



# **The usage of plants and its impact on the vegetation in the gold mining area of Mayo-Rey Division**

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## **Abstract**

The usage of plants and its impact on the vegetation in the gold mining area located inside the national parks of Mayo-Rey Division have been conducted. For the purpose of the development and conservation of the resources and the ecosystem of the areas. Surveys and observations were carried out on the study area. The study reveals that the miners have the significant skills in the plants usages for diets patterns, pharmacopoeia and cosmetic. Several plants with multiples ethnobotanical's usages have been identified. 14 species of diets plants, 12 medicinal plants, 23 firewood plants and 8 plants for artisanal usage among miners have been identified. These valorization of forest resources have an environmental and ecological disagreement. In fact, the increase the sampling of these resources within the protected areas of the Mayo-Rey Division can lead to weakening or even depletion of the resources.

**Keywords:** forest resources, gold mining, ethnobotany, Mayo-Rey.

## **Introduction**

Gold mining is a significant way for reducing poverty and income inequality in rural areas. As some agricultural and livestock activities, gold mining is considered as an economic activity in the Mayo-Rey Division despite its impacts on

ecosystem. Plants resources have served not only for the primary human needs but also for health care for gold miners. So, ethnobotany has played important role in the development of new drugs for many centuries and becoming increasingly important in defining strategies and actions for conservation or recuperation of residual forests,

Cheikhoussef *et al.* (2011). And that, miners as other categories of rural workers, use directly the local vegetation to earn their life. They use them for various purposes: diet pattern, traditional pharmacopoeia, domestic energy, service wood, crafts and even for trade. This article analyses the relevance of ethnobotany in current scenario. It is anticipated that, in the future, ethnobotany may play an increasingly important role in sustainable development and biodiversity conservation, Neelo *et al.* (2015). The objective of the present study is to draw up an inventory of ethnobotany on gold panning in the study area and its impact on vegetation.

### The Study Area

The research was conducted in the administrative district of the North-Cameroon region. They focused on artisanal mining sites in protected

areas of the Mayo-Rey Division. Indeed, the North Region was created by the Presidential Decree of 23 August 1983 following the outbreak of the Great North in three Regions (Adamawa, North and Far North). Covering an area of 6,798 km<sup>2</sup>, the Region extends between 8th and 10th degrees north latitude and 12 degrees East longitude. It is bounded in the North by the Far North Region; in the South by the Region of Adamawa; in the East by Chad and the Central African Republic; and to the West by Nigeria. So, the BNP and BNNP were created by Pierre FLIZOT, French hunting inspector, classified as a wildlife reserve respectively by decree N° 34/32 of November 11th, 1932 and by decree N° 270 of July 29th, 1947 of the high commissioner of the French Republic in Cameroon. Figure 1 presents the location of the study area.

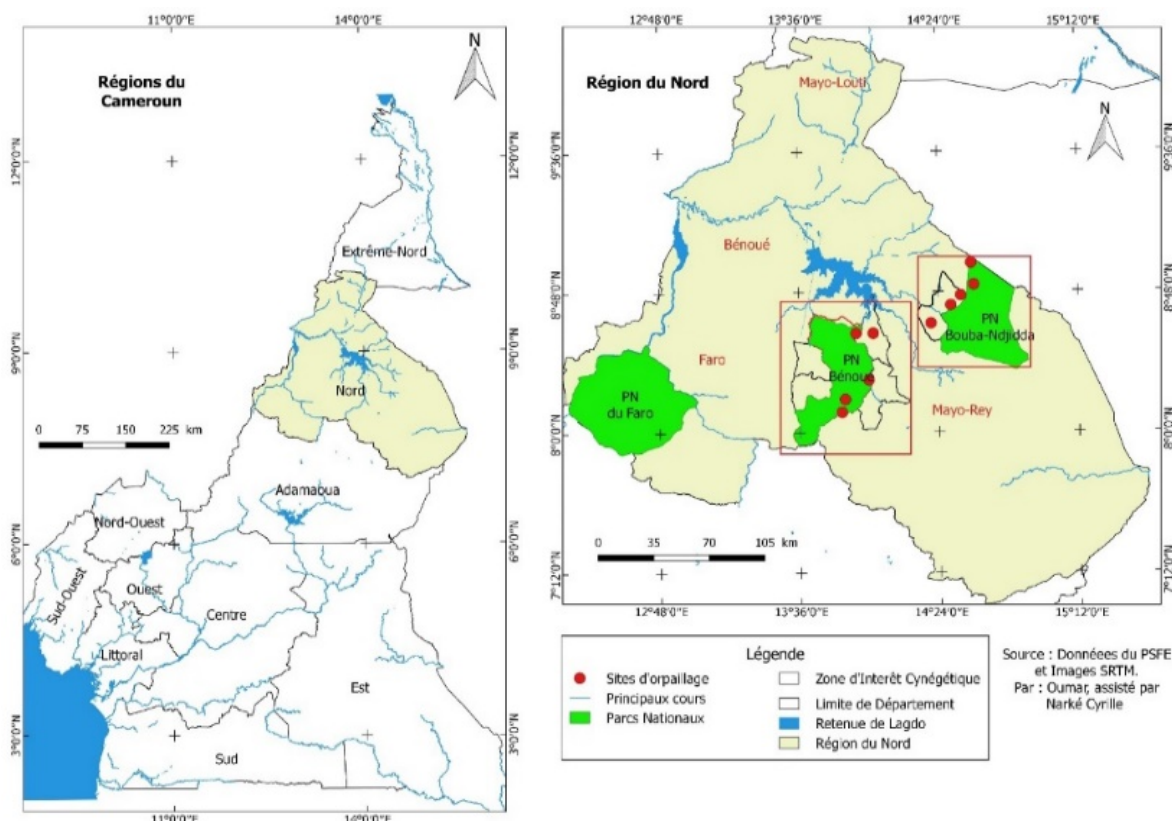


Figure 1: Location of study Area

### Methodology

To conduct the ethnobotanical study on artisanal gold mining sites in the protected areas of Mayo-

Rey Division, field surveys were used as the most appropriate method. The semi structured and structured questions were administered to the artisanal miner population in the study area. The

questionnaires used were divided in the following manner: closed questions (with yes or no response), open questions (of which answers are given deliberately according to one's point of view), oriented questions (which consists of proposing some answers to the respondents). These surveys are carried out on the mining sites by miners, households in the riparian villages and encampments of the personal in charge of protected areas. In total, 510 people were surveyed during this study, ie 75 gold miners (15 people randomly selected from the various exploitation sites), or 150 people (30 people randomly selected from surrounding villages) and 30 public officials in charge of the conservation of northern protected areas on both sides for each national park and its surroundings (Table 1). In fact, the main headings of these surveys concerned, on the one hand, ethnobotanical knowledge in mining site.

## Results and Discussion

### NTFPs for food use among miners in the department of Mayo-Rey

It appears from the table 1 that the lives of gold miners in their shipyards is supported by several plant species like any other life among local populations. We have identified several plant

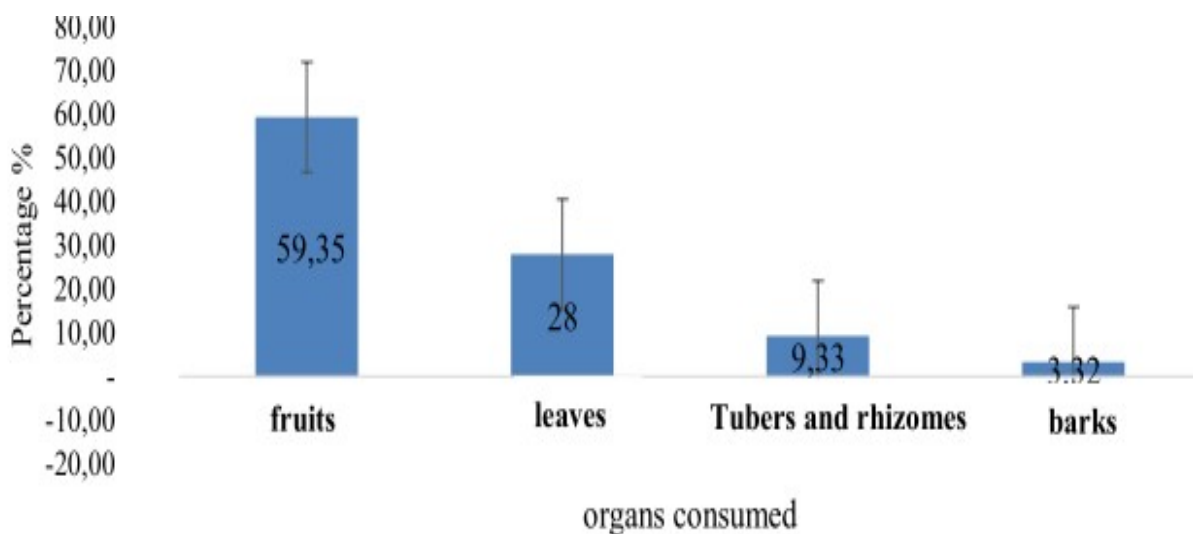
species for consumption by artisanal miners at their sites of exploitation. *Bombax costatum* (73.94±35.1) *Mitragyna inermis* (63.94±34.1) and *Borassus aethiopum* (51.52±46.1) are the species most consumed in Benoue National Park while the species *Ziziphus mucronata* (69,79±30,8) *Balanites Aegyptiaca* (61,18±37,7) and *Tamarandus indica* (61,82±29,1) are the species most consumed by the gold washers of the Bouba-Ndjidda National Park. The gold panners of the Bouba-Ndjidda National Park and its surroundings (44.33±15.83) use more food NWFPs than the Benoue National Park (44.31±15.3). Statistical analysis shows a highly significant difference between these (0.03 <0.05). They are an important source of income and livelihood for the people, and thus would reduce poverty. With the growing demographics, where the old systems of exploitation and management of natural resources have become obsolete in the face of the ever growing demand for food (FAO, 1999) or man, to practice this activity, use the machete to cut integrally the branches of the plant. These caused the accelerated destruction of vegetation cover (Anonymous, 1993). These results corroborate with that of Mapongmetsem (2005), which showed that farmers depend for the most part on non-timber forest products (NTFPs), sometimes called accessory products or non-timber forest products.

**Table 2:** NTFPs for food use among miners in the Mayo-Rey Division

| Scientifics names           | PNB                | PNBN              |
|-----------------------------|--------------------|-------------------|
| <i>Annona senegalensis</i>  | 38,15±31,0         | 36,97±30,7        |
| <i>Bombax costatum</i>      | 73,94±35,1         | 46,06±39,7        |
| <i>Balanites aegyptiaca</i> | 45,79±39,4         | 61,18±37,7        |
| <i>Borassus aethiopum</i>   | 51,52±46,1         | 51,52±46,1        |
| <i>Detarium microcarpum</i> | 49,70±20,9         | 45,45±23,3        |
| <i>Grewia flavescens</i>    | 46,67±25,6         | 46,94±25,5        |
| <i>Mitragyna inermis</i>    | 63,94±34,1         | 43,64±38,5        |
| <i>Pterocarpus lucens</i>   | 19,39±17,5         | 20,30±16,6        |
| <i>Strychnos spinosa</i>    | 19,39±17,5         | 19,12±17,1        |
| <i>Syzyguim sp.</i>         | 22,42±30,0         | 24,24±30,4        |
| <i>Tamarindus indica</i>    | 50,91±24,5         | 61,82±29,1        |
| <i>Vernonia amygdalina</i>  | 54,24±36,4         | 51,52±34,1        |
| <i>Ziziphus mucronata</i>   | 42,73±34,2         | 69,79±30,8        |
| <i>Zizyphus mauritiana</i>  | 41,82±17,2         | 41,82±17,2        |
| <b>Means</b>                | <b>44,33±15,83</b> | <b>44,31±15,3</b> |

These different NTFPs are used in food for their various organs consumed as vegetables. Figure 2 gives the proportions of the different edible organs of the plants used in the diet of the local population surveyed. Fruit (59.35%) is commonly sought and consumed by the local population, followed by leaves (28%) that are prepared as vegetables. Tubers and rhizomes (9.33%) are consumed as a staple or supplement and other organs, including bark and small pieces of wood

(3.32%) are traditionally used as condiments or as seasoning. These results corroborate those of Toirambe (2007) in the RDC, which showed that fruits and leaves constitute the most used NTFPs by the local population. In developing countries, most farmers depend on non-timber forest products (NTFPs), otherwise known as accessory products or non-timber forest products (Mapongmetsem, 2005).



**Figure 2:** Proportions of the different edible organs of the plants used

### Species used by artisanal fishers in traditional medicine

In the light of this table 2, several species of listed medicinal plants testify to the importance accorded to the pharmacopoeia by Mayo-Rey Department protected area miners. The species *Khaya senegalensis*  $80,61 \pm 33,3$  is the species most used in traditional medicine by gold miners in Mayo-Rey Division. The species *Securidaca longepedunculata*  $73,94 \pm 35,1$ , *Vitellaria paradoxa*  $73,33 \pm 26,7$  are the most used species in Benoue National Park against *Khaya senegalensis*  $78,18 \pm 32,1$ , *Securidaca longepedunculata*  $73,94 \pm 35,1$ , *Vitellaria paradoxa*  $73,03 \pm 31,9$  in the Bouba-Ndjidda National Park. The use of medicinal plants by villagers is becoming increasingly important in developing countries. Thus the many species used in the traditional pharmacopoeia are gradually disappearing over

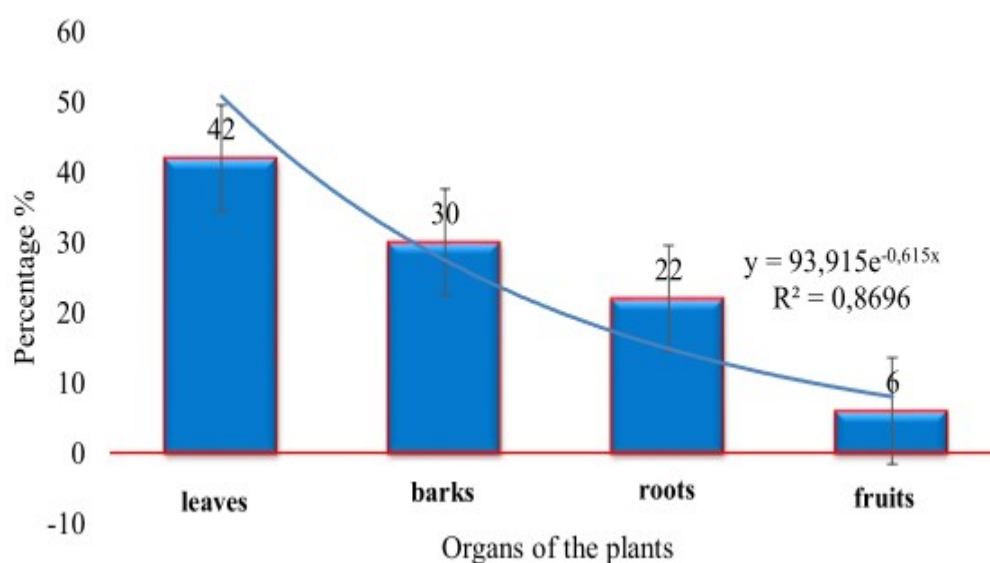
time and some are not even found in nature. The vital importance of these species is due to its various healing properties. The results of the investigations it possible to highlight the multiple medicinal uses of these species by the gold digger population. In fact, the gold miners' populations surveyed treats the malaria by the *Khaya senegalensis*. Some people use *Khaya senegalensis* to treat typhoid. The gold panners of Bouba-Ndjidda National Park and its surroundings  $53,59 \pm 1,9$  use more plant species in the traditional pharmacopoeia than the Benoue National Park of  $53,89 \pm 34,4$ . Analysis of variance found a significant difference between species ( $0,000 < 0,001$ ) and between gold panning sites ( $0,021 < 0,05$ ). These results corroborate those of Toirambe (2007), which shows that nature has a mosaic of medicinal plants that people can use for health care. He adds that with the plurality of medicinal plants, everyone is his own therapist.

Table 3: species used by artisanal fishers in traditional medicine

| Scientifics names                  | BNP              | BNNP              |
|------------------------------------|------------------|-------------------|
| <i>Annona senegalensis</i>         | 36,97±30,7       | 38,18±29,3        |
| <i>Anogeissus leiocarpus</i>       | 46,06±39,7       | 52,73±41,3        |
| <i>Bridelia scleroneura</i>        | 51,52± 46,1      | 47,27±44,7        |
| <i>Burkea africana</i>             | 49,70±20,9       | 55,15±25,4        |
| <i>Daniellia olivieri</i>          | 46,67±25,6       | 42,12± 27,4       |
| <i>Ficus platyphylla</i>           | 43,64±38,5       | 40,00±34,2        |
| <i>Piliotigma thonningii</i>       | 19,39±17,5       | 73,03±31,9        |
| <i>Khaya senegalensis</i>          | 80,61±33,3       | 78,18±32,1        |
| <i>Pseudocedrela kotschyi</i>      | 50,91±24,5       | 46,67±26,6        |
| <i>Pterocarpus erinaceus</i>       | 70,30±33,1       | 52,12±39,3        |
| <i>Securidaca longepedunculata</i> | 73,94±35,1       | 78,48±33,4        |
| <i>Vitellaria paradoxa</i>         | 73,33±26,7       | 41,82±17,1        |
| <b>Means</b>                       | <b>53,59±1,9</b> | <b>53,81±13,0</b> |

In this management of his own states of illness, each farmer contributes to the health of all and uses the various plant organs: bark, leaves, fruits, roots. Figure 3 presents the percentages of the different parts of the plant used in traditional medicine, leaves 42%, barks 30%, roots 22% and in the end fruits 6%. It shows that leaves (42%) are the most used in the traditional medicine. Leaves and bark are therefore vegetative organs that contain more active ingredients sought. These

organs are well known for their circulatory role of raw and processed sap and metabolic waste. These wastes include alkaloids, glycosides, tannins, saponins, etc. which are biochemical substances commonly used in chemotherapeutic treatments. These results corroborate those of Mapongmetsem *et al.* (2004) in their study on the use of NTFPs in the Sudano-Guinean savannahs. They showed that there are a multitude of species of importance locally and internationally.



**Figure 3:** Proportions of the different organs of the plants used in traditional medicine

### Species used as firewood in gold panning sites

The exploitation of the wood is done through the cut, that is to say to cut down a tree or a shrub on foot. Today, the exponential rate of exploitation endangers the species used while increasing the access to the resource each year (Tchotsoua *et al.*, 2000). The use of fruit trees as firewood is an indicator of woodfuel scarcity in the periurban savannahs of Adamaoua (Mapongmetsem & Akoua, 1997). 23 plant species are commonly used by the population (Table 4). The percentage varies according to the species and the sites of artisanal exploitation of gold. The species most in demand in the firewood in gold panning sites are *Balanites aegyptica* 87.88±27.7, *Acacia siberiana* 86.06±25.0, *Anogeissus leiocarpus* 83.03±22.8. The species *Anogeissus leiocarpus* 83.03±22.8

and *Daniela oliveri* 80.61±21.2 are much more used in the miners of the Benoue National Park and its surroundings while the genus *Balanites aegyptica* 87.88±27.7 and *Acacia siberiana* 86.06±25 are the most widely used among miners in Benue National Park and its surroundings. These results differ from that obtained by Tchobsala (2011) in the peri-urban savannas of Ngaoundere, which showed that several species such as *Annona senegalensis*, *Daniellia oliveri*, *Khaya senegalensis* and *Securidaca longepedunculata* are used as firewood. The reasons that drive the producers of fuelwood are more or less variable. In some families, poverty, the search for firewood and other sources of energy such as oil become more expensive that push them to look for wood for domestic work and for sale.

**Table 4:** Species used as firewood in gold panning sites

| Scientifics names                  | BNP              | BNNP              |
|------------------------------------|------------------|-------------------|
| <i>Accacia siberiana</i>           | 9,09±10,1        | 86,06±25,0        |
| <i>Annona senegalensis</i>         | 30,30±29,5       | 30,30±29,5        |
| <i>Anogeissus leiocarpus</i>       | 83,03±22,8       | 81,82±31,3        |
| <i>Balanites aegyptica</i>         | 30,30±32,2       | 87,88±27,1        |
| <i>Bombax costatum</i>             | 16,97±31,2       | 20,61±28,7        |
| <i>Bridelia scleroneura</i>        | 31,52±15,7       | 23,64±18,0        |
| <i>Burkea africana</i>             | 38,79±15,1       | 31,52±28,9        |
| <i>Daniela olivieri</i>            | 80,61±21,2       | 55,15±32,9        |
| <i>Ficus platyphylla</i>           | 15,76±15,0       | 29,70±30,7        |
| <i>Grewia flavescens</i>           | 22,42±30,7       | 22,42±34,9        |
| <i>Isobertlinia doka</i>           | 75,15±31,6       | 50,30±24,7        |
| <i>Khaya senegalensis</i>          | 52,12±24,7       | 52,12±33,7        |
| <i>Mangifera indica</i>            | 43,64±33,7       | 43,64±37,9        |
| <i>Parkia biglobosa</i>            | 54,55±37,9       | 54,55±16,4        |
| <i>Pseudocedrela kotschy</i>       | 36,97±16,4       | 36,97±28,0        |
| <i>Pterocarpus erinaceus</i>       | 32,12±20,2       | 36,00±17,4        |
| <i>Pterocarpus lucens</i>          | 24,85±20,6       | 19,33±13,8        |
| <i>Sarcocephalus latifolius</i>    | 29,70±29,0       | 19,39±9,7         |
| <i>Securidaca longepedunculata</i> | 26,67±16,5       | 37,58±29,9        |
| <i>Strychnos spinosa</i>           | 43,64±26,6       | 27,27±27,0        |
| <i>Vitex vitex</i>                 | 20,61±14,5       | 49,70±21,1        |
| <i>Ximenia americana</i>           | 12,12±15,6       | 24,24±11,5        |
| <b>Means</b>                       | <b>36,86±7,4</b> | <b>21,21±11,5</b> |

## NTFPs for artisanal use in artisanal populations

The results of our surveys give a list of seven species used as building materials, baskets, hats, tablecloths and even furniture (Table 5). *Terminalia laxiflora* 84.24±16.9, *Piliostigma thonningii* 82.42±7.5 and *Daniellia oliveri* 80.00±12.6 are used for artisanal miners. These species of plants serve as poles for the construction of houses, wood for the manufacture of tam-tams as well as mortars. The gold panners of Bouba-Ndjidda National Park and its

surroundings (68.41±18.5) uses more species of plants in the craft industry than the Benoue National Park 66.97±7.7. The variance analysis highlights the existence of a significant difference between the species used in the craft industry ( $0.003 > 0.01$ ) and the gold panning sites. These results are in agreement with those of Karsenty (1999) on the economic instruments of the tropical forest which noted that species such as *Piliostigma thonningii*, *Sterculia setigera*, *Daniellia oliveri* and *Azelia africana* are conserved by the rural population of the DRC for their use craft.

**Table 5:** NTFPs for artisanal use in artisanal populations

| Scientifics names             | BNP              | BNNP              |
|-------------------------------|------------------|-------------------|
| <i>Sterculia setigera</i>     | 65,46±35,6       | 67,27±31,8        |
| <i>Isoblerlinia doka</i>      | 72,73±21,8       | 67,88±22,7        |
| <i>Pterocarpus lucens</i>     | 61,21±40,5       | 80,00±12,6        |
| <i>Terminalia laxiflora</i>   | 67,88±12,6       | 84,24±16,9        |
| <i>Terminalia glaucescens</i> | 58,18±18,6       | 25,45±18,1        |
| <i>Piliostigma thonningii</i> | 82,42±7,5        | 73,33±27,3        |
| <i>Daniellia oliveri</i>      | 63,64±35,9       | 80,00±12,6        |
| <i>Azelia africana</i>        | 64,24±41,3       | 69,09±11,7        |
| <b>Means</b>                  | <b>66,97±7,6</b> | <b>68,41±18,5</b> |

## Conclusion

Ethnobotanical research may be applied to current areas of study such as biodiversity prospecting and vegetation management. It is hoped that, in the future, ethnobotany may play an increasingly important role in sustainable development and biodiversity conservation. the two sectors that we think are the most promising are firewood with 23 species and food with 14 species despite the ecological and environmental impacts that entails. The percentage varies according to the species and the sites of artisanal exploitation of gold. The species *Bombax costatum* 73.94 ± 35.1 and *Mitragyna inermis* 63.94 ± 34.1 are the species most consumed by gold miners in the Benoue National Park while the species *Ziziphus mucronata* 69,79 ± 30,8 and *Balanites Aegyptiaca* 61,18 ± 37,7 are the most consumed species in the Bouba-Ndjidda National Park. The species most in demand in the firewood in gold panning sites are *Balanites aegyptica* 87.88 ± 27.7 and *Acacia*

*siberiana* 86.06 ± 25.0. The species *Anogeissus leiocarpus* 83.03 ± 22.80 and *Daniela oliveri* 80.61 ± 21.2 are much more used in the miners of the Benoue National Park and its surroundings while the genus *Balanites aegyptica* 87.88 ± 27.7 and *Acacia siberiana* 86.06 ± 25.0 are the most widely used among miners in Benue National Park and its surrounding.

## Acknowledgments

The authors would like sincerely to thank the administrative, traditional authorities and local population of the Mayo-Rey Department to have actively contributed to the achievement of this research. Then, our thanks go to the Head of Department of Biological Sciences of the Faculty of Sciences of the University of Ngaoundere and Institute of Geological and Mining Research for giving us some materials for the realization of the field work.

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### How to cite this article:

Oumar Mahamat Oumar, Godwe Gara Jean Marie, Tchobsala, Megueni Clautilde. (2025). The usage of plants and its impact on the vegetation in the gold mining area of Mayo-Rey Division. *Int. J. Adv. Res. Biol. Sci.* 12(10): 80-87.  
DOI: <http://dx.doi.org/10.22192/ijarbs.2025.12.10.008>