruits requires the involvement of three groups of women (EMPA et al., 2010): The first category consists of farmers collecting wild edible fruits in the surrounding areas, the second consists of those serving intermediaries between farmers and traders and vendors who supply third category consumers in different markets.

The operation of these products generates substantial cash income for household survival of different actors. The overall height of the market price offers a wide accessibility to the consumer because prices within reach of every budget. The frequency of wild edible fruits available for consumption in Douala is linked to the habits of ethnic consumers and varies with the seasons. These edible wild fruits contain a potential rich enough (food, medicines, cosmetics and culture) and varied very beneficial to the consumer (Table 1). This aspect seems essential in the Cameroonian context marked by numerous health problems related to poverty populations. From this point of view, it could open up interesting avenues of research on the constituents of these edible wild fruits and their contribution to man (EMPA et al., 2010), beyond this study on their inventory.

Status (Table 2) shows that the 24 NTFPs inventory 15 are common and 9 are exclusive market. The first statute shows that the pressure in the forests of collection is important and requires the implementation of concrete practical modalities of operation.

Conclusion

For judicious use of these renewable plant resources, both strategies can be developed: the first would be to inventory the NWFP in particular wild edible fruits in the whole territory in order to rank them in order of importance. A perspective of domestication of fruit can be a credible alternative and play an important role in the implementation of initiatives aimed at improving marketing channels of NWFP. While the second is based on the implementation of conservation practices green forest with a good knowledge of operating rules and sustainable management at all operators.

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