Forests and Forest Products Journal

RESEARCH ARTICLE

Forests and Forest Products Journal 23: 14-21

Assessment of Marketing and Utilization of Wild Edible Frogs (*Hoplobatrachus occipitalis*) in Selected Markets in Ogun State, Nigeria

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Abstract

Non-timber forest products (NTFPs) include all biological materials (wood and animals) excluding industrial round wood and related products that are found within or at the edge of the forest. Among African NTFPs delicacies that are yet to be fully exploited for their socio-economic importance are edible frogs. Unlike fish and livestock, edible frogs are not easily come-by in southwestern Nigerian markets. Knowledge of consumers' preference and marketing of edible frogs is scanty. This study was therefore carried out to investigate marketing and utilization of edible frogs in five major markets (Ayetoro (AM), Lafenwa (LM), Kuto (KM), Sabo (SM) and Awolowo (AWM)) in Ogun State, Nigeria. Using purposive and snowball sampling techniques, data were collected through personal observation and in-depth interview of 144 respondents spread among three different categories: consumers (70.83%), retailers (12.5%) and wholesalers (16.67%). Result showed that consumers purchased edible frogs from Sabo (26.5%), Ayetoro (21.5%), Kuto (20.6%), Awolowo (19.6%) and Lafenwa (11.8%) markets, with preference for dried (63.7%), roasted (19.6%) and fried (8.8%) forms, used most especially in stew (51%) and melon soup (28.2%). The retailers in Lafenwa (27.27%), Sabo (27.27%), Ayetoro (18.18%), Awolowo (18.18%) and Kuto (9.09) markets purchased edible frogs from middlemen in Ilara (57.1%), Ibadan (28.6%) and Republic of Benin (14.3%), who sourced them majorly from the wholesalers in Sokoto (45.8%), Zaria (25%), Kano (20.8%) and Lokoja (8.3%). The wholesalers gave no detailed account of their sources due to difficult accessibility or other logistics. For more economic gain and easy accessibility, domestication of edible frogs in southwestern Nigeria should be highly encouraged.

Keywords: Edible Frogs, Marketing, Non-timber Forest Products

Cite this article as: *Adewale, R. O., Odebiyi, B. R., Sule, S. O., Durojaiye, A. F., Ojetayo, T. A., Oyetunji, O. T., Mufutau, R. A. and Muibi, M. T. (2023). Assessment of Marketing and Utilization of Wild Edible Frogs (Hoplobatrachus occipitalis) in Selected Markets in Ogun State, Nigeria. Forests and Forest products Journal, 23: 14-21.*

INTRODUCTION

Non-timber forest products (NTFPs) include "all biological materials excluding industrial round wood and related products like sawn timber, wood chips, wood-based panel and pulp" (Wickens, 1991) of which edible frogs are inclusive. Edible frogs are from vertebrate class, amphibian family and Anura order (Oldham, 2001). Consequent upon their recent decline due to increasing demand by the ever-growing human population, edible frogs have been listed as threatened species in the red list of International Union for the Conservation of Nature and Natural Resources (IUCN, 2020). For decades, frogs have been collected as pets, food, medicines and raw materials for industries, teaching and research from the forest. The recent rise in the market and utilization of edible frogs in Nigeria cannot go un-noticed (Akinyemi

and Efenakpo, 2015; Efenakpo *et al.*, 2016). Since edible frogs have now been found to be more nutritious and palatable than some other protein sources (Oduntan *et al.*, 2012), their utilization is expected to further increase. A number of studies have recorded places where edible frogs were bought and sold in Nigeria. These places include but not limited to Lagos State (Alimosho LGA; Abule Egba), Oyo state (Akinyele and Ibadan north LGA; Ibadan), Ogun state (Odeda LGA), Anambra State (Anambra East LGA; Aguleri) and Sokoto State (Sokoto North and Sokoto South LGA; Wamakko) (Onadeko *et al.*, 2011; Oduntan *et al.*, 2012; Akinyemi and Efenakpo, 2015; Efenakpo *et al.*, 2015; Sanusi *et al.*, 2016; Yusuf *et al.*, 2018). Although, various species of edible frogs have been identified in Nigerian markets. *Hoplobatrachus occipitalis* is the most widely consumed in Nigeria because of its large body mass and its availability (Mohneke, 2011; Oduntan *et al.*, 2012; Akinyemi and Efenakpo, 2015).

Unlike in the past, hawkers of edible frogs in various markets are becoming noticeable, similar to fish and livestock. It appears there is a shift in consumers' preference in protein sources from fish and livestock to edible frogs. This may not be unconnected with the sudden rise in the cost of fish and livestock proteins, which may be partly due to the ever increasing human population and/or economic crises rampaging many nations, especially developing countries. Aside the emerging current shift in consumer's preference in protein sources, the use of the skin of edible frogs for the production of leader materials, souvenirs and other industrial materials, appears to also be on the increase. This cumulative rise in the demand of edible frogs may attract adverse economic and ecological implications, if adequate measures are not taken into consideration. It is a common knowledge that edible frogs have not been successfully domesticated in Nigeria (Efenakpo *et al.*, 2015). Among necessary steps towards domesticating edible frogs is to conduct survey to identify sources, marketing channel and utilization of the animal in Nigeria. This will go a long way to help policy makers in their decision making with regards to rearing of edible frogs. This study therefore investigated the marketing and utilization of edible frogs in some selected major markets of Ogun State, Nigeria

METHODOLOGY

Study Area

This study was carried out in selected communities in Ogun State, Nigeria. The State, which was created in 1976, has a land mass of about 17,000 km^2 and 20 local government areas distributed across four major divisions: Egba, Ijebu, Remo and Yewa/Awori. The Yoruba language is the indigenous language spoken by most of the inhabitants of Ogun state. Being a rainforest area with characteristically sandy clay, sandy loam and loamy sand, residents of Ogun State are predominantly farmers with a population of about 3,760,000. The state is located between latitude 6.2°N and 7.8°N and longitude 3.0°E and 5.0°E and shares boundaries with Republic of Benin (West), Oyo State (North), Lagos State (South) and Ondo and Osun States (East). The climate is tropical, characterized with two distinct seasons (dry and wet seasons), with an annual rainfall of about 1,000mm and an average temperature of about 29.34^oC.

Data Collection

Both primary and secondary data were used for this study. Primary data were obtained through the use of semi-structured questionnaire and personal observation, while journals articles and books obtained from internet were used to collect secondary data. Data were collected from a total of 144 respondents with vast experience (not less than 5 years) in marketing and utilization of edible frogs using purposive and snowball sampling techniques. The respondents were distributed among different categories based on their relationships with edible frogs: cconsumers (70.83%), frog retailers (12.5%) and wholesalers (16.67%). Based on these categories, selected respondents were interviewed and keenly observed together with their customers during transactions. From 20 local government areas (LGAs) in Ogun State, three LGAs were conveniently selected. The 113 respondents (consumers and retailers of edible frogs) interviewed were distributed as follows: Ayetoro market in Yewa North LGA (n=22 and

n=2); Lafenwa market n=12 and n=1); Kuto market (n=21 and n=3) and Sabo market (n=27 and n=3) in Abeokuta LGA as well as Awolowo market (n=20 and n=2) in Shagamu LGA. Seven respondents (retailers of edible frogs) were further interviewed, they were distributed: Ilara (n=4), Ibadan (n=2) and Republic of Benin (n=1) via phone calls. The remaining 24 respondents (wholesalers of edible frogs) from whom previous retailers usually got their edible frogs were also interviewed via phone calls (Figure 1). Data collected was coded to obtain quantitative data for statistical analyses. The data was then subjected to descriptive statistics (mean, pie chart, percentage, and bar chart) using Statistical Package for Social Sciences (SPSS), version 20.

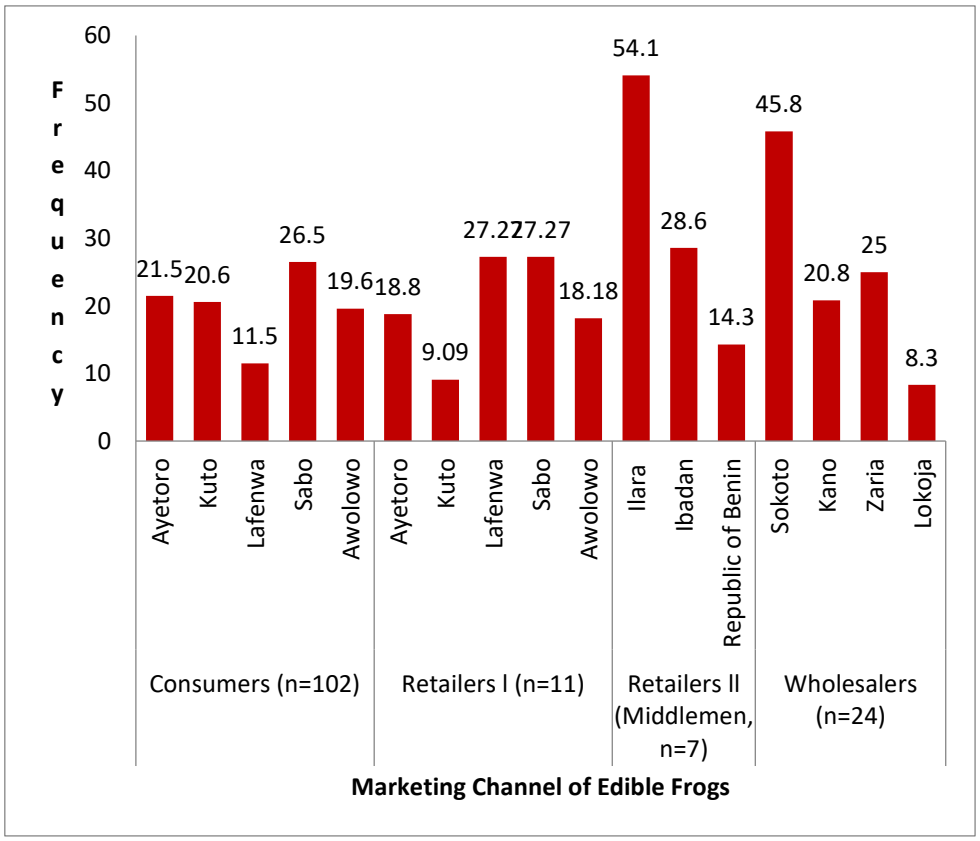

Figure 1: Distribution of various categories of respondents

RESULTS AND DISCUSSION

Demographic Characteristics of Respondents

A combined total of 144 frog wholesalers and consumers were interviewed in this study (Figure 1). However, frog collectors could not be interviewed due to logistic issues (e.g. inaccessibility, lack of mobile networks in their locations, unwillingness of the wholesalers to link researchers with frog collector, etc). The challenges of meeting with frog collectors is not peculiar to this study. Apart from Mohneke (2011) who was able to access frog collectors in his study, many studies rarely traced the marketing of edible frogs to frog collectors. For some reasons, frog collectors have always been difficult to reach. Table 1 shows that a greater percentage of the wholesalers (58.4%), retailers (50%) and consumers (65%) fell within the age range of 31 – 50 years. This indicates that a high percentage of frog marketers and consumers are still within their active age, which is also the economically productive age range. The results indicated that female respondents (79.2% wholesalers, 88.9% retailers and 82% consumers) dominated the edible frog enterprise. It was observed that unlike in northern Nigeria, where the male gender are

predominant in the sale of food stuff, the market in the southwestern part of Nigeria is usually dominated by females (Eekeran, 1995; Agbebi and Adetuwo, 2018).

Table 1: Demographic characteristics of respondents

Variable	Marketers					
	Wholesaler (n=24)		Retailer (n = 18)		Consumer (n=102)	
	Freq.	%	Freq.	%	Freq.	%
Tribe						
Yoruba	17	70.8	18	100	93	92.0
Igbo	6	25.0	-	-	9	8.0
Hausa	1	4.2	-	-	-	-
Sex						
Male	5	20.8	2	11.1	20	20.0
Female	19	79.2	16	88.9	82	80.0
Age Range						
<30	4	16.7	2	11.1	11	11.0
31-40	7	29.2	3	16.7	41	41.0
41-50	7	29.2	6	33.3	25	24.0
51-60	2	8.3	6	33.3	20	19.0
>61	4	16.7	1	5.6	5	5.0
Level of Education						
No formal education	6	25.0	7	38.9	15	11.0
Primary school	15	62.5	8	44.4	33	54.0
Secondary school	3	12.5	3	16.7	50	32.0
Tertiary education	-	-	-	-	4	3.0
Primary Occupation						
Frog trade	12	50.0	8	44.4		
Petty trading	5	20.8	3	16.7	9	9.0
Farming	-	-	-	-	7	7.0
Artisan	4	16.7	-	-	15	12.0
Private business	-	-	-	-	4	3.0
Others	3	12.5	7	38.9	-	-
Total	**24**	**100**	**18**	**100**	**102**	**100**

Although, a small portion of the respondents had secondary education (12.5% wholesalers, 16.7% retailers and 32% consumers), a higher percentage (62.5% wholesalers, 44.4% retailers and 54% consumers) of the respondents had primary education. It is however not surprising to find fewer percentage of the consumers (3%) with tertiary education. This is an indication that edible frogs are not likely traded or consumed by the elites, rather by farmers, artisan, petty traders and private business owners. It is believed that their level of western education is enough to help each category of respondents make good decision in their trade and other activities. Many of the retailers (38.9%) and few of the wholesalers (25%) and consumers (11.0%) interviewed did not have any form of formal education. Majority of the respondents (70.8% wholesalers, 100% retailers and 92% consumers) were of the Yoruba tribe, while very few were of the Igbo (25% wholesalers and 8% consumer) and Hausa tribes (4.2% wholesalers). This is probably because the study was conducted in southwestern part of Nigeria,

where the Yoruba tribe dominates. A number of the marketers had other trades/jobs besides selling edible frogs. It appears like trading of edible frogs was on part-time bases for both wholesalers (50%) and retailers (44.4%), as the two categories combined edible frog trading together with other trades.

Table 2: Distribution of wholesalers in relation to socio-economic characteristics of edible frogs

Variable	Number of Retailer	%
Forms of Sales		
Basket	7	22.58
Counting	7	22.58
Bag	13	41.94
Others	4	12.90
Preservation		
Smoking	23	74.19
Frying	8	25.81
Years of Experience		
1-5	8	25.80
6-10	14	45.16
11-15	4	12.90
16-20	2	6.45
> 21	3	9.68
Association		
Yes	7	22.58
No	24	77.42
Economic return per trip		
₦100-5000	4	12.90
₦ 5,001-10,000	7	22.58
₦ 10,100-20,000	3	9.68
₦ 20,100-30,000	11	35.48
>₦30,100	6	19.36
Profit Usage		
Feeding	17	54.84
Paying off bills	10	32.26
Investment	4	12.90
Total	**31**	**100**

Socio-economic Characteristics of respondents

Tables 2 and 3 as well reveal the socio-economic characteristics of the marketers. The retailers (though small in number) from whom the consumers from Ayetoro market (21.5%), Kuto market (9.09%), Sabo market (27.27%), Awolowo market (18.18%), Lafenwa market (27.27%) purchased their edible frogs were reported to be from Ilara (54.1%), Ibadan (28.6%) and Republic of Benin (14.3%), who sourced their edible frogs from northern Nigeria. This indicates that all the edible frogs were supplied from the northern part of Nigeria to the retailers in southwestern Nigeria (Ilara, Ibadan, etc) and the Republic of Benin where buyers from various places in Nigeria obtain them. Akinyemi and Efenakpo (2015) confirmed the sales of edible frogs in Ibadan at Arisekola, Moniya, Bodija, Ojoo and Ijaiye markets. The wholesalers did not volunteer detail information on frog collectors. All effort to get a link to frog collectors proved abortive as they were reported to live in rural areas devoid of mobile telecommunication network accessibility. It is also likely that the wholesalers intentionally did not want to link the researchers with the frog

collectors. Generally, most consumers are unaware of the location of frog collectors or frog farmers (Efenakpo *et al.*, 2016). From the results of this study, it is obvious that majority of the retailers got their edible frogs supply from Sokoto in northern Nigeria. The work of Yusuf *et al.* (2018) confirmed the availability of edible frogs in Sokoto but emphasized only on economic transactions of frogs, rather than frog consumers because most Sokoto residents have no religious value for frog consumption. This is similar to the case in Turkey (Baygar and Uzgur, 2010) and Sokoto in Nigeria (Yusuf *et al.*, 2018), where the people are known to market almost all of their collected frogs rather than consume them.

According to the retailers, the edible frogs were usually packaged for sales in different sizes at different prices (Table 2). The frogs were sold in bags (41.94%), basket (22.58%), counting forms (22.58%) and others (12.29%). Most of the retailers obtained their edible frogs from middlemen, except for one retailer in Ayetoro who claimed to purchase edible frogs directly from wholesalers in northern Nigeria without the involvement of the middlemen. Most retailers (74.19%) opined that edible frogs were mainly preserved through smoking (74.19%) rather than through frying (25.81%) process. A high number of retailers (45.16%) have 6-10 years marketing experience, followed by 1-5 years marketing experience (25.8%). There were very few retailers with more than 21 years of edible frog marketing experience (9.68%), thus showing that edible frog business is currently growing. This may be one of the reasons why many of the retailers (72.42%) had no affiliated association and as such were still able to generate tangible income from the business. While about 35.48% of the retailers (majority of whom were middlemen) claimed to realize ₦20,000 to ₦30,000 on a business trip, others (majority of whom were retailers) claimed to generate less. Nonetheless, all the marketers benefited from the edible frog business as it helped to meet their family demand for food (54.84%), augmented their bills (32.26%) and some money to invest in other business (12.9%) (Table 2). Soaga *et al.* (2014) reported sales of bush meat business in Nigeria to be profitable.

Utilization of Edible Frogs

Table 3 shows that majority of the consumers preferred to make stew with edible frogs (51%) or loved it in melon soup (38.2%). Many of the consumers (97.1%) normally sourced frogs from the market while only few (2.9%) hunt it by themselves. This is similar to the report of Efenakpo *et al.* (2016) who acknowledged that majority of consumers of edible frogs at Ibadan purchased them from their vicinity, except for few collectors. Efenakpo *et al.* (2016) affirmed that neither frog farming nor frog collection are common in southwestrern Nigeria, high percentage of the edible frogs being consumed in the southwestern Nigeria are sourced from northern Nigeria. Almost all the respondents (97%) have feedback about the taste and richness of edible frogs. All respondents opined that edible frogs were being prepared either by rinsing with ordinary water or salt water before cooking to give it a nice (23.5%), very good (37.3%) and very delicious (36.3%) taste (Table 3). A higher number of consumers (65%) preferred dried frog (63.7%) to roasted (19.6%), fried (8.8%) and fresh frogs (5.8%), especially in stews (51%) and melon soup (38.2%).

Table 3: Distribution of consumers' utilization of edible frogs

Variable	Freq.	Percentage
Source of frog		
Bought	99	97.1
Caught	3	2.90
Preferred Soup		
Stew	52	51.0
Melon soup	39	38.2
Okra soup	3	2.90
Vegetable	1	1.00

Soup	3	2.9
Others	4	3.9
Taste of frog		
very good	38	37.3
very delicious	37	36.3
Nice	24	23.5
Others	3	2.9
Preparation of frog before cooking		
Rising with warm water only	102	100.0
Rising with warm water and salt	102	100.0
Frog parts consume		
Legs	22	20.4
Trunk-Head	36	34.7
Whole Frog	44	44.9
Frog complementary food		
Rice	48	48.0
Eba	16	15.7
Semo	11	10.8
Pounded yam	8	7.8
Others	15	14.7
All	4	3.9
Choice of form of edible frogs		
Dried	65	63.7
Fresh	6	5.9
Roasted	20	19.6
Fried	9	8.8
All	2	2.0
Total	**102**	**100**

Consumers' preference for dried and whole part has been reported in various studies in Africa (Efenakpo *et al.*, 2016). In Europe, whole frogs or only frog legs are commonly consumed as delicacies (Altherr *et al.*, 2011; Mohneke, 2011). Most consumers in this study prefer to consume the whole frog (44.9%), while some will consume only the legs (20.4%) or trunk-head (34.7%). Frog legs are often valued as delicacies and item for exportations in some part of the world, especially in Turkey (Baygar and Uzgur, 2010). It seems the consumption of edible frogs by consumers was a choice not dependent on income level. This is against the opinion of Eekeran (1995) who concluded that consumption is a function of income. The common food in the southwestern part of Nigeria is rice (48%), which was reported to be used by consumers to complement frog consumption; next to it was eba (15%) (a common stable food in Nigeria, usually prepared with cassava flour). Pounded yam (7.8%) and maize flour or semovita (10.8%) were seldom used to complement frog consumption. At present, the prices of edible frogs vary slightly from place to place. For instance, from retail markets to consumers, it was reported that edible frogs were usually sold in counting or park depending on their sizes; 3 pieces of small to medium sized frogs were sold at ₦200 to ₦400, while 5 pieces of large sized frogs were sold for ₦500 to ₦700. This current price of edible frogs is beginning to affect the preference of the consumers. This is contrary to the reports of some studies conducted in Ibadan, in which a pack comprising of six edible frogs were sold for between ₦50 - ₦200 in 2015 and 2016 (Akinyemi and Efenakpo, 2015; Efenakpo *et al.*, 2016).

CONCLUSION

The need for cheaper, affordable, readily available and qualitative animal protein in human diet cannot

be over emphasized. This study revealed that dried edible frogs served as alternative source of protein and were traded in some major markets in Ogun State in order of consumers' patronage; Sabo market >Ayetoro market > Kuto market > Awolowo market > Lafenwa market. Currently, edible frogs are still not domesticated nor collected much in southwestern part of Nigeria, they are sourced from northern parts of the country. This may explain why they are mostly available in dried, smoked and fried forms and distributed by very few marketers compared with other protein sources.

REFERENCES

Agbebi, F. O. and Adetuwo, K. I. (2018). Analysis of socio-economic factors affecting fish marketing in Igbokoda Fish Market, Ondo State, Nigeria. *International Journal of Environment, Agriculture and Biotechnology,* 3(2): 512-521.

Akinyemi, A. F. and Efenakpo, D.O. (2015). Frog consumption pattern in Ibadan, Nigeria. *Journal for Studies in Management and Planning*, 1(3): 522-531.

Altherr, S., Goyenechea, A., and Schubert, D. (2011). Canapés to extinction: the International trade in frogs' legs and its ecological impact. A report by Pro Wildlife, Defenders of Wildlife and Animal Welfare Institute (eds.), Munich (Germany), Washington, D.C. (USA).

Baygar, T. and Uzgur, N. (2010). Sensory and chemical changes in smoked frog (*Rana esculanta*) leg during cold storage. *Journal of Animal and Veterinary Advances,* 9 (3): 588-59.

Eekeran, E. A. (1995). Bushmeat in Africa as a Natural Resource with Environmental Implications. *Environmental Conservation*, 10: 130-137

Efenakpo, O. D., Ayodele, I.A., and Ijeomah, H. M. (2016). Assessment of frog meat utilization in Ibadan, Oyo State, Nigeria. *Journal of Research in Forestry, Wildlife and Environment*, 8(3): 32-43.

Efenakpo, O. D., Ijeomah, H. M. and Eniang, E. A. (2015). Assessment of frog meat trade and nutritional composition of selected anura species in Ibadan, Nigeria. *Production Agriculture and Technology Journal.* 11 (2): 203-218.

IUCN. (2020). The IUCN Red List of Threatened Species; IUCN SSC Amphibian Specialist Group: Cambridge, UK.

Mohneke, M. (2011). (Un)sustainable use of frogs in West Africa and resulting consequences for the ecosystem. Dissertation, Humboldt University Berlin.

Oduntan, O. O., Soaga, J. A., and Jenyo-Oni, A. (2012). Comparison of edible frog (*Rana esculenta*) and other bush meat types: Proximate composition, social status and acceptability. *Journal of Environmental Research and Management*, 3(7): 124-128

Oldham, R. S. (2001): Biodiversity and Hyperdiversity in Nigerian amphibians: *The Nigerian field*, 65:72-91.

Onadeko, A. B., Egonmwan, R. I. and Saliu, J. K. (2011). Edible amphibian species: local knowledge of their consumption in southwest Nigeria and their nutritional value. *West African Journal of Applied Ecology*, 19: 67-76

Sanusi, A. Z., Yusuf, A., Jibir, M., Danmusa, A. M. and Ribah, M. I. (2016). Consumer attitudes to edible frog (*Rana esculenta*) meat in Sokoto metropolis, Sokoto State, north-western Nigeria. *International Journal of Scientific and Engineering Research*, 7 (6): 799-802.

Soaga, J. A., Shotuyo, A. L. A., Oduntan, O. O., and Fatoki, J. G. (2014). Economic analysis of bushmeat trade in Abeokuta, Ogun State. *Journal of Agricultural Science and Environment,* 14:97-108.

Yusuf, A., Koko, H. M., Sani, I., Kabir, M.S. and Jibir, M. (2018). Consumer attitudes to edible frog (*Rana esculenta)* meat in Sokoto metropolis, north-western Nigeria. *The International Journal of Engineering and Science,* 65:61-63.

Wickens, G.E. (1991). Management issues for development of non-timber forest products. *Unasylva* 42 (165): 3-8.