EJSIT
European Journal of Science, Innovation and Technology
ISSN: 2786-4936
www.ejsit-journal.com
Volume 5 | Number 4 | 2025

Perception of the Local Population of the Availability of Host Tree Species with Edible Caterpillars in the Yangambi Biosphere Reserve (Tshopo Province, DRC)

Dan KAPOLI OMBA[1,2*], Hilaire USSENI NASIBU[1,2], Augustin YAKAYENGO TOKO[1,2], Pierre YUMA MADJALIWA[1], Leon IYONGO WAYA MONGO[2], Janvier LISINGO WA LISINGO[3], Prosper SABONGO[3], Freddy Robert OKANGOLA EKILI[2], Hyppolite NSHIMBA SEYA WA MALALE[3]

[1]University of Kindu, Faculty of Agricultural and Environmental Sciences, Department of Renewable Natural Resources Management, BP 122, Kindu, DRC

[2]University of Kisangani, Faculty of Renewable Natural Resources Management, BP 2012, Kisangani, DRC

[3]University of Kisangani, Faculty of Sciences, Department of Ecology and Plant Resources Management, BP 2012, Kisangani, DRC

ABSTRACT

We set out to conduct a study on the perception of the local population on the availability of edible caterpillar host tree species in the Yangambi Biosphere Reserve (Tshopo Province, DRC). The main objective of this study is to analyze the perception of the local population on the availability of edible caterpillar host tree species in the Yangambi Biosphere Reserve. To achieve this objective, we used participatory and empirical methods, which were supported by documentary, survey and direct observation techniques. After analysis, the following results were obtained: in total, 35 species of host trees for edible caterpillars and 12 species of edible caterpillars were listed, these species are predominantly *Fabaceae* with 34,4% of genera and 33,3% of species ; they were generally used as medicinal plants and timber trees (71,4% each); 67,9% of respondents are men; 35,2% have secondary education ; 40,1% are farmers ; 90,1% of respondents note that the species of host trees for edible caterpillars in the Yangambi Biosphere Reserve are in decline. The perception of the local population is influenced by gender (p-value=0,006), education level (p-value=0.000) and activity (p-value=0,000); *Entandrophragma cylindricum* is the rarest edible caterpillar host tree species (44,4%) in the Yangambi Biosphere Reserve.

Keywords: perception, availability, host tree, edible caterpillar, Yangambi

1. INTRODUCTION

In the Democratic Republic of Congo (DRC), several insect species are frequently consumed. Among these insects, caterpillars are consumed at approximately 40% of the total animal protein consumption (Bomolo, 2017). Malaisse and Parent (1980) analyzed the nutritional value of 22 species of edible caterpillars and found that the number of calories per 100g of dried caterpillars is 457 and the percentage of crude protein for the same quantity is 63,5%.

Despite the importance of these insects, in the province of Tshopo, the tree species that serve as their habitat and food support are used by the local population as medicinal plants, timber trees, fuelwood trees and food plants (Okangola *et al.,* 2019). This exploitation, considered negligent and irrational, leads to a decline in these woody species, with the consequence of reducing the population of edible caterpillars (Traoré *et al.,* 2011).

* Corresponding Author

The participation of the local population in the management of host tree species for edible caterpillars has therefore become a necessity. The participatory approach aims to ensure the sustainability of management, by engaging the local population, who depend on these resources, in the decision-making process so that they maintain control over the uses and benefits that result from their exploitation (Djogbenou *et al.,* 2011).

One of the relevant approaches to the management of host tree species for edible caterpillars is the study of the perception of the local population of the dynamics of these species. In fact, the perception of the local population will reflect the first signs of success and/or failure of the sustainable management process of these species. It is therefore important to highlight the perception that the local population has of the availability of host tree species for caterpillars and the factors influencing their perception.

This will obviously make it possible to better take into account the aspirations of the local population in the management of these resources.

This study will analyze the perception of the local population of the availability of host tree species for edible caterpillars in the Yangambi Biosphere Reserve.

2. ENVIRONMENT, MATERIALS AND METHODS

2.1. Environment

2.1.1. Location and period of the research

The research was carried out in the Yangambi Biosphere Reserve, which is located in the northeast of the DRC, in the province of Tshopo, approximately 100 km west of the city of Kisangani, the provincial capital (Kyale *et al.,* 2019), with local members residing in the Lusambila, Ekutshu, Likango, Lomboto and Mandikala districts, during the period from April to July 2024, i.e. 4 months of research.

Figure 1 below shows the location and boundaries of the Yangambi Biosphere Reserve.

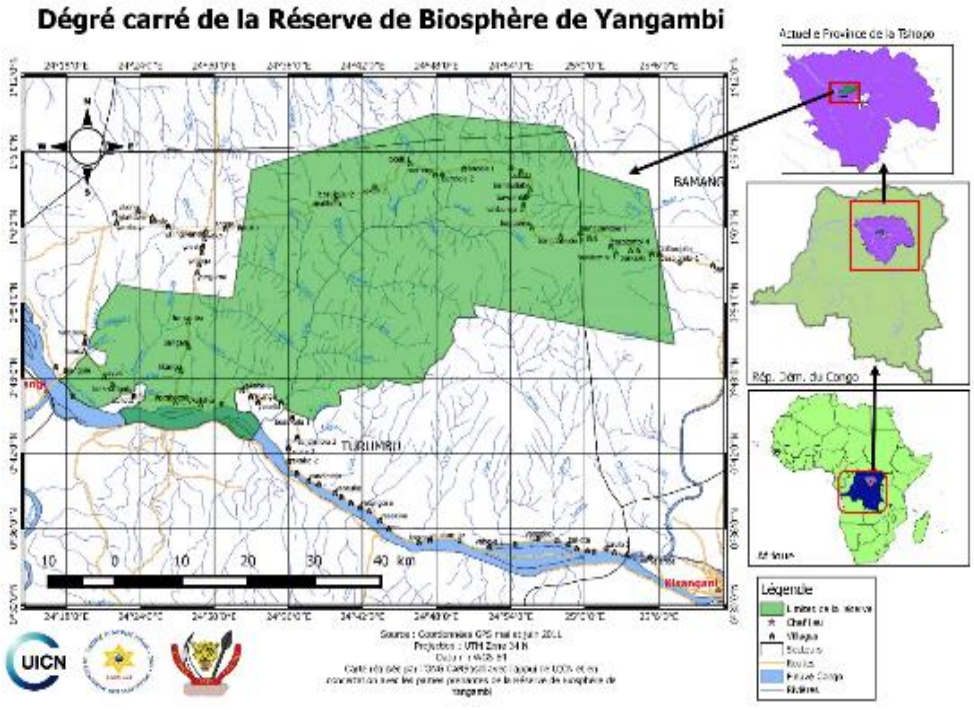

Figure 1: Location and boundaries of the Yangambi Biosphere Reserve (MECNT, 2020)

2.2. Materials

To better conduct this research and achieve the expected results, the use of edible caterpillars, caterpillar host tree species and respondents as biological material for this study was made. We used the following non-biological materials: a GPS device, for collecting the geographical coordinates of the study site; questionnaire sheets, to sort information on the subject of the survey; a smart phone, for taking images of edible caterpillars and caterpillar host plants, as well as browsing the Internet; a computer, for text entry, data processing and plotting tables, histograms and sectors.

2.3. Methods

In relation to the objectives of this work, we used the following methods:

- **Participatory method**: involving the survey using a pre-established questionnaire in order to obtain from the respondents, information on the perception of the local population of the availability of species of host trees for edible caterpillars in the Yangambi Biosphere Reserve;
- **Empirical method**: in addition to contacts with the operators of species of host trees for edible caterpillars and the various supervisory offices, the empirical method allowed us to make personal observations on the exploitation and perception of the availability of species of host trees for edible caterpillars in the Yangambi Biosphere Reserve.

2.3.1. Data collection techniques

The data collection techniques used in this work are:

- **the documentary technique**: allowed us to consult certain books, service reports and scientific works related to edible caterpillars, host tree species for edible caterpillars and the local perception of renewable natural resources;
- **the survey technique**: the interviews focused on the identification of host tree species for edible caterpillars, as well as the informant's point of view on the local population's perception of the availability of host tree species for edible caterpillars in the Yangambi Biosphere Reserve;
- **direct observation**: hikes in the forest were carried out for field observations and sample collection.

To identify the species of edible caterpillars, we showed the respondents, during the surveys, the photos of the edible caterpillars of Tshopo, found in the works of LISINGO *et al.* (2010), ONGAGOLA *et al.* (2019) and LOOLI *et al.* (2021) and from these photos, they gave the vernacular names of each edible caterpillar.

The trees were determined at the Herbarium of the Faculty of Agronomy Institute in Yangambi based on local collections and the work of TAILFER (1989), PAUWELS (1993) and WILKS and ISSEMBE (2000).

2.3.2. Data processing and statistical analyses

To statistically analyze the socio-demographic aspects, ethnobotanical aspects and the perception of the local population of the availability of host tree species for edible caterpillars in the Yangambi Biosphere Reserve, we used the calculations of: percentage, mean, standard deviation and variance.

To analyze the factors that influence the perception of the local population of the availability of host tree species for edible caterpillars, we used the Chi-square test.

3. RESULTS

3.1. Species of host trees for edible caterpillars

A total of 35 species of host trees for edible caterpillars and 12 species of edible caterpillars were recorded during the survey. *Amphimas pterocarpoides, Erythrophleum suaveolens, Uapaca guineensis* are each colonized by 3 species of edible caterpillars, or 25%. They are followed by *Millettia laurentii, Petersianthus macrocarpus and Ricinodendron heudelotii* with 2 species each, or 16,7%. The other species of host trees for edible caterpillars are each conquered by 1 species, or 8,3%.

The 35 species of host trees for edible caterpillars recorded in the study area belong to 17 families, 8 orders, 2 classes, 2 sub-phyla and 1 phylum. The observation of our results also allows us to note the numerical superiority of *Fabaceae* with 34,4% of genera and 33,3% of species.

3.2. Socio-demographic aspects

The sample of this study consists of 162 people, of which 67,9% are men and 32,1% are women; 35,2% are of secondary education level, 29,6% are of primary education level, 22,8% are of higher education level and 12,3% are illiterate; 40,1% are farmers, 19,1% are foresters, 14,8% are public and private civil servants, 11,7% are traders, 8,6% are fishermen and 5,6% are respondents doing other activities.

3.3. Uses of edible caterpillar host trees

Out of 35 species of edible caterpillar host trees, 25 species, or 71,4%, are used, ex-aequo, as medicinal plants and timber trees; 16 species, or 45,7%, are used as fuelwood trees; 9 species, or 25,7%, are used as food plants and finally, 1 species, or 2,9% is used as an ichthyotoxic tree.

These results reveal that 31,4% of edible caterpillar host tree species have 1 use, 28,6% have, ex-aequo, 3 uses and 2 uses and 11.4% have 4 uses.

Note that the average use of caterpillar host tree species is 2,17 uses, the standard deviation is 1,043 uses and the variance is 1,087 uses; this implies that there is a moderate dispersion or variability of uses of caterpillar host tree species compared to the average, because the values are close to each other.

3.4. Local perception of the availability of edible caterpillar host tree species

Figure 2 presents the local perception of the availability of edible caterpillar host tree species in the Yangambi Biosphere Reserve.

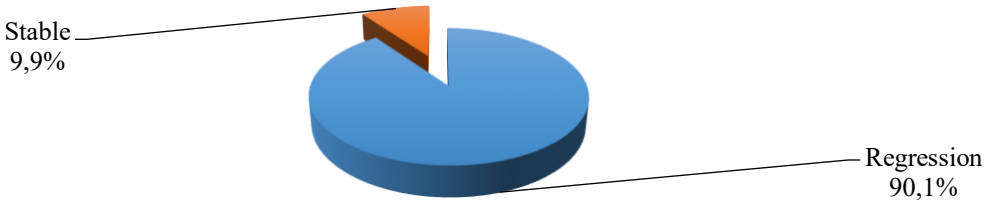

Figure 2: Local perception of the availability of edible caterpillar host tree species

It appears from Figure 2 that 90,1% of respondents noted that the edible caterpillar host tree species in the Yangambi Biosphere Reserve are in decline compared to 9,9% of optimistic respondents, who believe that these species are stable.

3.5. Influence of socio-demographic variables on the local perception of the availability of edible caterpillar host tree species in the Yangambi Biosphere Reserve

3.5.1. Influence of gender

Figure 3 below illustrates the influence of gender on the local perception of the availability of edible caterpillar host tree species in the Yangambi Biosphere Reserve.

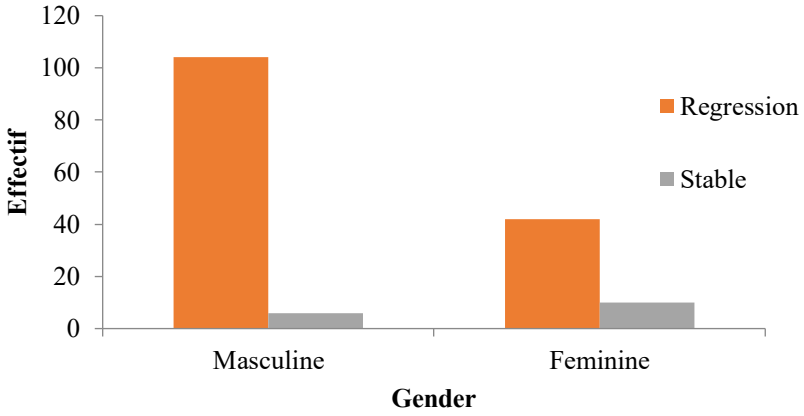

Figure 3: Influence of gender on local perception of the availability of edible caterpillar host tree species

It appears in this figure that men observed the regression of edible caterpillar host tree species in the Yangambi Biosphere Reserve more (94,5%) than women (80,8%). The difference between the sexes is statistically significant (p-value=0,006), so the local perception of the availability of edible caterpillar host tree species is influenced by gender.

3.5.2. Influence of the level of education

Figure 4 below shows the influence of the level of education on the local perception of the availability of edible caterpillar host tree species in the Yangambi Biosphere Reserve.

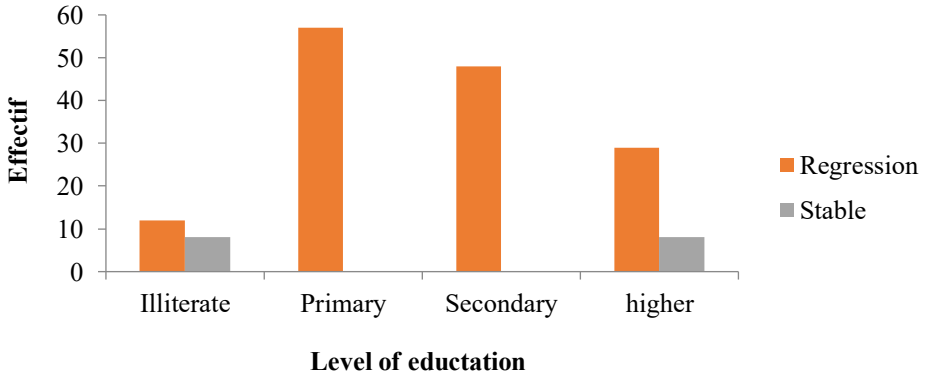

Figure 4: Influence of the level of study on the local perception of the availability of edible caterpillar host tree species

This figure 4 indicates that the respondents at the primary and secondary levels all noticed the regression of edible caterpillar host tree species in the Yangambi Biosphere Reserve. The difference resulting from the comparison of these distributions is statistically highly significant (p-value=0,000), therefore the local perception of the availability of edible caterpillar host tree species is influenced by the level of study.

3.5.3. Influence of main activities

Figure 5 below shows the influence of main activities on the local perception of the availability of edible caterpillar host tree species in the Yangambi Biosphere Reserve.

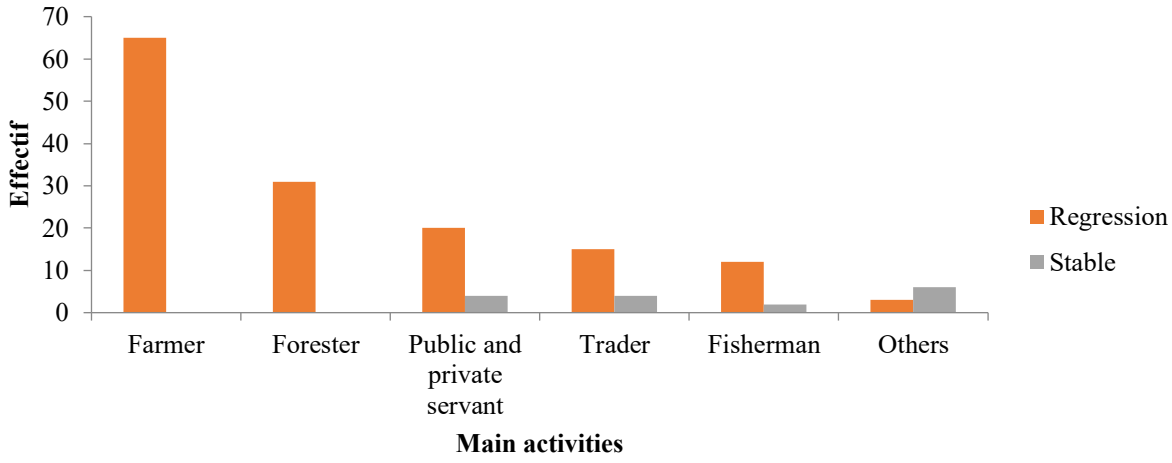

Figure 5: Influence of main activity on Local Perception of the Availability of Edible Caterpillar Host Tree Species

It follows from this Figure 5 that farmers and foresters all perceived the regression of edible caterpillar host tree species in the Yangambi Biosphere Reserve. The difference that results from the comparison of these distributions is statistically highly significant (p-value=0,000), therefore the local perception of the availability of edible caterpillar host tree species is influenced by the main activity.

3.6. Species of host trees for edible caterpillar that have become rare

Figure 6 shows species of host trees for edible caterpillar that have become rare in the Yangambi Biosphere Reserve.

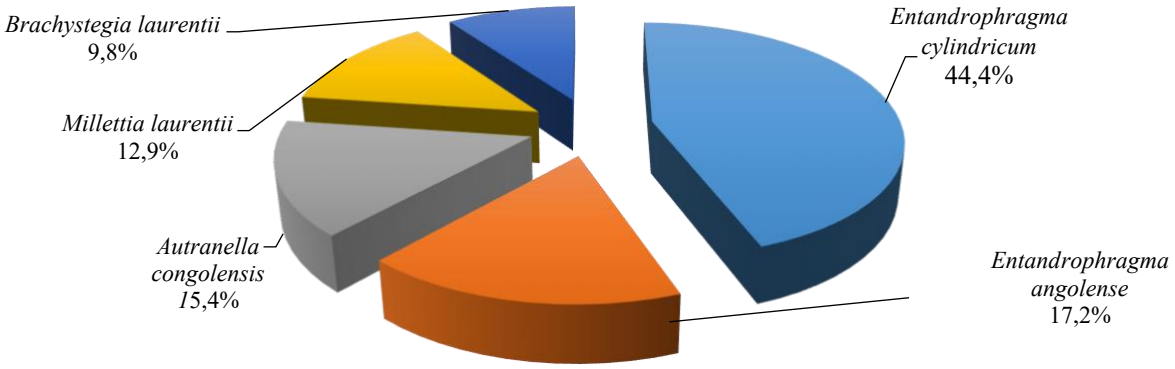

Figure 6: Species of host trees for edible caterpillar that have become rare

Figure 6 shows that *Entandrophragma cylindricum* is the rarest edible caterpillar host tree species (44,4%), followed by *Entandrophragma angolense* (17,2%), *Autranella congolensis* (15,4%), *Millettia laurentii* (12,9%) and *Brachystegia laurentii* (9,8%).

4. DISCUSSION OF RESULTS

4.1. Host tree species and their edible caterpillars

The results of this study show that 35 edible caterpillar host tree species and 12 edible caterpillar species were clearly recorded in the Yangambi Biosphere Reserve. The 35 edible caterpillar host tree species recorded in the study area belong to 17 families, 8 orders, 2 classes, 2 sub-phyla and 1 phylum. The observation of the results also allows us to note the numerical superiority of *Fabaceae* with 34,4% of genera and 33,3% of species.

These results corroborate those found by Okangola *et al.* (2019), who identified in his study 32 species of host plants for edible caterpillars and 12 species of edible caterpillars, the majority of which is dominated by tree species of the *Fabaceae* family with 25% of different species. Lisingo *et al.* (2010) confirm these results, by listing in his study, 32 species of plants whose leaves are consumed by caterpillars and 12 species of edible caterpillars, these plants are predominantly *Fabaceae*. Looli *et al*. (2021) confirm these results by identifying the host plants for edible caterpillars, the majority of which are *Fabaceae* with 33,1% of species.

This similarity of the results obtained would be justified by the fact that the Yoko Forest Reserve and the Yangambi Biosphere Reserve are part of the same forest ecosystem. The numerical superiority of *Fabaceae* would be explained by the high number of individuals that make up the species in the study environment. It would also be justified by the fact that *Fabaceae* have many species with large feet occupying large areas.

4.2. Uses of edible caterpillar host tree species

In this study, we found that the edible caterpillar host tree species in the Yangambi Biosphere Reserve are used as medicinal plants, timber trees, energy trees, food plants and Ichtyotoxic tree. 71,4% of edible caterpillar host tree species are used, ex-aequo, as medicinal plants and timber trees, 45,7% are used as energy trees.

This observation is consistent with that of Lisingo *et al*. (2010), who also report in their study that the host plants of the caterpillars are mainly used by the population as medicinal plants, charcoal trees and timber, very few are food.

These uses would be justified by the economic and financial crisis that our country is going through, not allowing the local population to buy pharmaceutical products, the latter increasingly resorts to traditional herbal medicines for their health; the increased needs for construction and furniture, as well as the search for profits lead to an abusive exploitation of timber from species of host trees for edible caterpillars and finally, the local population having no other energy alternatives, has no other choice but to use energy wood from species of host trees for edible caterpillars.

4.3. Local perception of the availability of host trees for edible caterpillars

The data collected during this study show that 90,1% of respondents note that the species of host trees for edible caterpillars in the Yangambi biosphere reserve are in decline, against 9,9% of optimistic respondents, who believe that these trees are stable.

Generally, in several studies, interviewees noted a decline in woody species following their use by the population (Traore *et al*., 2011, Beriname *et al*., 2018 and Yaovi *et al*., 2021), even if some people have a more optimistic opinion, believing that these resources are stable.

5. CONCLUSION

This study focused on the perception of the local population of the availability of edible caterpillar host tree species in the Yangambi Biosphere Reserve (Tshopo Province, DRC).

The main objective of this study was to analyze the perception of the local population of the availability of edible caterpillar host tree species in the Yangambi Biosphere Reserve.

At the end of this study, we can retain the following : a total of 35 species of host trees for edible caterpillars and 12 species of edible caterpillars were listed, these species were predominantly *Fabaceae* with 34,4% of genera and 33,3% of species; 67,9% of respondents were men; 35,2% had a secondary education ; 40,1% were farmers; 71,4% of species of host trees for edible caterpillars are used, ex-aequo, as medicinal plants and timber trees; 90,1% of respondents noted that the species of host trees for edible caterpillars in the Yangambi Biosphere Reserve were in decline; population perception was influenced by gender (p-value=0,006), education level (p-value=0,000) and activity (p-value=0,000); *Entandrophragma cylindricum* was the rarest edible caterpillar host tree species (44,4%) in the Yangambi Biosphere Reserve.

REFERENCES

Beriname, B., Kouami, K., Nadedjo, B., Dabitora, K., Ayitre, A., Macomba, B., & Georges, A. (2018). Ethnobotanical study of woody species of dry savannahs in Northern Togo: diversity, uses, importance and vulnerability. *Biotechnol. Agron. Soc. Environ., 22*(3), 152-171.

Bomolo, O. (2017). *Entomophagy, ecology and exploitation system of the edible caterpillar "Elaphodes lactea (Gaede 1932) of the open forest of the Miombo type of the Lubumbashi plain, Haut-Katanga (D.R. Congo)".* Thesis, University of Lubumbashi, Democratic Republic of Congo. 115p.

CARS asbl (2015). *Land use of the Yangambi Biosphere Reserve*, 42p.

Djogbenou, C.P., Glele, R.K., Arouna, O., & Sinsin, B. (2011). Analysis of local perceptions of participatory forest management in Benin. *VertigO - the electronic journal in environmental sciences,* 11-24.

Lisingo, J, Wetsi, J.L., & Ntahobavuka, H. (2010). Survey on edible caterpillars and the various uses of their host plants in the districts of Kisangani and Tshopo (D.R. Congo). *Geo-Eco-Trop., 34,* 139-146.

Looli, B.L., Dowiya, B, Bosela, O., Salumu, P., Monzenga, J.C., Posho, B., Mabossy-Mobouna, G., Latham, P., & Malaisse, F. (2021). Harvesting techniques and sustainable exploitation of edible caterpillars in the Yangambi region, D.R. Congo. *Geo-Eco-Trop, 45*(1), 113-130.

Malaisse, F. & Parent, G. (1980). Contribution to the study of the open forest ecosystem (Miombo), note 31: Edible caterpillars of southern Shaba (Zaire). *Les Naturalistes Belges, 61*(1), 2-24.

MECNT (2020). *General management plan for the Yangambi biosphere reserve*. 56p.

Okangola, E., Dudu, A., & Upoki, A. (2019). *The bioecology of edible caterpillars and screening of host plants*. European University Editions, Mauritius, Republic of Moldova. 257p.

Pauwels, L. (1993). *Guide to trees and shrubs in the Kinshasa-Brazzaville region*. Jard. Bot. Nat. of Belgium. 493 p.

Tailfer, Y. (1989). *The dense forest of Central Africa. Practical identification of the main trees.* Agency for Cultural and Technical Cooperation & CTA, Wageningen, Volume 1 (456 p) and 2 (1271 p).

Traore, L., Ouedraogo, I., Ouedraogo, A., & Thiombiano, A. (2011). Perceptions, uses and vulnerability of woody plant resources in the South-West of Burkina Faso. *Int. J. Biol. Chem. Sci., 5*(1), 258-278.

Wilks, M.C., & Issembé, Y.A. (2000). *Practical identification guide: the trees of Equatorial Guinea, Continental Region.* CUREF Project, Bata, Equatorial Guinea, 546 p.

Yaovi, C.R., Hien, M., Kabore, S.A., Sehoubo, Y.J., & Somda, I. (2021) Use and vulnerability of plant species and adaptation strategies of populations living in the Kou Classified Forest (Burkina Faso). *Int. J. Biol. Chem. Sci., 15*(3), 1140-1157.