

Socio Economic Analysis of Forest Edible Insects Species Consumed and Its Role in the Livelihood of People in Lagos State

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Abstract

The study surveyed the edible forest insect consumed in two Local Government areas of Lagos States, Nigeria. It also identified the socio-economic profile of the edible insect marketers, harvesting, processing and preservation techniques, seasonality, uses of insects, marketability and profitability of edible forest insect business. A total of One Hundred (100) copies of questionnaires were administered and data collected were analyzed using descriptive methods. The results were presented using bar chart, pie chart and tables. Survey results revealed that 80.61% of the respondents are married with majority falling within the age range of 25 and 35 years. Sixty-Five percent of the respondent had at least primary school education while 29.6% had no formal education. Most of the respondents (42.8%) engage in trading as their main occupation. The only commercially prevalent edible insect is the *Ralphia* palm beetle grub (*Rhynchophorus phoenics*). 50-52% of the edible insect marketers source for the insect from retailers while 30-35% source for them by catching with traps. A profit of ₦101(60Cent) – ₦500 (3.00USD) was made by 57-59% of the respondent. 60-65% of the consumers get informed about edible insect in the market and from the farm. Majority of the respondent do not consume their edible insects raw. Their processing methods range from roasting, frying and boiling. The people of this area use their edible forest insect mainly as an alternative to meat while about 20-25% uses it in treating ailment. Indications from the survey shows that since the business of edible insects requires little capital investment, time and is easy to master and a fast revenue generator; it should therefore be seriously considered in food security and poverty alleviation strategies in Nigeria.

Keywords: Edible Insects, Lagos States, Food Security, Revenue

1. Introduction

The forest and its by products, in addition to timber firewood and charcoal are of vital importance to the rural population. These include various vegetables and fruits, mushroom, edible insects etc. (Adeduntan and Bada, 2004; Ashiru 1988). Non timber forest products are important for food security, health, social and economic welfare of rural communities.

Entomophagy is the term used to describe the process of eating insects as a food source. De Foliart, 1990 described insects and other related invertebrates as a food source for people for tens of thousands of years, all over the planet. In general, insects provide a high source of protein, vitamins, minerals and low in fats. A number of insect or their products were used as food in some parts of Nigeria and to a large extent eaten as tit-bits of exclusively by children.

Hundreds of insect species have been used as human food, some of the more important groups include grasshopper, caterpillars, beetle grubs and sometimes adults, winged termites (some of which are very large in the tropics), bee, wasp, and ant brood (larvae and pupae) as well as winged ants, cicadas and a variety of aquatic insects. The commercial exploitation of food insects had led to their decline in some places. Some people propose the development of Entomophagy to provide a major source of protein in human nutrition (Fasoranti and Ajiboye, 1993). In addition, insects are noted for their ability to have a high reproductive capacity, short life cycles cost little to source and domesticate. Several species may also play an important role in traditional medicine.

According to Banjo *et al.*, The consumption of non-toxic insects therefore, should be encouraged. Insects are traditional foods in most cultures, playing an important role in human nutrition and have much nutrient to offer. The consumption of edible insects has a long history for many cultures. More than one thousand insect species, edible at some stage of their cycle. They can be reared for their high nutritional qualities and sold to the populace that regards them as delicacies. In several areas of Zimbabwe, South Africa Zambia and Nigeria, many families make fairly good living from selling insects. They are not only a source of nutrition but a source of income for economically marginal rural population. Edible insect are food resources that continue to be tapped extensively by population in the third world (De foliart, 2002, 1990, Latham, 2001).

The question is often raised whether increased harvest of insect as food might serve as a form of biological pest control. This could obviate the need for pesticide. Other benefit of entomophagy is its ability to reduce organic pollution by recycling agricultural and forestry wastes into high quality food or animal feed stuff (e.g palm weevils) they also increase environmental and economic efficient by developing and product systems (i.e silks and silk moth larvae/pupae, honey and honey bee brood).

However, on the downside, it is uncertain whether all the component of there edible insects can be absorbed by the human digestive system (Ashiru, 1988), they are susceptible to microbial attack where moisture is the key factor leading to spoilage (Anita *et al*, 2006). The problems with utilizing edible insect are the lack of social acceptance, nutritional knowledge,

information and disbelief about delicacies of these insects that are naturally abundant in our farm and forests.

The ailing economy of our nation has in recent times necessitated a shift of focus from total dependence on government jobs to exploring areas of self-employment, one of which is rearing of edible insects or Entomophagy. It requires little capital investment and time, is easy to master, and a fast revenue generator. The potential of insects need to be more seriously considered in food security and poverty alleviation strategies in Nigeria.

This study was designed to appraise the socio-economic characteristics of edible insects marketers and consumers, harvesting, processing and preservation techniques as well as its marketability as an income generating activity in Lagos State. An attempt is also made to identify factors that will encourage edible insect marketing business in order to promote it in cottage industry.

1.1. RESEARCH METHODOLOGY

1.1.1. The Study Area

The Study was carried out in two of the major edible insects commercial areas in Lagos State, namely, Itokin Local Government and Epe Local Government. These areas are high rain forest with equatorial climate and a notable dry and rainy seasons and high relative humidity for most part of the year. The dry season lasts from November to March while the rainy season starts from April and ends in October. Average daily temperature of the area ranges between 25⁰C and 35⁰C almost throughout the year.

1.1.2. Data Collection

A total of 100 traders were purposively selected based on their participation in edible insect trade in the areas listed using random sampling procedure. Data were collected mainly from primary sources and this involved the use of well structured questionnaires/interviews to get information on the perception, harvesting, processing and preservation techniques and challenges of the sampled farmers. The data collected were grouped as follows:

- Socio-economic characteristics of respondents
- Sources of awareness of edible insects
- Harvesting, processing and preservation techniques of the edible insects
- Seasonality of the edible insects
- Profitability of the trade
- Utilization of insects
- Challenges in the business

1.1.3. Data Analysis

Descriptive statistics like frequency counts, percentages and tables were used in analyzing the data obtained.

2. Results and Discussion

Table 1 shows some commonly eaten forest insects in Nigeria. Most of these insect species are found in the order Isoptera (termites), Lepidoptera (Moths), Orthoptera (Grasshoppers/crickets), Coleoptera (Beetles) and Hymenoptera (Bees). Observation on table 1 shows that edible insects consumption (Entomophagy) is a common practice in Nigeria.

According to Ekop *et al.*, 2010; and Elemo *et al.*, 2011, Yam beetle (*Heteroligus meles*) and grass-hopper (*Zonocerus variegatus*) are commonly eaten by some people in South Eastern Nigeria and some parts of Benue State while Grubs of the palm weevil (*Rhynchophorous phoenicis*) and larva of *Oryctes monoceros* are eaten in several parts of Oyo, Ondo, Osun, Ekiti, Ogun, Lagos (western Nigeria), Delta and Edo States.

During the study, Rhinoceros beetle was the most commercially available due to the High Forest vegetation nature of the study area. This study area is abundantly blessed with palms; especially *Raphia* palms which makes the insect pest to be predominant. The list of some of them is presented below in table 1 below:

Table 1. Inventory of some commonly eaten edible insects in Nigeria with their native names and consumption stage

Scientific name	Common name	Order	Family	Stage of consumption
<i>Cirina forda</i> Westwood	Yoruba: Kanni, Munimuni	Lepidoptera	Saturniidae	Larvae
<i>Bunaea alcinoe</i>	Igbo- Egu	Lepidoptera	Saturniidae	Larvae
<i>Rhynchophorus</i> <i>Phoenics</i>	Yoruba: Ipe, Itun	Coleoptera	Curculionidae	Larvae
<i>Oryctes spp</i> Oliver	Yoruba: Ogongo	Coleoptera	Scarabaeidae	Larvae
<i>Analeptes trifasciata</i>	Ibo: Ebe Rhinocerus beetle	Coleoptera	Scarabaeidae	Larvae
<i>Anaphe venata</i>	Caterpillar Yoruba: Ekuku	Lepidoptera	Notodontidae	Larvae
<i>Heteroligus meles</i> Billberger	Yam beetle	Coleoptera	Scarabaeidae	Adults
<i>Zonocerus Variegatus</i> ,	Grasshopper Yoruba: Tata Ibo: abuzu, Ukpana	Orthoptera	Pyrgomorphidae	Adults
<i>Apis mellifera</i>	Honeybee Yoruba: Oyin	Hymenoptera	Apidae	Eggs, Larvae and Pupae
<i>Macrotermes bellisocous</i>	Termites, Ibo- Aku Yoruba: Esunsun	Isoptera	Termitidae	Winged adults, queen
<i>Brachytrupes</i>	Yoruba: Ire Cricket	Orthoptera	Gryllidae	Adults
<i>Gryllotalpa Africana</i>	Yoruba: Ire Cricket	Orthoptera	Gryllidae	Adults

Source: Field Survey (2013)

2.1. Socio-economic characteristics of edible insects' marketers

The result presented in Table 2 shows that (80.61%) of those involved in edible insect trade are married, 60% are women and about 41% of them are between the ages of 31 and 35, while a few of them (22.45%) are between the ages of 21 and 25. This shows that most of the most married women between ages 21 and 35 in these communities are actively involved in edible insect trade, indicating that the business is mainly a family affair. This corroborates findings of Fasoranti and Ajiboye, 1993; Adeduntan and Bada, 2004 who stated that many Nigerian families make fairly good living from selling insects and most of these insects are gathered from bushes and farmlands by women and children, processed and eaten or sold in school premises and open markets.

About sixty five percent (65%) of the respondents had only primary school education while a few (3%) proceeded to secondary school after primary education. A higher percentage (43%) practices trading as their main occupation while they engage in farming as their secondary

occupation. This low level education among the sellers explains their disdain attitude when their products are referred to as insects and their lack of cooperation with researchers (quest for money in exchange for information) during the questionnaire administration.

Table 2. Socio-economic characteristics of edible insects' marketers

Characteristics	Variable	Frequency (n = 98)	Percentage (%)
Sex	<i>Male</i>	38	38.78
	<i>Female</i>	60	61.22
Religion	<i>Christianity</i>	51	52.04
	<i>Islam</i>	42	42.86
	<i>Traditional</i>	5	5.10
Marital status	<i>Single</i>	18	18.37
	<i>Married</i>	79	80.61
	<i>Divorced</i>	0	0
	<i>Widow</i>	1	1.02
Age (yrs)	<i>16 – 20</i>	0	0
	<i>21 – 25</i>	22	22.45
	<i>26 – 30</i>	31	31.63
	<i>31 – 35</i>	40	40.82
	<i>>35</i>	5	5.10
Educational status	<i>No formal</i>	29	29.60
	<i>Primary</i>	64	65.30
	<i>Secondary</i>	3	3.06
	<i>Tertiary</i>	2	2.04
	<i>Others</i>	0	0
Occupation	<i>Civil servant</i>	19	19.39
	<i>Farmer</i>	20	20.41
	<i>Business</i>	17	17.35
	<i>Contractor</i>	0	0
	<i>Trading</i>	42	42.86
	<i>Others</i>	0	0

2.1.1. Source of awareness about edible insect

Survey results reveals that people generally has four major means of information about edible insects; the market, the forest, the farm, and the media. Figure 1 below shows that the market place (60- 63%) is the major source of awareness of edible insects followed by the farm (20-25%) for consumers as well as the marketers. The media (5%) rates low as source of information thus explaining the low level of perception about the importance of edible insects among people.

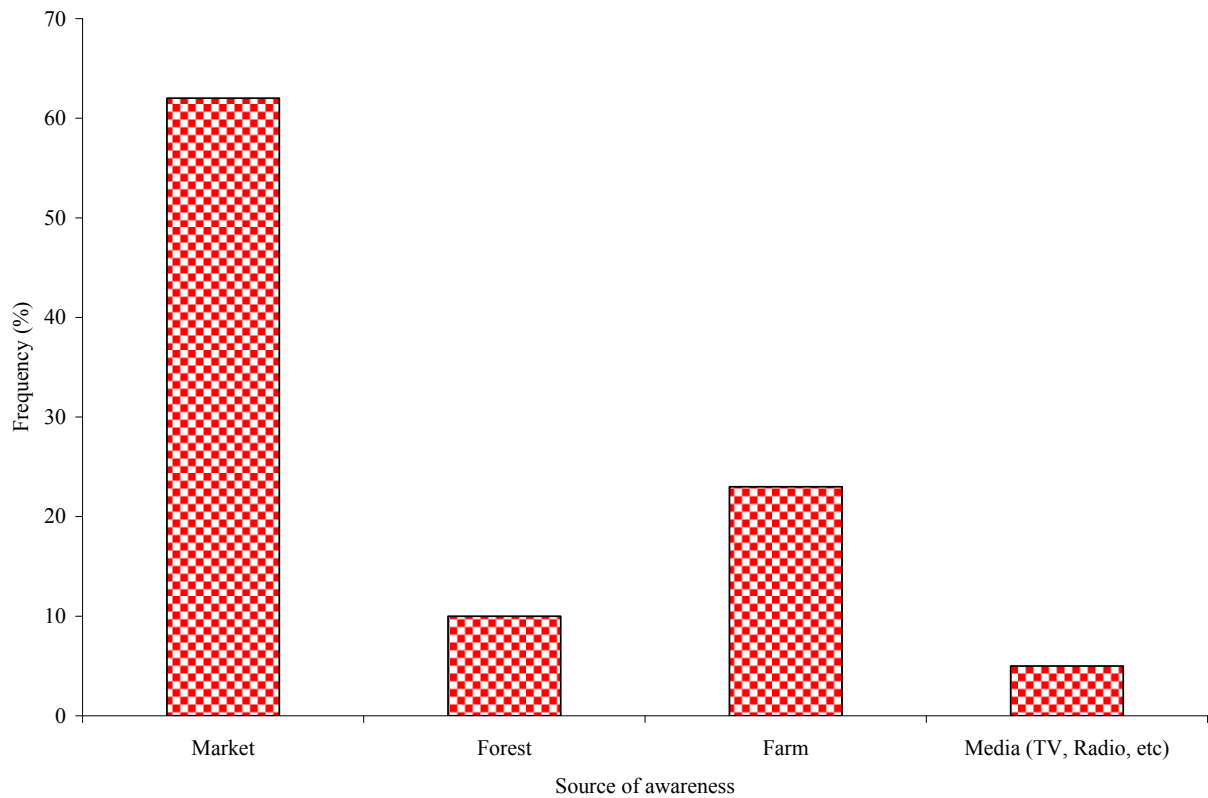


Figure 1. Major information source about edible insect in Lagos State, Nigeria

2.1.2. *Harvesting/ Catching Methods Practiced*

The edible insect marketers in the study areas are majorly middlemen, they are not actively involved in catching /harvesting the insects for processing. They mostly buy them from palm wine tappers. While few (30-32%) use traps to harvest their insects. The result is shown in figure 2 below.

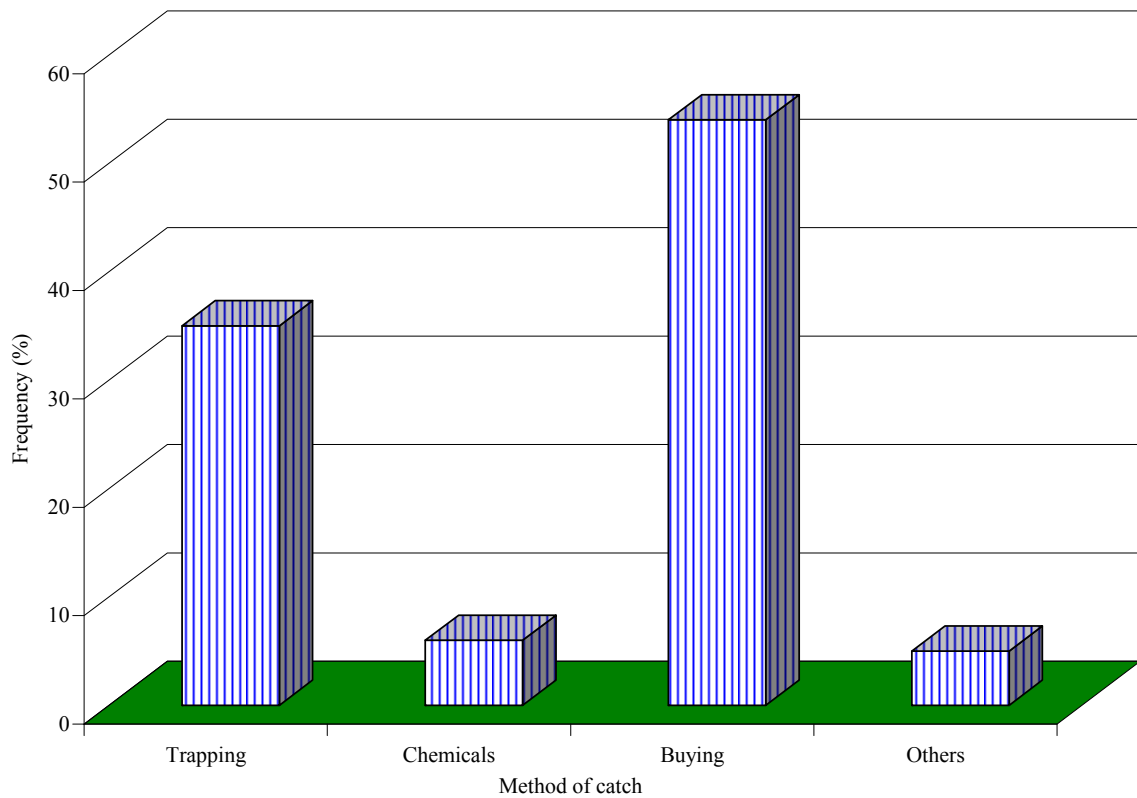


Figure 2. Edible insects Harvesting/ Catching Methods Practiced in the study area

2.1.3. Preferred State of Edible Insect Consumption.

Figure 3 below shows the state in which edible insects is consumed in the study areas. It was observed that some people consumed these insects in their raw form, about 30% of the respondents attest to this. While the larger portion of the respondents (75%) prefer consuming their edible insects processed. This is indicated in Figure 3 below:

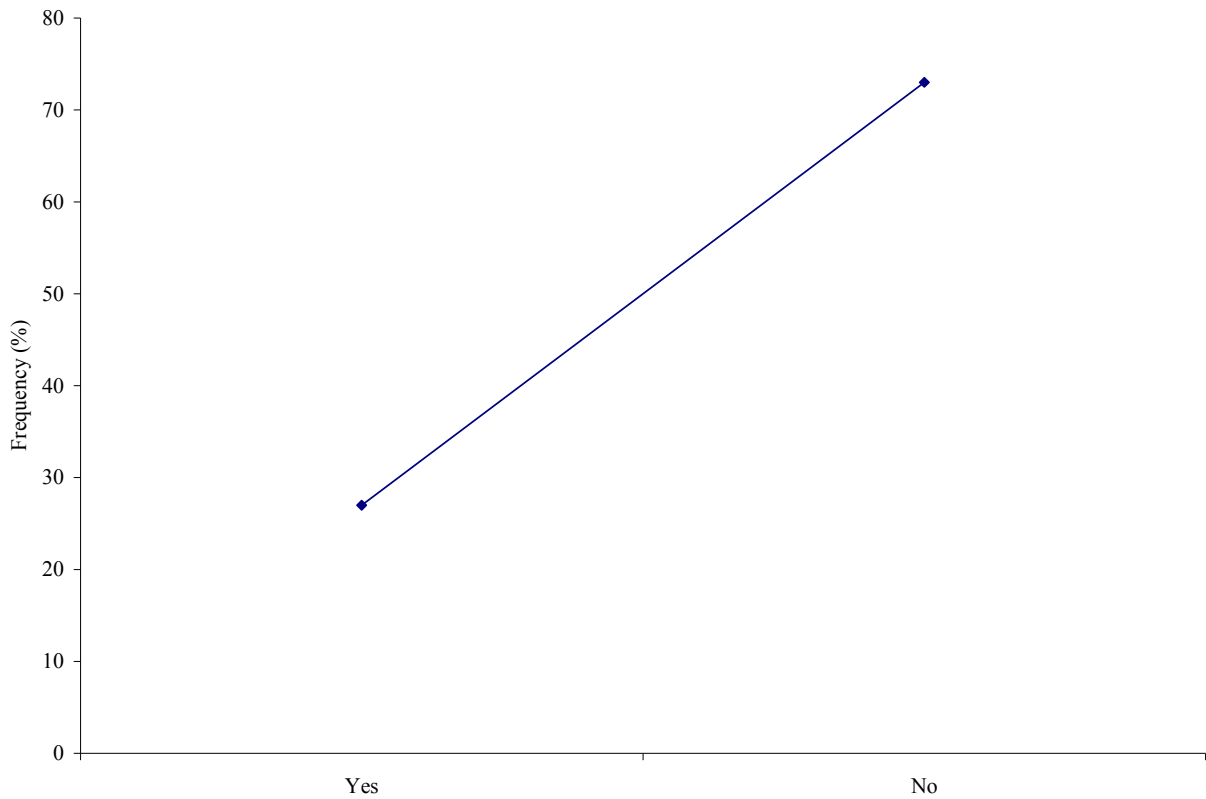


Fig 3. The state at which consumers preferred consumption of edible insects

2.1.4. *Processing Methods*

Survey of the processing means of edible insects by the respondent (consumers and marketers) shows that the most preferred method for preparation of these insects before consumption is roasting (62%) followed by frying (28%) while boiling (7%) is the least preferred. This is shown in Figure 4 below:

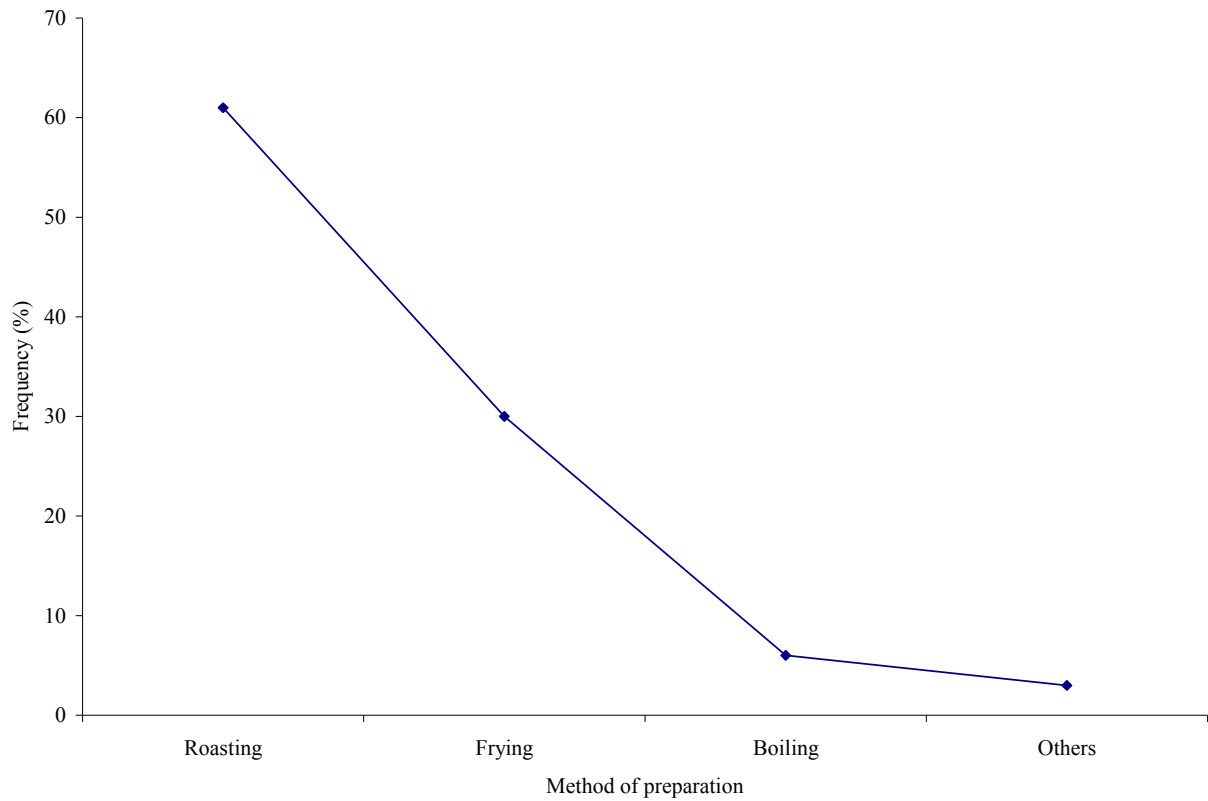


Fig 4. Different Processing Methods Practiced for preparing edible insects

Plate 1. Fresh live larvae of *Rhynchophorous phoenicis* for purchase in the market at the study areas



Plate 2. Freshly fried *Rhynchophorus phoenicis* displayed for sale alongside fried snails at Itokin market in Lagos State



Plate 3. A edible insect hwaker along the highway in Itokin area



Plate 4. An interactive session with one of the respondent



2.1.5. *Edible Insect Preservation Methods*

Similarly, Figure 5 below revealed that 50-52% of the respondents preserves their freshly harvested insects by salting and sun drying, while 30- 32% will fry only for preservation. 8% will roast, 6% will smoke while 5% will rather keep inside the refrigerator for preservation.

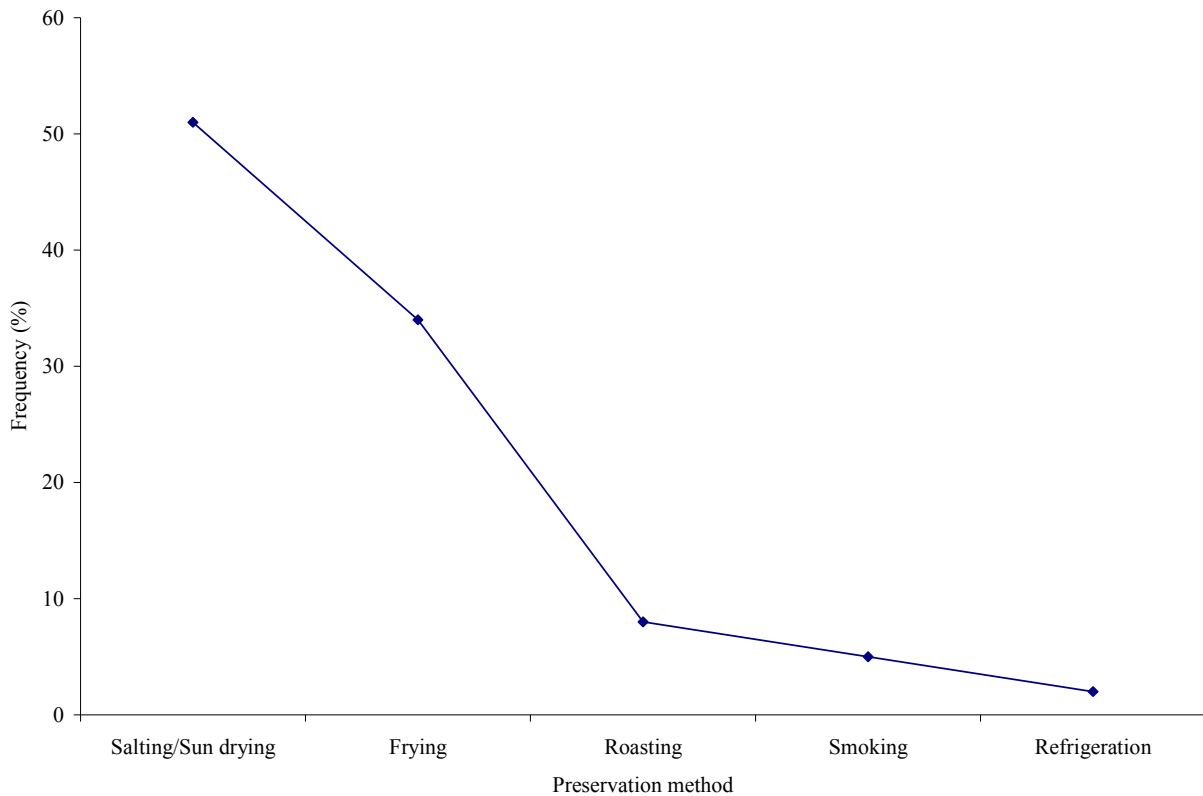


Figure 5. Edible Insect Preservation Methods Practiced

2.1.6. *Profitability of Entomophagy business.*

Figure 6 below shows the profitability of the edible insect business. 5% of the respondent makes at least over ₦500 (3 USD) per day as an average profit while 60% makes an average profit of ₦500 (3 USD) per day and 5% makes about ₦50 (30Cent) per day. The results of this study have shown that edible insects are prominent items of commerce in riverine areas of Lagos State. Thus, contributing to the socio-economic well-being of the people in both rural and urban communities alike. It also shows that edible insects compete favorably with snails and other meat products in the study area which explains why they are displayed for sale alongside snails and other meat products like “suya”, pork and poultry eggs. It is also indicative of the fact that the edible insect species (*Rhynchophorus phoenicis*) are abundant in Lagos State since the quantities are enough to meet household consumption and also for sale due to the nature of its vegetation.

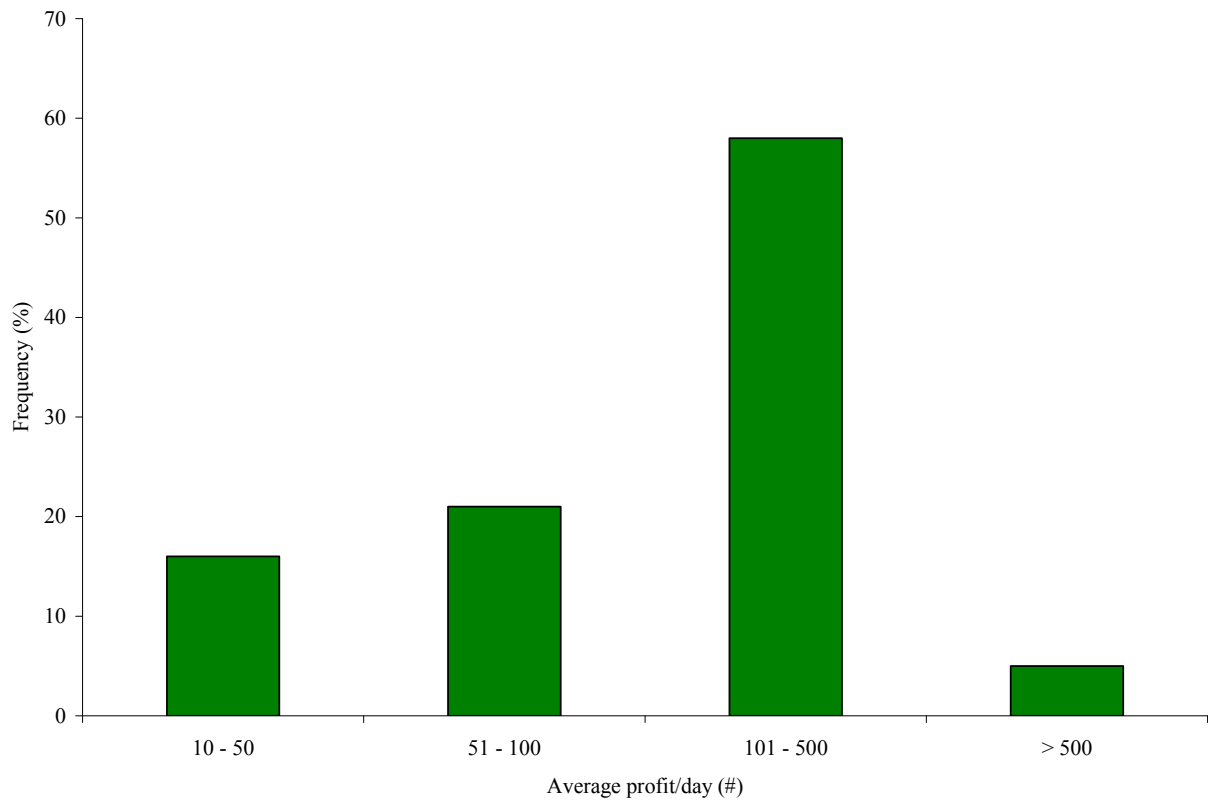


Fig 6. Average daily profit from sales of edible insects by marketers in the study area

2.1.7. Seasonality of Edible Insects in Lagos State

Figure 7 below indicate the seasonality at which these edible insects are available. They are mostly available during the wet season and at the onset of the dry season. In the dry season they are scarcely available. Ifie and Emeruwa, 2010 reported that the population of variegated grasshopper, *Z. variegatus* (Linn.) is high during the dry season in southwestern Nigeria; and Fasoranti and Ajiboye, 1993 similarly reported that the winged termites popularly known as ‘aku’ in Ibo, ‘chingé’ in Hausa and ‘Esusu’ in Yoruba are enjoyed in all parts of Nigeria, especially because it is present at the onset of the rainy season when livestock is lean, new crops have not yet produced food, and store produced from previous growing season is running low

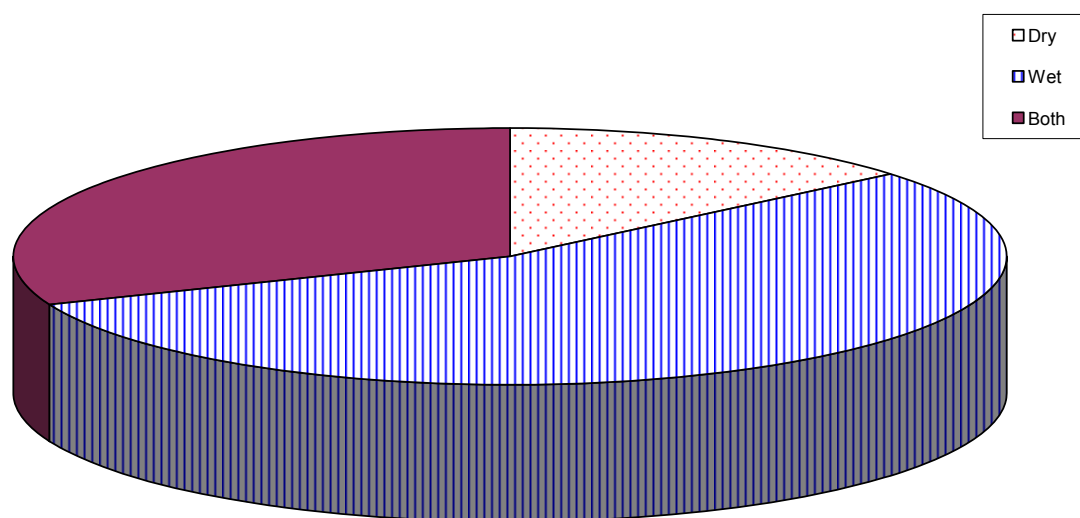


Fig 7. Seasonality of the edible insects in the study area

2.1.8. Uses of Edible Insects in the Study Area

Figure 8 below shows the various uses of forest insects by man. This ranges from alternative to meat, treatment of ailment to dieting and so on. 70% of the respondents simply consume edible forest insects as a cheaper alternative source of protein compared to meat. 20- 25% use it in treating one ailment or the other such as soberness, correct malnutrition in children, respiratory disorder, and circulatory disorder among others. 10- 15% of the respondents reported that they use it in dieting especially diabetic patients and overweight. Anita *et al.*, 2006 confirm that *M. nigeriensis* is an important food component for those who have high blood cholesterol content and probably at a risk of cardiovascular disease due to its low saturated fatty acid and high desirable unsaturated fatty acid contents.

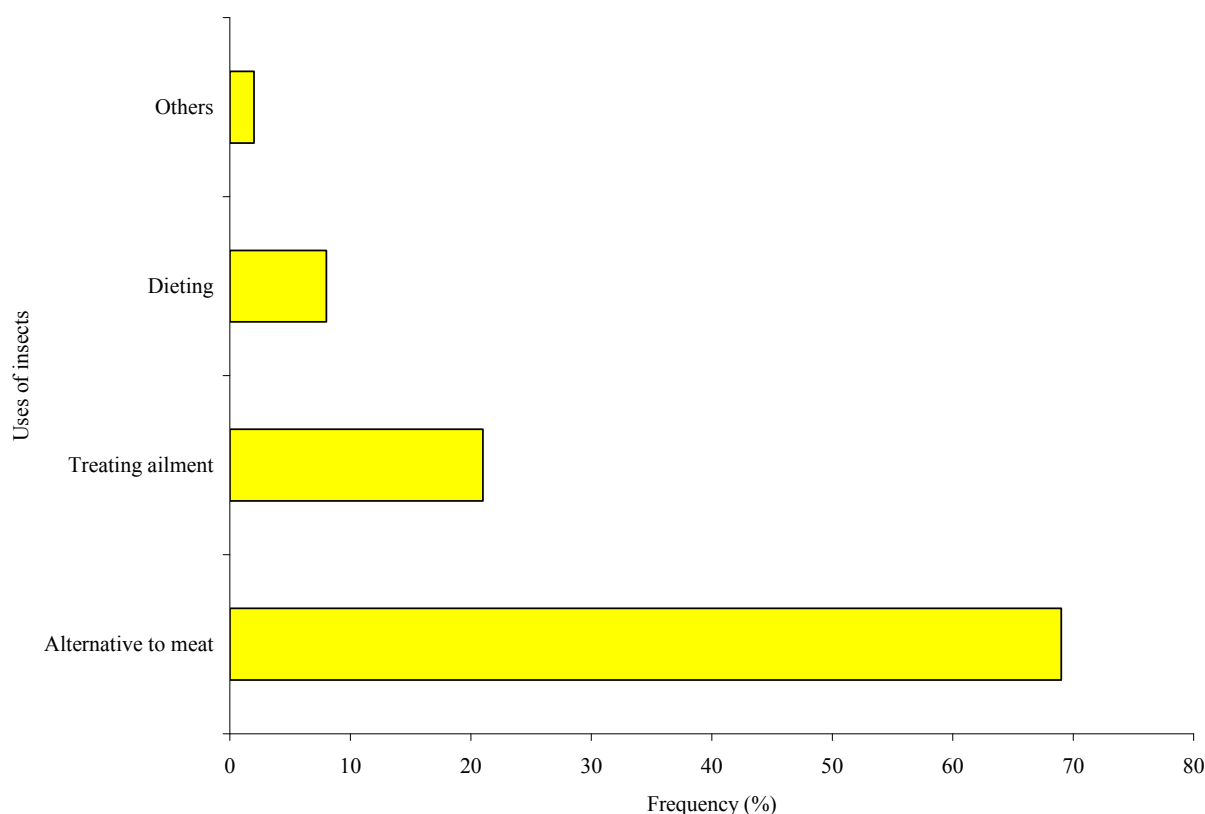


Figure 8. Various uses of Nigeria forest insects

Edible insects in Nigeria has been reported to be rich and higher in protein content, on a mass basis, than other animal and plant foods such as beef, chicken, fish, soybeans, and maize (Teffo *et al.*, 2007). Protein is the basis of all organism activity and constitutes many important materials such as enzymes, hormones and haemoglobin. Bukkens, 1997; Elemo *et al.*, 2011; Ifie and Emeruwa, 2011 and Belluco *et al.*, 2013 reported that edible insects are rich in essential amino acids such as, tryptophan, lysine, vitamins, mineral elements, and carbohydrates, especially high unsaturated fatty acid, which has an excellent nutritive value and immense health benefit when combine in diet for man and animals.

3. Conclusion

This study has revealed that edible forest insects are majorly used as a meat alternative and marketed in riverine areas of Lagos State with the most marketed being *Rhynchophorus phoenicis*. Information on the marketability and nutritive value of this insect specie in Lagos State revealed their economic value, harvesting and processing styles by consumers as well as marketers. Several constraints given by the marketers include lack of incentive, poor marketing channels, and inadequate awareness for consumers.

4. Recommendation

In the light of the economic significance of the edible insect in these areas, the conservation of the host plant (*Raphia palms*) of *Rhynchophorus phoenicis* should be encouraged by the state government through the enforcement of legislation against bush burning and illegal tree

felling. Establishment its plantation should also be promoted to enhance the production of this insect for heavy marketing. More attention should also be given to domestication, improved processing and preservation techniques by Entomologist and Nutritionist to ensure all year availability and affordability of this edible insect. The government should provide accessible funds for edible insect marketers in rural areas and in collaboration with all stakeholders in food security create massive awareness through the media and extension agents.

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