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# Survey on the Sale of Megaphrynium Macrostachyum (Marantaceae) Leaves in Gbado-Lite City and Surroundings (Nord Ubangi Province, Democratic Republic of the Congo)

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**Abstract:** *In Africa, the importance of NTFPs in the livelihood security is well recognized and these products represent vital sources of income for poor population. However, the sales chain of Marantaceae leaves is informal in Gbado-Lite and there is no information available on this sector for the promotion of the sale of NTFPs at the local level to reduce poverty and protect the environment as well as to conserve biodiversity. This survey shows that mostly female (55%) carries out the sale of Marantaceae leaves in Gbado-Lite. Among traders, 37.5% are illiterate, 32.5%, 20% and 10% have a secondary, primary and university education respectively. Regarding the marital status, 52.5% of respondents are divorced, 25% are widows and 22.5% are married. While 40% of respondents are unemployed, 30% are farmers while housewives and pupils account for 17.5% and 12.5% respectively. Our respondents know seven other non-woody forest products. These include: Mushrooms (27.5%), Caterpillars (22.5%), Marantaceae leaves (20%), honey (17.5%), snails and game (5% each) and vines (2.5%). Marantaceae leaves are first used for food packaging (47.5%), food preservation (35%), building material (10%). The forest accounts for 52% of the total harvesting habitat of Marantaceae leaves. It is followed by fallow (25%), fields (15%) savannah (8%) respectively. This sale allows the schooling for children (27.5%); health care (20%); food purchase (17%); beverage purchase (12.5%). The majority of respondents believe that these leaves are not well managed after use and therefore pollute the environment because of the lack of a waste collection structure. Yet, they are biodegradable and should be used to make compost for crops in Gbado-Lite.*

**Keywords:** *Marantaceae; NTFPs; household income; Gbado-lite; Democratic Republic of the Congo*

## I. Introduction

The Democratic Republic of the Congo (DRC) harbors about 130 million hectares of forest in the Congo Basin (Debroux et al., 2007), which represents the second largest dense forest after the Amazonian forest and constitute a reservoir of biodiversity (Asimonyio et *al*., 2015; Baelo et *al*., 2016a, b; Kambale et *al*., 2016a, b). In both urban and rural zones of DRC, the importance of non-timber forest products (NTFPs) known also as non-wood forest products (NWFPs) in the livelihood security and as safety nets is well recognized. These NWFPs supplement household in agricultural production by providing them with essential foods, medicinal products but they represent also sources of income for many households (Kambale et *al*., 2016c; Ngbolua et *al*., 2014; Ngbolua et al., 2017a, b, c). Their economic valorization can promote biodiversity conservation, contribute to resource maintenance, and

participate in socio-economic development on a sustainable basis. Yet, NTFPs provide wealthy resources for both rural and urban inhabitants throughout DRC including foods, medicines, building materials, fuel wood, as well as resources of spiritual and cultural significance (Temote, 2012).

Many people in Nord Ubangi province (DRC), particularly in Gbado-Lite city, make extensive use of biological resources from the wild plant and animal origin for their survival. These items also defined as NTFPs (Shackleton & Shackleton, 2004) are harvested for both subsistence and commercial use, either regularly or as a fall-back during times of need. They add to peoples' livelihood security, especially for rural inhabitants. The key role these NTFPs play as vital sources of income, nutrition (edible insects, bushmeat, wild honey, etc.) and sustenance for many forest-based communities were previously reported (Shackleton & Shackleton, 2004; Solomon, 2016). Ubangi eco-region forest is source of a variety of NTFPs such as fruits, honey, medicinal and aromatic plants and bushmeat. These products are of importance to the livelihoods of both rural and urban communities of Nord Ubangi province (including Gbado-Lite city and its surroundings) and constitute a significant source of household income (Ngbolua et *al*., 2014; Ngbolua et *al*., 2017a, b, c). However, the NTFPs trade is an unorganized activity where it is difficult to measure the costs of income and the impact on natural resources conservation since there is a total lack of management structures (Mamba, 2013). NTFPs were also mooted as a potential cause of deforestation and land conversion activities (Ngalim, 2011).

Thus, in order to document and preserve knowledge on NTFPs from Ubangi eco-region, a few studies have been undertaken but the results are incomplete (Ngbolua et *al*., 2014; Ngbolua et al., 2017a, b, c).

The economic development of the Marantaceae leaves sector can contribute to the socio-economic development of the Nord Ubangi province on a sustainable basis. However, the sector is characterized by the absence of social rules of access to the species in its habitat. However, the trade of these leaves can help to reduce the unemployment at the local level.

The present study was carried out with the aim (i) to evaluate the knowledge on the Marantaceae leaves marketed in Gbado-Lite city and surroundings, (ii) to determine the socio-demographic profile of the traders and (iii) to evaluate the role of the Marantaceae leaves trade in Gbado-Lite city.

## II. Materials and Methods

The present survey was carried out at Gbado-Lite city and surroundings located in the Nord-Ubangi Province in DRC (figure 1). Gbado-Lite city belongs to the Ubangi eco-region, a subgroup of *Northeastern Congolian lowland forests* (PARAP, 2015). This eco-region is one of the 200 globally priority terrestrial eco-regions known as the "G200" (Olson & Dinerstein, 1998). Information about Marantaceae leaves reported in this study was obtained by interviewing traders in Gbado-Lite city and surroundings. Surveys were conducted between March and July 2019 in the commune of Gbado-Lite and surroundings.

A total of 40 experienced traders of Marantaceae leaves among 150 pre-selected people were interviewed, on a voluntary basis, having a good knowledge on NTFPs and their seniority in the activity. Local language Ngbandi or Lingala was used during anthropological interviews. The questionnaire was divided into three sections: (i) socio-demographic characteristics of respondents (including sex, marital status, education level /background and profession) and (ii) information related to Marantaceae leaves (including leaf destination after harvesting**,** utility of Marantaceea leaves, leaf provenance axes, causes of scarcity, income allocation, habitat types, and waste management mode). The questionnaire was pre-tested before final administration to respondents. The figure 11 gives the location of the Gbado-Lite city.

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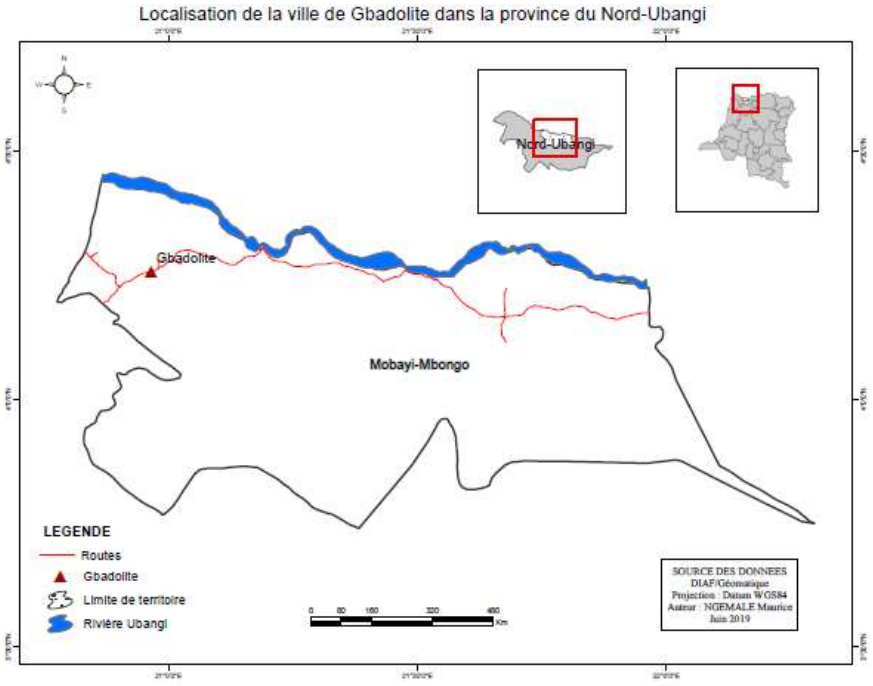


**Figure 21.** Location of the Gbado-Lite city

## III. Results and Discussion

Table 1 gives the socio-demographic parameters of the respondents. It appears from this table that the sale of Marantaceae leaves in Gbado-Lite is performed by women (55%) than men (45%). Among traders, 37.5% are illiterate, 32.5% have a secondary education, 20% have a primary education while 10% have a higher education level respectively. Considering the marital status, the majority of respondents are divorced (52.5%) while 25% are widows and 22.5% are married. No singles were recorded among the study population. As far as the profession of the respondents is concerned, 40% are unemployed, 30% are farmers, while housewives and pupils accounted for 17.5% and 12.5% respectively.

**Table 1.** Socio-Demographic Data of Respondents

| **Socio-demographic data** | **Number of people** | **Frequency** (%) |
|---|---|---|
| **1. Sex** | | |
| ○ Male | 18 | 45 |
| ○ Female | 22 | 55 |
| **Total** | **40** | **100** |
| **2. Education level** | | |
| ○ Illiterate | 15 | 37.5 |
| ○ Primary | 8 | 20 |
| ○ Secondary | 13 | 32.5 |
| ○ University | 4 | 10 |
| **Total** | **40** | **100** |
| **3. Marital status** | | |
| ○ Married | 9 | 22,5 |
| ○ Divorced | 21 | 52.5 |
| ○ Widow | 10 | 25 |

| | | | |
|---|---|---|---|
| | **Total** | **40** | **100** |
| **4.** | **Profession** | | |
| ○ | Farmer | 12 | 30 |
| ○ | Unemployed | 16 | 40 |
| ○ | Housewife | 7 | 17.5 |
| ○ | Student | 5 | 12.5 |
| | **Total** | **40** | **100** |

The figure 2 gives the other different types of non-woody forest products known in the study area by the respondents.

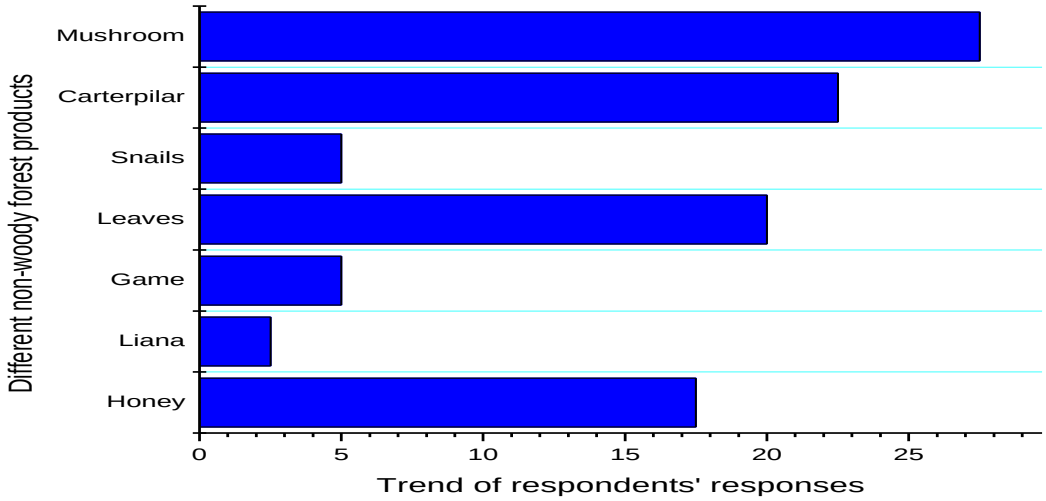


**Figure 2.** Non-Woody Forest Products Known to Respondents

This figure shows that seven non-woody forest products are known by our respondents. These include: Mushrooms (27.5%), Caterpillar (22.5%), Marantaceae leaves (20%), honey (17.5%), snails and game (5% each) and vines (2.5%). Figure 3 shows the destination of the product (Marantaceae leaves) after harvest.

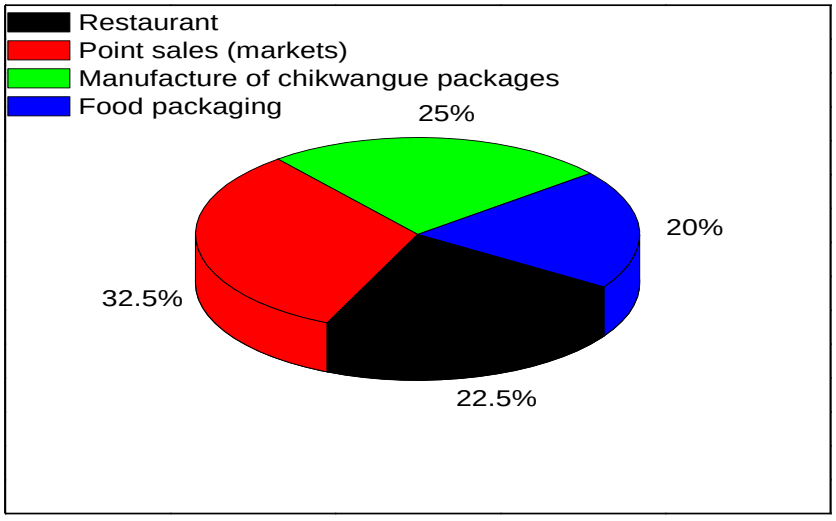


**Figure 3.** Leaf Destination after Harvest

According to the respondents, the Marantaceae leaves harvested are carried directly to the point of sale at the central market (32.5%) to be sold. For the rest, they are intended for the

manufacture of Chikwangue and are used for the preparation of packets of meat, squash, and fish in restaurants. However, Chikwangues sold in the Market of Gbado-lite are made from Marantaceae leaves. Figure 4 gives the utility of Marantaceae leaves in different activities of the community**.**

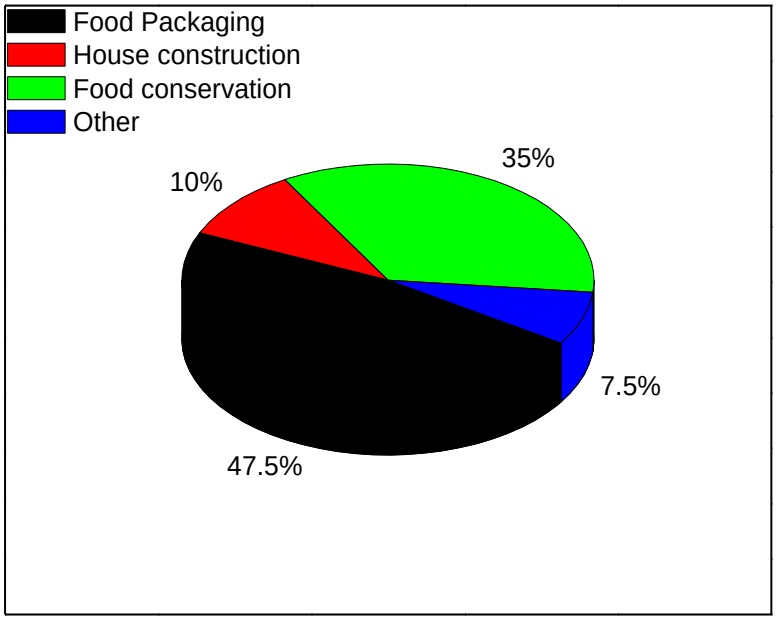


**Figure 4.** Utility of Marantaceae Leaves

It is clear from the figure that the leaves of Marantaceae are used primarily for food packaging (47.5%), followed by food preservation (35%) and construction (10%). Figure 5 gives the opinion of the respondents on the reference between Marantaceae leaves and plastic bag.

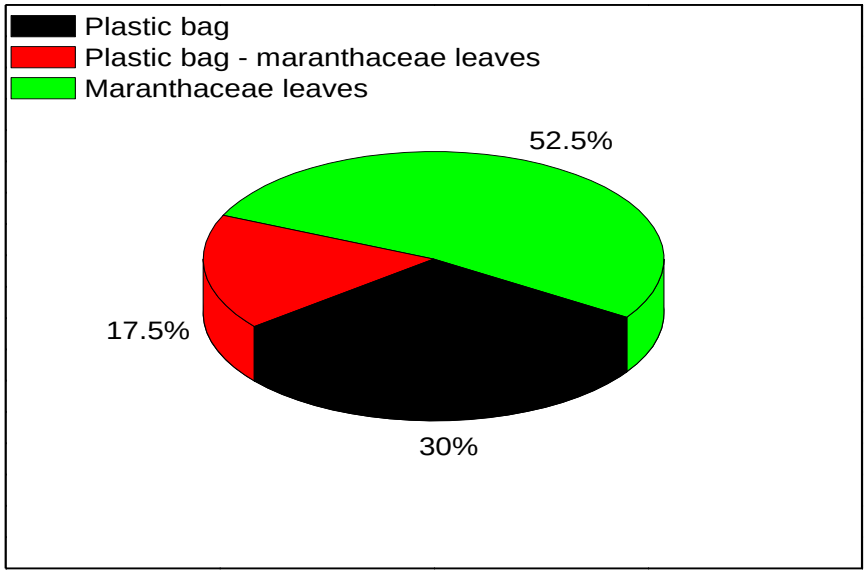


**Figure 5.** Preference between Marantaceae Leaves and Plastic Bag

It appears from this figure that respondents prefer Marantaceae leaves (52.5%) than plastic bag (30%) while other prefers to use both (17.5%). This shows that the community places more importance on leaves because of their low cost. Figure 6 gives the respondents'

opinion on the origin of the Marantaceae leaves sold in Gbado-Lite.

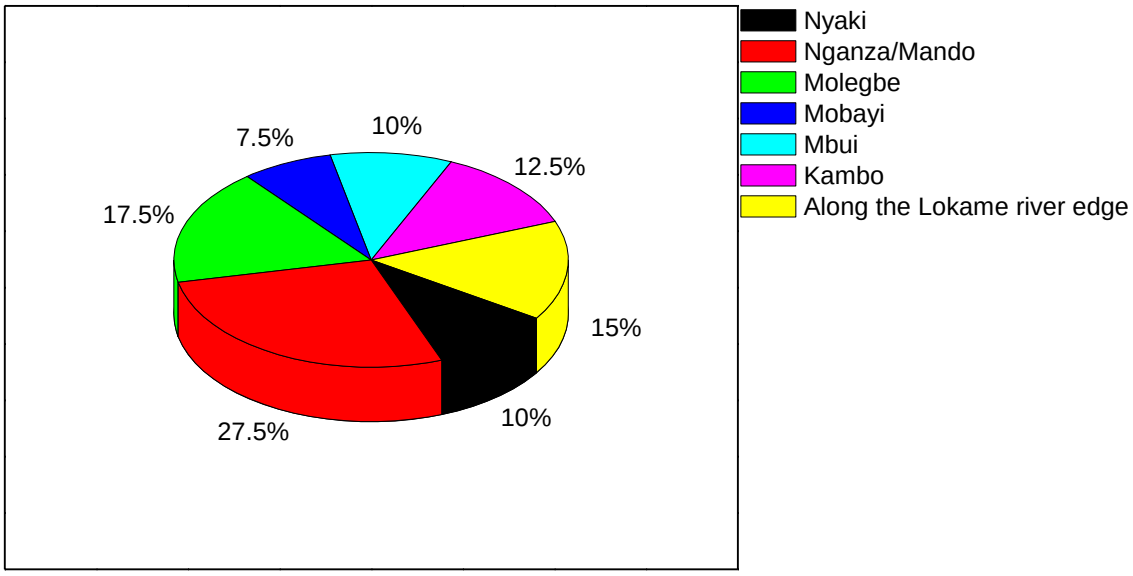


**Figure 6.** Marantaceae Leaves Provenance Axes

Figure 6 shows that the leaves come more from the direction of Nganza/Mando (27.5%) followed by the Molegbe direction (17.5%), the lokame River (15%); Kambo (12.5%); Nyaki and Mbui (10% each) respectively. Figure 7 gives the types of habitat from which these leaves are harvested.

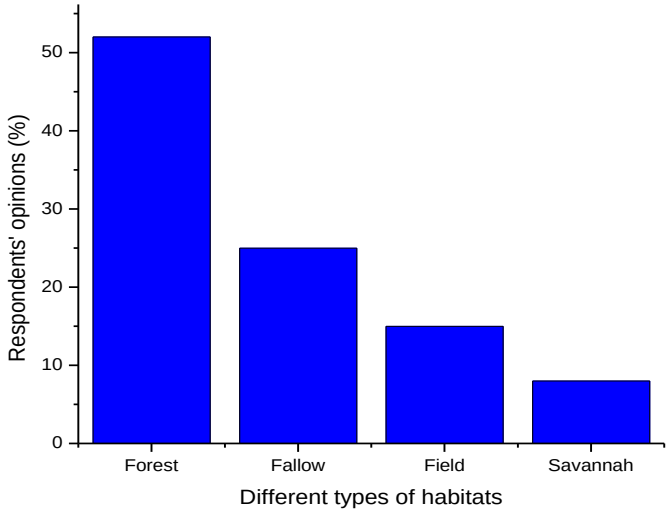


**Figure 7.** Types of Habitats

This figure shows that the forest represents 52% of the range of habitats for the harvesting of Marantaceae leaves. It is followed by fallow (25%), fields (15%) and savannah (8%). Table 2 gives the period of scarcity of Marantaceae leaves in the study area.

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**Table 2.** Period of Scarcity

| Period | Scarcity of Marantaceae leaves (%) | |
|---|---|---|
| | yes | No |
| ○ Rainy season | 30 | 70 |
| ○ Dry season | 70 | 30 |
| **Total** | **100** | **100** |

According to the respondents, Marantaceae leaves are rare during the dry season (70%) than in the rainy season. The causes of scarcity of Marantaceae leaves in the study area are given in the figure below.

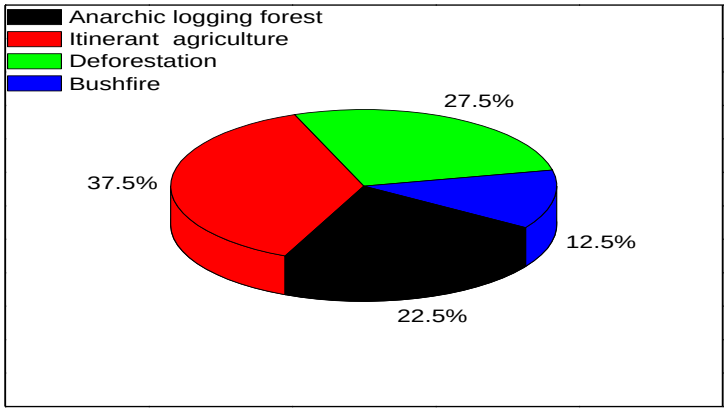


**Figure 8.** Causes of Marantaceae Leaves Scarcity

Figure 8 shows that the cause of the scarcity of Marantaceae leaves in its habitat is itinerant agriculture (37.5%), monitoring of deforestation and anarchic logging of forests (27.5% and 22.5%) respectively while the bushfire represents 12.5%.

Almost all Marantaceae leaves are sold in large bunches (42.5%) and this at 5000 Congolese Francs (CDF). Which would mean that if the seller has more than 5 bunches; he can earn 25.000 CDF which is enough to cover the daily need of the family. Figure 9 provides household income allocation.

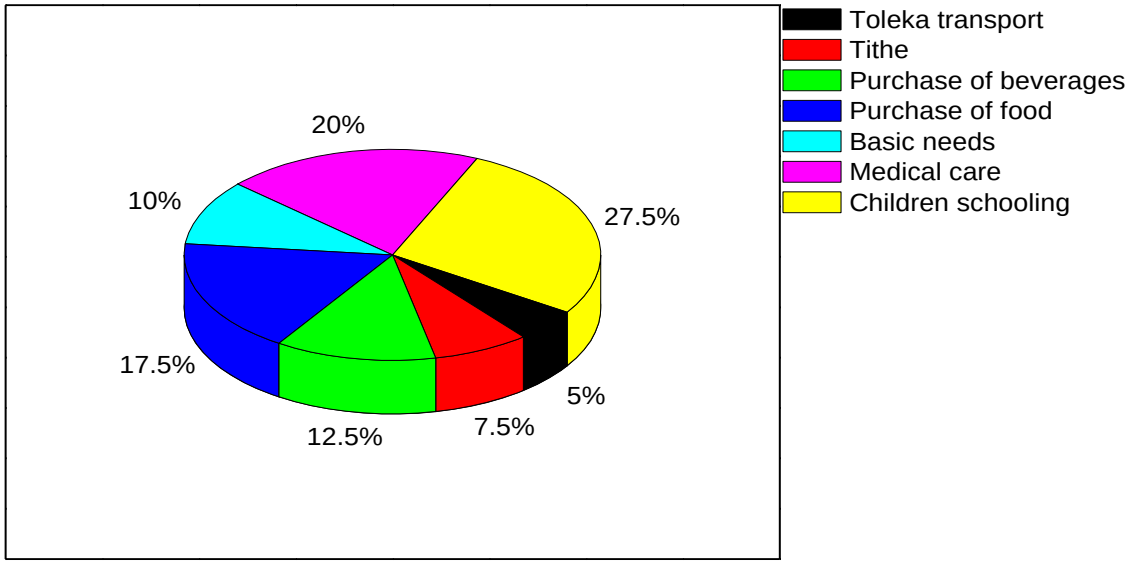


**Figure 9.** Income Allocation in Households after Sale of Marantaceae Leaves

Respondents believe that the money obtained after-sale from Marantaceae leaves allows the schooling of children (27.5%); the medical care (20%); the purchase of food (17%); the purchase of beverages (12.5%). Other basic needs as well as tithe and transportation are also insured by this sale activity. Table 3 gives respondents' views on the management of Marantaceae leaves after community use.

**Table 3.** Management of Marantaceae Leaves after Use

| **Terms** | **Number of people** | **Frequency** (%) |
|---|---|---|
| ○ Yes | 8 | 20 |
| ○ No | 32 | 80 |
| **Total** | **40** | **100** |

This table shows that 80% of respondents believe that the leaves of Marantaceae are not well managed after use and therefore pollute the environment because of the lack of waste collection structure. Regarding the opinion of respondents on sustainable methods of managing Marantaceae leaves after use, the majority of respondents believe that these leaves are biodegradable; they can be used to make compost for different crops.

Non Timber Forest Products are biological resources from plant and animal origin, harvested from natural forests, man-made plantations, wooded land, farmlands, and trees outside forests and/or domesticated. These products are vital sources of income, nutrition and sustenance for many forest-based communities in the third world (Shackleton & Shackleton, 2004). In Africa, more than two-thirds of the population relies partly on these forests products to satisfy their livelihood needs (Arnold, 2001; Brigham et *al*., 1996; Kaimowitz, 2003; Monizi et *al*., 2018). Ngbolua et *al*. reported that NTFPs are traded in all market of Gbado-Lite markets and households of Gbado-Lite city use several different NTFPs to meet their daily needs. Among the most commonly used products is found *Megaphrynium macrostachyum* leaves (Ngbolua et *al*., 2019). Recent findings revealed that the average sales amount of *Megaphrynium macrostachyum* leaves is 7 USD, while that from other sources is 4 USD for an average weekly income of 11 USD. This gives 63% for the contribution of leaf marketing of the species in household income (Mamba, 2013). This survey carried out in Gbado-Lite city and surroundings also confirmed that Marantaceae leaves sector constitute a source of income for households evidencing thus the importance of this forest product in livelihood security as previously reported (Mhuji & Barakaeli, 2018; Mukendi et *al*., 2018). The survey revealed that the management and exploitation of this NWFP is done in a traditional way and is informal, this has been also reported by (Kipouni, 2008). However, this activity could have a negative impact on the environment by the fact that the excessive extraction of Marantaceae leaves (figure 10) could cause deforestation (Ngbolua et *al*., 2018; Ngbolua, 2018).

**Figure 10.** The Marantaceae Leaves Solved in the Nyaki Market

## IV. Conclusion

The aim of this survey was to assess the knowledge of Gbado-Lite population on the Marantaceae leaves marketed in Gbado-Lite city and surroundings. It is clear from this investigation that the sale of Marantaceae leaves in Gbado-Lite is carried out more by female. The majority of traders is made up of the illiterates, divorced and unemployed people. Six others non-woody forest products are also known by our respondents. These include: Mushrooms, Caterpillars, Honey, Snails, Game and Vines.The leaves of Marantaceae are used as food packaging, food preservation and building material. These leaves are harvested from four types of habitat: forest, fallow, fields and savannah. This sale allows the schooling of children, health care, buying food, buying drinks, etc. The majority of respondents believe that these leaves are not well managed after use and contribute to the environmental pollution due to the lack of a waste collection structure yet they are biodegradable and should be used to make compost for crops in Gbado-Lite city.

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