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Research Article

The Acceptability of *Oryctes Owariensis* Beauvois (Coleoptera: Scarabaeidae) Larva as Food in Bayelsa State Nigeria

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Abstract: This work was aimed at evaluating the acceptability of the larva of *Oryctes owariensis* commonly known as Bayelsa suya in Bayelsa State with the objectives of improving livelihood and nutrition through supplementing the daily requirements of protein by the grub consumption. Sample survey method was employed with the distribution of 120 open ended questionnaires with 95 retrieved. There was 100% acceptance of the larvae as food by the respondents. 90.52% of the respondents affirmed the eating of the grub by all and sundry in Bayelsa state. 81.05% supported the inclusion of the larva in the diet of pregnant women. 75.79% declined it being implicated as disease vector or pathogen. 82.11% reported the sale of the larvae as a means of livelihood. A total of 67.37% called for mass rearing and domestication of the grub. The fried form of the larva was most preferred (69.47%) against the dried (20.01%) and fresh (10.52%) respectively. About 25.30% preferred leisurely eating the grub alone, 30.50% alongside beer, 24.20% with soft and 20.01% had other choices. Reasons for eating the grubs included: love (44.20%), nutrient content (21.05%), medicinal properties (15.80%) and peer influence (18.25%). The results generated justified the objective of the research hence we recommend that *O. owariensis* larva be included as one of the edible insects so as to improve the nutritional and health needs of the people for the achievement of the sustainable development goals in Bayelsa State specifically and Nigeria in general via Agricultural practices.

Keywords: Acceptability, *Oryctes owariensis*, Sample survey method, Bayelsa State, Nutritional, Questionnaires.

INTRODUCTION

Insects have played important part in the history of human nutrition in Africa, Asia and Latin America and several species have been used as human food ((Bodenheimer, 1951, Defoliart, 1988 and 1992).

Oryctes owariensis is one of the edible species of *Oryctes* beetle and is most acceptable as food insect in Nigeria especially in the Niger Delta area. The third instar larval stage is of great economic importance in Bayelsa State of the South South region where it is sold as a form of trade and fondly called Bayelsa suya: a delicious meat toast (Omotoso and Adedire, 2007). All larval stages are destructive to Raphia and Oil palms. Observations show that *Oryctes* species attack these palms entering through any cut at the frond during wine tapping, thereby destroying the inflorescence of the palms, eating deep into the pith of the palms, feeding on tissue juices, degenerating them into dark brownish mass Bedford, (1980a and 1980b). *O. owariensis* larvae are usually hunted at their third instar stage when they are believed to possess a soft and nutritious body tissue inside the trunk of palms (*Raphia hookeri*). At this stage the grubs are white in colour and display peristaltic movements just like caterpillar stage of butterflies. They are harvested and prepared in different manner such as roasting, frying, toasting and drying which can be used as condiments or eaten alone. The grubs are sold in different parts of the State.

Bayelsa State is defined as one of the Niger Delta States in the South South geopolitical zone. She comprises a people of great cultural diversities ranging from Ijaw through Epie Atissa, the Ogbia tribe to the Nembe people. In addition, the State is filled with migrants from different parts of the country. This diversity among the people has a way of affecting the acceptability of the larva under study as food. The study

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is aimed at accessing the acceptability of the larva of *Oryctes owariensis* commonly known as Bayelsa suya in Bayelsa State with the objectives of advocating for the daily requirements of protein by supplementing with the grub consumption and evaluating the knowledge and believes of the people in Yenagoa and Sagbama Local Government area concerning the acceptance of the beetle as edible insects and the practice of entomophagy.

Plate 1: *Oryctes owariensis* third instar larvae Source; Author

MATERIALS AND METHODS

The study was carried out in Bayelsa State, a southern core State of the Niger Delta region and one of the Six (6) States in South-South Geopolitical Zones of Nigeria, located in the Niger Delta Region. The study area covered three locations: Sagbama main town, Swali market and Famgbe communities. Sagbama is a Local Government Area in Bayellsa State with co-ordinates: $5^{o}10$'N, $6^{o}12$'E and $5^{o}17$'N and $6^{o}20$'N. It lies within the Bayellsa National Forest and has an area of 945km^2 and population of 187,146 people (NIPOST, 2009). Swali and Famgbe communities are in Yenagoa Local Government Area having a land area of 706 km^2 and co-ordinates $4^{o}55$'29"N, 6 ^{o} 15'51"E and 4 ^{o} 92'47"N, $6^{o}26$'42" with population of 266,008 people (NIPOST, 2009).

MATERIALS

Material employed in the research was open ended questionnaires using sample survey methods by Nodu *et al*., (2013). A total of one hundred and twenty questionnaires with ten open ended questions bound on the 'Acceptability and nutritional awareness' of *O. owariensis* larvae fondly called 'Bayelsa suya' as food in Bayelsa State, were distributed amongst males and females within the age bracket of 25-60 years. Respondents were shown pictures of *O. owariensis* larvae and adults. Filled questionnaires were retrieved from the respondents after a period of one week.

STATISTICAL ANALYSIS

The data generated from the studies were subject to statistical analysis as percentages and presented in table form while the charts were plotted using Microsoft excel.

RESULTS AND DISCUSSION

A total of ninety five (95) out of the one hundred and twenty (120) questionnaires distributed were retrieved from the respondents. The sex distribution showing the number of respondents (male and female) and their percentages are represented on table one below.

Table 1: Sex distribution showing percentages of respondents

Sex	Number of questionnaires distributed	Number of questionnaires retrieved	Percentage (%)
Male	60	45	47.37
Female	60	50	52.63
Total	120	95	100.00

A total of a ninety five questionnaires were retrieved from the respondents. These were compiled and used for the computation of the results. The result showed that the people of Bayelsa State were well aware of the practice of 'entomophagy' that is insect eating, of which the larvae *of O. owariensis* stand as one of the edible species. A total of 69.47% of the respondents preferred eating the larvae when fried, 20.01% ate it fresh while 10.52% ate it when dried giving a total of a 100% of persons that ate the larvae

at all whether in fried, fresh or dried forms as seen on figure 1. Among the respondents, 30.42% and 39.05% males and females respectively like it fried. Also, 5% male and 8.02% female preferred it fresh, while 15.01% and 2.5% males and female respectively showed preference for the dried form.

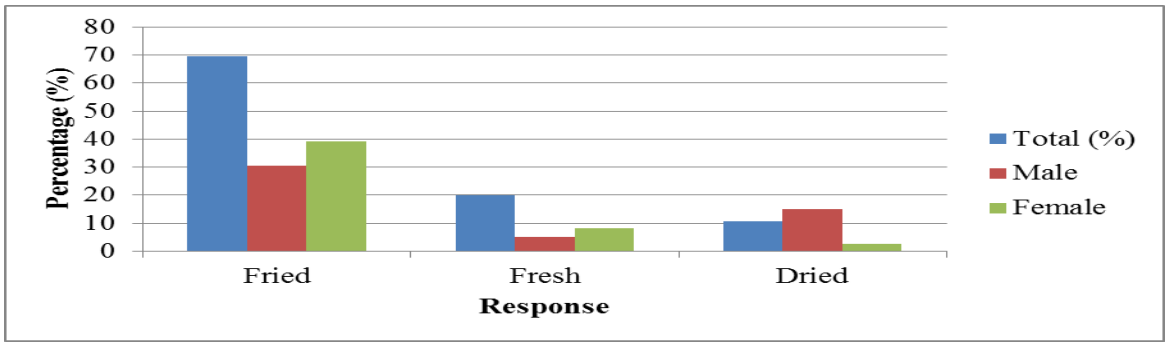

Fig. 1: Percentage distribution on how the respondents enjoy eating the larvae

A total of 30.52% of the respondents preferred eating the larvae while drinking beer, 25.26% ate the grub alone without augmenting it with any other food or drink. 24.21% ate it as snack along with soft while 20.01% enjoy eating the grub in some other ways like garri drinking, rice preparation, stew making and so on. A summation of all these percentages still gives a total of a 100% of persons that eat the larvae in any which way they desire as represented on figure 2 below. Among the respondents, 28.50% and 02.02% males and females respectively liked consuming the larvae with beer. 12.22% male and 13.04% female preferred eating it alone due to its taste. 8.01% and 16.20% males and female respectively showed preference for drinking soft along with the grub while 6.25% and 13.76% males and females respectively ate it along with other items.

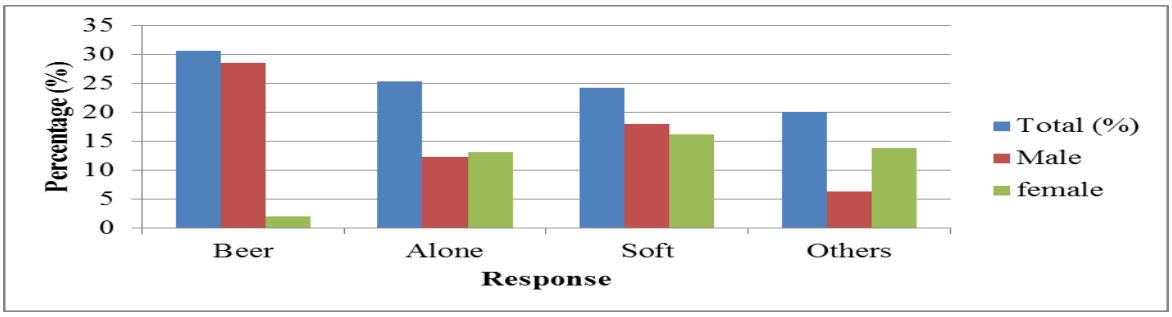

Fig. 2: Percentage distribution on the choices of what people enjoy eating the larvae with

The graph on figure 3 shows that a total of 44.20% of the respondents preferred eating the larvae due to their genuine love for the taste. 15.80% eat the grub because they believed the grubs had some medicinal value. 21.05%% eat it since they feel it is highly nutritious, yet 18.95% claimed they eat it due to peer pressure. A summation of all these percentages still gives a total of a 100% of persons that eat the larvae due to one reason or the other. Among the respondents, 22.00% and 22.20% males and females respectively ate the grub for love. 10.71% male and 5.09% female preferred eating it because it is medicinal. 10.00% and 11.01% males and female respectively showed preference for it because of its nutrient content while 8.02% and 10.93% males and females respectively ate it due pressure from peers.

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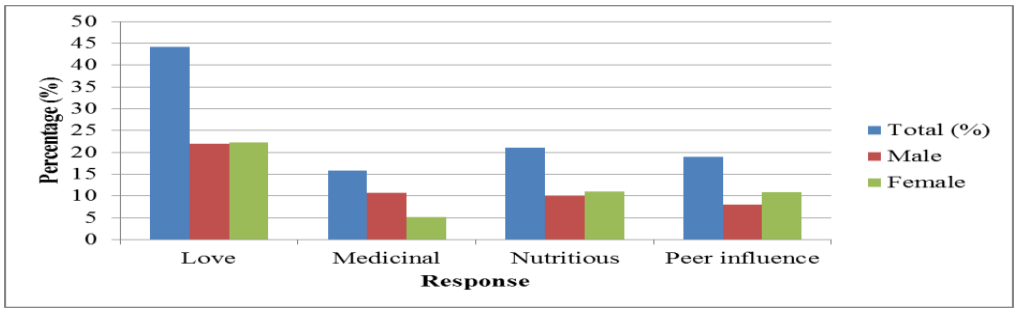

Fig. 3: Percentage distribution as to why people like eating the grub

The result also showed that the people of Bayelsa State are well aware that the larva of *O. owariensis* is not a pathogenic organism that carries the malaria parasite, neither is it a vector of malaria

parasite. Hence, a total of 75.79% of the respondents vehemently disagreed to the notion that the larvae are associated with malaria and other illnesses. However, 24.21% were supportive of the notion that the larvae could actually cause malaria in sufferers. Out of the number, 10.10% male and 12.11% female supported the notion while 40.32% males and 35.47% females disallowed the notion (fig. 4).

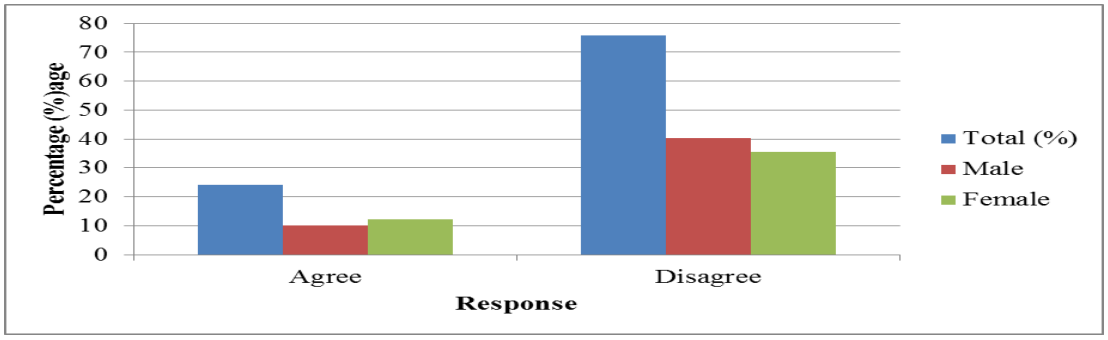

Fig. 4: Percentage distribution of respondents on the notion that *O owariensis* larvae are associated with malaria or any other illness

Figure 5 depicts the response of people pertaining to mass rearing and domestication of the larvae. A total of 67.37% called for mass rearing of the larvae while 32.63% were against its mass rearing. Out of the number, 33.14% and 34.23% males and females respectively voted towards the call while 20.23% males and 12.40% female were against it been mass reared.

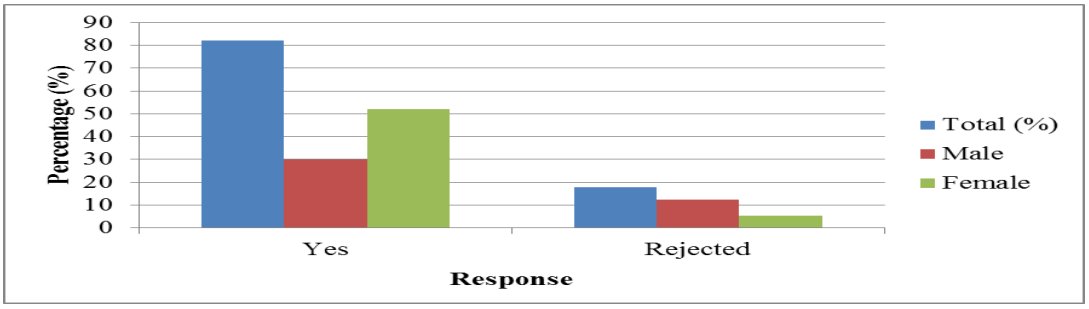

Fig. 5: Percentage distribution of respondents for and against mass rearing of *O. owariensis* larva

82.11% of the respondents accepted commercialization of the larvae as source of income to low income earners while 17.89% did not see it as a small scale business venture. 30.02% of males and 52.09% of the females view it as a small scale business that should be ventured into while, 12.45% and 5.44% of males and females respectively did not accept as seen on fig. 6.

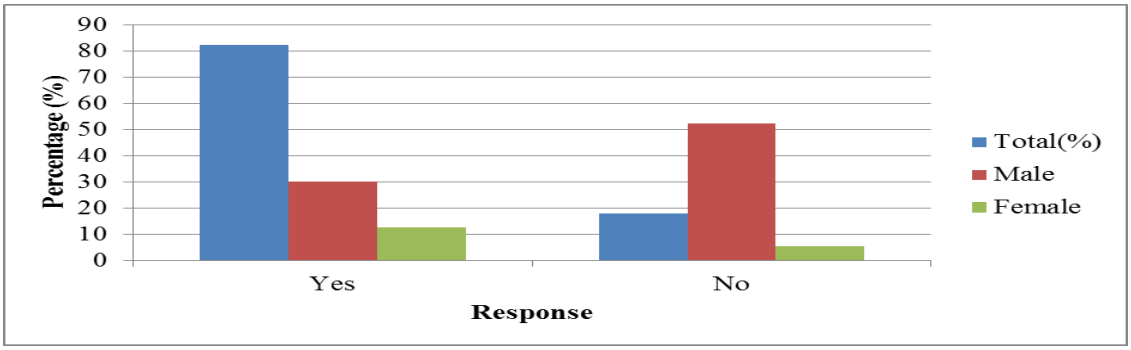

Fig. 6: Percentage distribution of respondent concerning sales of the larvae as a means for earning income

Concerning the eating of the grub by pregnant women, the total of 81.05% responded favorably while 18.95% were against it. 30.04% males and 51.01% females supported that women ate the grubs during pregnancy while 12.45 males and 5.44% females objected to that as represented on fig. 7.

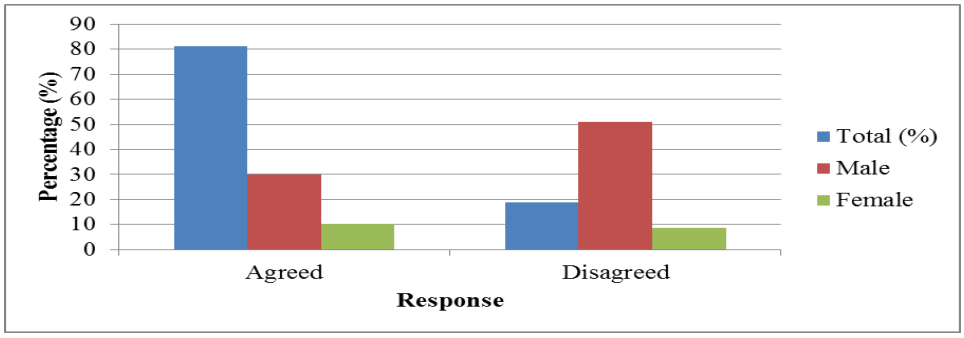

Fig. 7: Percentage distribution of respondent concerning the eating of *O. owariensis* grubs by pregnant women

The call to eating of the grubs by all and sundry: men, women, youth and children recorded positive outcome of 90.52% and 9.48% decline (fig. 8). From the above, 42.20% and 48.32% of males and female respectively responded that the grubs be eaten by all while 5% males and 4.48% females rejected the eating of the grub by everyone.

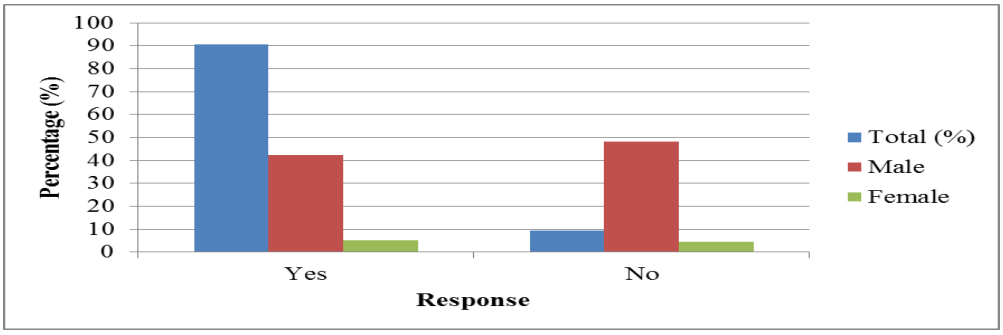

Fig. 8: Percentage distribution of respondent concerning the eating of *O. owariensis* grubs by all and sundry

The larval stage of *R. phoenicis* is well known to the indigenes and non-indigenes of Bayelsa State who strongly believe that the 'grubs' have high nutritional and medicinal potentials. The respondents had favourable perceptions regarding the larvae as food which positively influenced their level of acceptance at 100%.

Traditionally, many claimed that the larva content extends beyond nutritional to medicinal properties hence, its acceptability. This is in conformity with the statement of Mignon, (2016), which stated emphatically that *O. owariensis* larvae are highly prized and widely consumed as alternative protein source. This is further buttressed by the report of Solomon *et al*., (2008), who stated that as long as protein-energy malnutrition prevails in developing countries, the search for low cost, nutritious and easy to prepare locally available complementary foods will continue. The protein content of *O.* species larva compares with those from most conventional protein sources (Omotoso, 2018). The high protein content of the larva is suggestive of the potential of the larva being used in combating protein deficiency if the larva is dehydrated and defatted. A relatively high cash value is observed for the larva, when compared with the reported values for meats, meat products and poultry. These grubs have been proven by researchers to be good source of protein and other nutrient supplements Omotoso, (2018). He further reported that all life stages of the Oryctes species are nutritional from the larva, pupa and adult with high content of protein (65.34-74.18), fiber (2.24-5.44), fats (7.47-20.21), carbohydrate (2.76-7.01), moisture content (1.04-4.76), ash content (3.17-8.29) and energy (15598.48-1661.33) all in g/100g These values are higher than the values obtained by Banjo *et al*., (2006), Ekpo, *et al*., (2009).

These insects are known to be rich sources of various macro and trace elements/ minerals such as sodium, potassium, calcium, magnesium, iron, manganese, phosphorus, zinc and chromium. The copper content cannot be defined Banjo *et al*., (2006), Olowu *et al*., (2012), Omotoso, (2018).

81.05% of the respondents attested to the fact that pregnant women actually gave birth to healthy babies upon inclusion of the grubs in their diets. This is also supportive of the statement by Bodenheimer, (1951), that palm beetles are reportedly eaten as protection against sterility. Saris *et al*., (2000), Abdel-Moniem *et al*., (2017) disclosed that iron deficiency has been a major problem in women's diet in the developing world particularly among pregnant women and most especially in Africa but that these grubs are rich source of iron. They stated that the iron content of palm beetle larvae is a good source of minerals for young, pregnant and lactating mothers and for the proper development and functioning of the body system.

A total of 67.37% of the respondents called for the domestication and mass rearing of the grub for commercial purposes. This is in agreement with the statement of Ebenebe *et al*., 2016, who reported that the unsustainable practice of wild collection of the larvae has been characterized by low yield and seasonality problems and thus calls for alternate means of culturing the insect outside its natural habitat with the purpose of ensuring year round supply. Also, Fasoranti and Ajboye, (1993), stated that it was easier manufacturing proteins from palm grubs than other plant tissues, thereby advocating the need for the development of mass rearing methods of the insects for food and commerce.

A 100% of the respondents claimed to have eaten various delicacies prepared using the grub Out of which 15.80% attributed their eating to its medicinal value, 21.05% said it is nutritious, 44.20% said they generally love the taste of the grub This is in conformity with the observations of Anthonio and Isoun, (1982), Banjo *et al*., (2005), Omotoso and Adedire, (2007), Okaraonye and Ikewuchi (2008), who having worked independently, variously stated that the grubs are widely enjoyed and consumed in large amounts, either eaten raw (fresh) or cooked, fried in their own oil, salted for snacks and cherished as special delicacies after been roasted, fried, smoked or stewed. This is further supported by Ratcliffe, (2006) who reported that in the tropics Scarabeid beetles are very important for religion, medicine, food, regalia and body ornamentation. Olowo *et al*., (2012) concluded that the grub is loved as snacks or main meals in the South Western part of Nigeria.

About 82.11% of the respondents agreed that sales of the larvae serve as source of income for low income earners in Bayelsa State. This finding is in agreement with that of Omotoso and Adedire, (2007) who reported that palm grubs are sold on the street in the South South region of Nigeria. This is in agreement with the observation of Ekpo, *et al*., who stated that low income earners supplement their high carbohydrate diets by eating insects.

Finally, 90.52% of respondents are supportive that the palm larvae be eaten by all and sundry: men, women, youth and children hence advocating for the practice of entomophagy in Bayelsa State.

CONCLUSION

O. owariesis grub fondly called 'Bayelsa suya' in Bayelsa State is generally loved and accepted as special treat and delicacy by all and sundry: men, women, youths and children including the aged. All developmental stages of the grub are revealed to contain high nutritional qualities particularly proteins and mineral salts and other secondary constituents called phytochemicals such as flavonoids, tannins, phenol, alkaloids, and saponins which promote immune system of human against cancer, lowers cholesterol level, blood glucose response, inhibits dental caries and platelets aggregation in humans. With regards to the knowledge generated by this research work, the grub should be domesticated, mass reared and incorporated into regular food types to meet the nutritional demands of the people of Bayelsa State with regards to increasing the quantity of proteins and other nutrients made available in the edible insect.

REFERENCES

1. Abdel-Moniem, A. S. H., El-Kholy, M. Y., & Elshekh, W. E. A. (2017). The Red Palm Weevil, Rhynchophorus ferrugineus Olivier, As Edible Insects for Food and Feed a Case Study in Egypt. *RESEARCH JOURNAL OF PHARMACEUTICAL BIOLOGICAL AND CHEMICAL SCIENCES*, *8*(3), 1653-1658.
2. Anthonio, H. 0, Isoun M. 1982. Nigerian Cookbook.
3. Banjo, A. D., Lawal, O. A., & Songonuga, E. A. (2006). The nutritional value of fourteen species of edible insects in southwestern Nigeria. *African journal of Biotechnology*, *5*(3), 298-301.
4. Bedford, G. O. (1980a). Biology, Ecology and Control of palm Rhinoceros beetle. *Annual Review Entomology, 1(26),213.*
5. Bedford, G. O. (1980b). Biology, Ecology and control palm Rhinoceros Beetle. *Annual Review Entomology, 2(25),309-339.*
6. Bodenheimer, F. S. (1951) . Insects as Human Food In: W. Junk: *The Hague, 352.*
7. Defoliart, G. R. (1988). Food Insects News Letter, 1-4. The Human Use of Insects as Food and as Animal. Entomology Society America. *Feed.Bulletin, 35: 22-35.*
8. DeFoliart, G. (1992). A concise summary of the general nutritional value of insects. *Crop Protection*, *11*, 395-399.
9. Ebenebe, C. I., Amobi, M. I., Udegbala, C., Ufele, A. N., & Nweze, B. O. (2017). Survey of edible insect consumption in south-eastern Nigeria. *Journal of Insects as Food and Feed*, *3*(4), 241-252.
10. Ekpo, K. E., Onigbinde, A. O., & Asia, I. O. (2009). Pharmaceutical potentials of the oils of some popular insects consumed in southern Nigeria. *African Journal of Pharmacy and Pharmacology*, *3*(2), 051-057.
11. Fasoranti, J. O., & Ajiboye, D. O. (1993). Some edible insects of Kwara state, Nigeria. *American Entomologist*, *39*(2), 113-116.
12. Mignon, J. (2016). Oryctes owariensis Larvae a Good Alternative Protein Source: Nutritional and Functional Properties. *www.researchgate.net. January 29th, 1:23 p.m.*
13. NIPOST, (2019). Post Offices –with Map of Sagbama Local Government Area. *Retrieved 2009-10-20.*

14. NIPOST, (2019). Post Offices –with Map of Yenagoa Local Government Area. *Retrieved 2009-10-20.*
15. Nodu, M. B., Vincent. K. P,. & Owen, O. J. (2013). Palm weevil larva (Rhynchophorus ferrugineus) consumption as supplement of Human protein in the Diets of Inhabitants of Bayelsa state, Nigeria. *International Journal of Health and Medical Information, 2 (1),2350-2353.*
16. Okaraonye, C. C., & Ikewuchi, J. C. (2008). Rhynchophorus phoenicis (F) larva meal: nutritional value and health implications. *Journal of Biological Science*, *8*, 122-125.
17. O, O. (2012). Assessment of Proximate and Mineral Status of Rhinoceros Beetle Larva, Oryctesrhinoceros Linnaeus (1758).(*Coleoptera: Scarabaeidae) from Itokin, Lagos State, Nigeria. Research Journal of Environmental Sciences, 6(3):118.*
18. Omotoso, O. T., & Adedire, C. O. (2007). Nutrient composition, mineral content and the solubility of the proteins of palm weevil, Rhynchophorus phoenicis f.(Coleoptera: Curculionidae). *Journal of Zhejiang University Science B*, *8*(5), 318-322.
19. Omotoso, O. T. (2018). The Nutrient Profile of the Developmental Stages of Palm Beetle Oryctes rhinoceros. *British Journal of Environmental Sciences, 6(1),1-11.*
20. Ratcliffe, B. C. (1991). The Scarab Beetles of Nebraska. *Bulletin of the University of Nebraka State Museum, 12:1-333.*
21. Saris, N. E., Mervaala, E., Karppanen, H., Khawaja, J. A., & Lewenstam, A. (2000). Magnesium: An Acta, *294:1-26.*
22. Soloman, M., Ladeji, O., & Umoru, H. (2008). Nutritional evaluation of the giant grassropper (Zonocerus variegatus) protein and the possible effects of its high dietary fibre on amino acids and mineral bioavailability. *African Journal of Food, Agriculture, Nutrition and Development*, *8*(2), 238-251.