

QUALITY ATTRIBUTE OF FRESH AND DRY MARINE EDIBLE SPECIES FROM NAGAPATTINAM DISTRICT, TAMIL NADU, INDIA**Vaishnavi T., B. Dhanalakshmi and G.Chitra**

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Correspondance: Dr. B. Dhanalakshmi - E.mail: dr.dhanalakshmi02@gmail.com**ABSTRACT**

The present study was to validate out the nutritional value of six selected fresh and dry marine species *Stolephorus commensonnii* (Indian Anchovy), *Hilsa ilisha* (Hilsa shad), *Otolithes ruber* (Kathalai), *Sardinella longiceps* (Sardines), *Ilisha elongate* (Poovali) and *Penaeus indicus* (Indian white shrimp) from Nagapattinam district, Tamilnadu, India. Nutritive parameters like moisture, carbohydrate, protein, fat and calorific content, that which influences the quality and character were estimated biochemically. In the present study the moisture content of the raw fishes and prawn varied from 71.84 to 79.11% and dry species varied from 4.69 to 15.06%. The highest moisture was observed in fresh raw sample than dry sample. The result of the proximate composition protein content of the raw fishes and prawn varied from 17.55 to 24.54% and in dry species varied from 35.02 to 46.12% (i.e.) higher protein content was observed in dry sample than raw sample. On the other hand the carbohydrate of the raw fishes and prawn was found in the range of 0.56 to 0.90% and dry species varied from 5.02 to 8.12%. The wide variation in the fat content of the raw fishes and prawn was observed to range from 1.20 to 3.12% and dry species varied from 0.68 to 7.62% (i.e.) in dry fish. The calorific value of the raw marine species varied from 127.6175 – 279.699% and dry species varied from 228.84 – 312.77%. The result of the present study on proximate content revealed there was a drastic change in all the as the drying time increased. Protein, carbohydrate and calorific value of dried species are higher than the fresh species and the dried variety was considered to be the acceptable one. This study clearly indicated that the proximate composition obtained could be helpful in choosing fish and fish based products on the nutritional values.

KEY WORDS: Food quality, Fresh and dried sample (Fish and Prawn), proximate /nutritional composition.**INTRODUCTION**

From times immemorial fish, an important source of food with high quality proteins, vitamins, distinguishing lipids, owing to its content of omega-3 fatty acids and minerals has widely been accepted as dietary sea food due to substantial increase in beneficial effect of consumption. Approximately 14% of the animal protein consumed by human being comes from marine fisheries sector which was considered as one of the important food producing sector in the state contributing to the livelihood as well as food security of a large section of the economically under-privileged population. But fish was susceptible to rapid spoilage and get deteriorated during the post-mortem period, at ambient temperature resulting in a variety of biochemical and microbial break down. Fish, which form a much cherished delicacy that cut across socio-economic, age, religions and educational barriers, was eaten fresh, dry, smoked and dried products received frequent complaints about the quality due to different marketing chains and time required to reach the landing centers and destinations from catching point, preservation techniques followed, dehydration techniques etc.

The global consumption of fish and fish derived products has greatly increased the fish demand during recent decades due to the increasing world population, higher living standards and the good overall image of fish among the world consumers. Thus it is imperative to process and preserve some of the fish caught in the period of abundance, so as to ensure an all-round supply. The present study was taken considering the popularity and importance of marine fish and its products (Dried and Fresh) among the commonly consuming poor in developing country like India it was envisaged to prepare good quality fresh fish and dry products using scientifically authorized methods and techniques to capture the urban market.

Therefore the crust of the present study was to evaluate the quality attribute of fresh and also to ascertain the effect of drying on dried marine edible species from Nagapattinam district, Tamilnadu, India

MATERIALS AND METHODS

Study area: Pushpavanam is a village in Nagapattinam District in the Indian state of Tamil Nadu. Pushpavanam is 34.8 km distance south from its district main city Nagapattinam. The village people's main occupation is fishing. The geo coordinate of the Pushpavanam are latitude 13.043359 and longitude 80.183856. The village is surrounded by a long coastal stretch.

Sample preparation: Selected freshly harvested fishes and shrimp were washed with tap water to remove the ice, and then rinsed with double distilled water and cleaned thoroughly. The fresh edible species were eviscerated beheaded and the muscle tissues were collected for further experimental work. Dry samples were cleaned with distilled water to remove the external dirt and debris for further analysis.

Proximate and Biochemical analysis: Proximate composition such as **moisture**: was determined by the reduction in weight when the sample was dried to a constant weight in an oven following the standard method of Oladipo and bankole, (2013) and **calorific value** of fresh and dried fish sample was analysed by AOAC,1975 . Biochemical parameters like **protein, carbohydrate** and **fat**: in the selected marine seafood like fish and shrimp was estimated by using standard procedures of Lowry *et al.*, 1975, Hedge and Hofreiter,1962 and Folch *et al.*, 1975.

RESULTS AND DISCUSSION

In most Asian countries over 50% of the animal protein intakes comes from fish that has edged over meat as potential, abundant and cheaper resource especially as food having essential nutrients required for supplementing both infants and adults diet. Fish provides 30% to 80% of the total animal protein intake of the large teeming population of tropics - South India and fish products constitute more than 60% of the total protein intake in adults especially in rural areas for the maintenance of healthy body. About 25- 30% of the world catch is being used for human consumption as dried, salted, smoked or treated by some combination of these processes (Kamruzzaman, 1992).

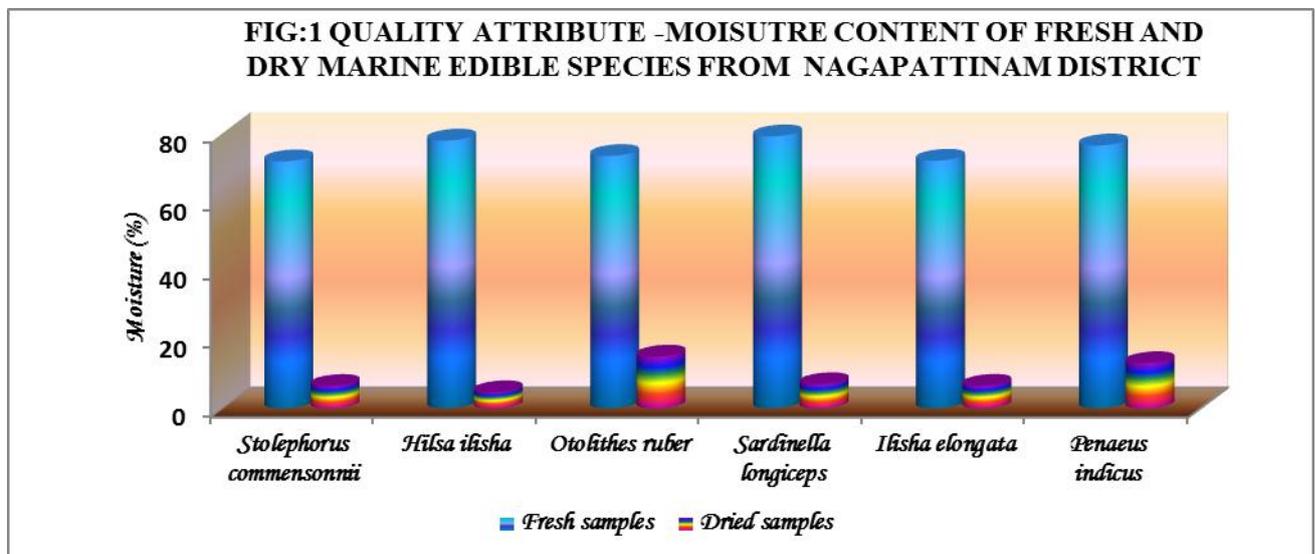


FIG:2 BIOCHEMICAL ATTRIBUTE- PROTEIN CONTENT OF FRESH AND DRY MARINE EDIBLE SPECIES FROM NAGAPATTINAM DISTRICT

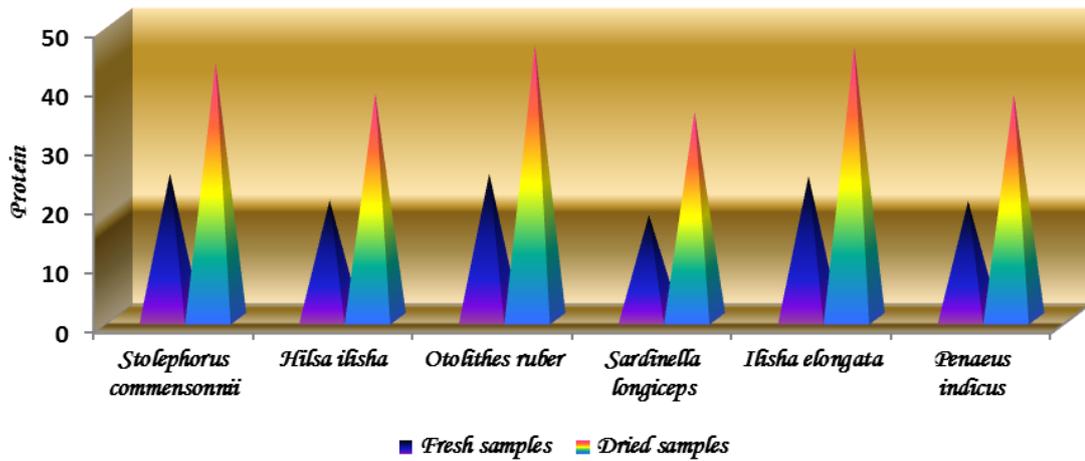


FIG:3 BIOCHEMICAL ATTRIBUTE- CARBOHYDRATE CONTENT OF FRESH AND DRY MARINE EDIBLE SPECIES FROM NAGAPATTINAM DISTRICT

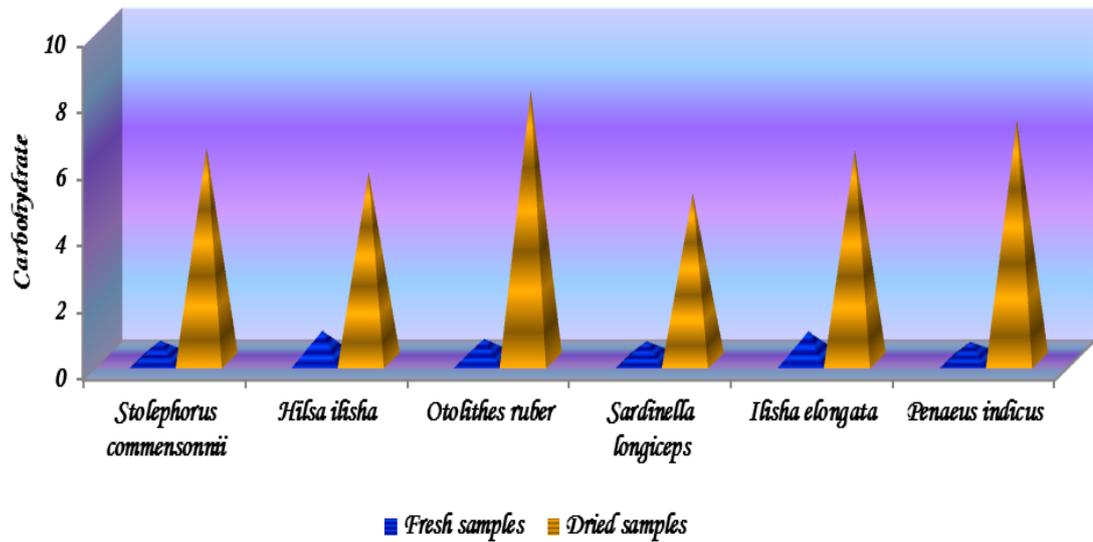


FIG:4 BIOCHEMICAL ATTRIBUTE- FAT CONTENT OF FRESH AND DRY MARINE EDIBLE SPECIES FROM NAGAPATTINAM DISTRICT

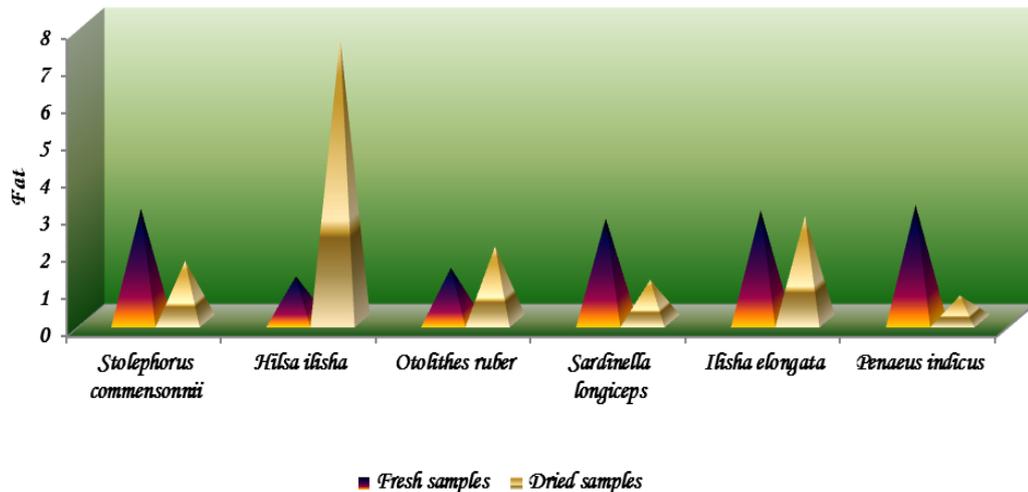
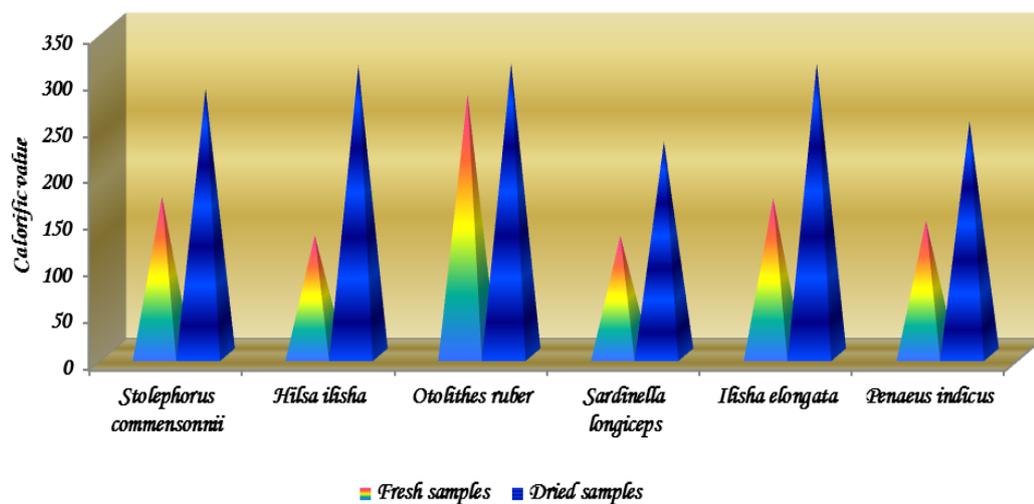


FIG:5 QUALITY ATTRIBUTE- CALORIFIC VALUE CONTENT OF FRESH AND DRY MARINE EDIBLE SPECIES FROM NAGAPATTINAM DISTRICT



The results of the proximate composition of the fresh and dried marine edible species obtained from the study location have been presented in Fig:1 and Fig:5. The biochemical parameters like protein carbohydrate and lipids (Fats) content of fresh and commercially and experimentally sun dried samples were estimated and the results were presented in Fig:2- Fig:4.

The proximate composition (nutritional level/properties) was an important aspect of fish quality and it influences both the keeping quality and technological characteristics of the fish. In the present study the moisture content of the selected raw fishes and prawn varied from 71.84 to 79.11% and in dry species it varied from 4.69 to 15.06 % (Fig:1).



According to Glucas, 1982 drying decreases the moisture content in the fish tissues and if dried hygienically it increases the shelf life. The proximate composition, moisture content seems to be an exact indicator of the susceptibility of a product to undergo microbial spoilage. From the present study, the result on moisture content showed that there was a drastic moisture reduction as the drying time increased which was in accordance to the result of various authors in earlier studies (Akhterr *et al.*, 2009, Olyemi *et al.*, 2011, Mohammed and karrar, 2012, Oparaku and Mgbenka, 2012).

In the present study, as regards to the percentage of protein content in the selected marine species it was observed to be 24.54% and 43.21% in raw and dry fish Indian anchovy- *Stolephorus commersonnii*. In *Hilsa ilisha* 38.12 % and 20.02% of protein was recorded in dry and raw samples and the amount of protein recorded in *Otolithes ruber*, *Sardinella longiceps* and *Ilisha elongata* dry samples were 46.12%, 35.02% and 46.0% (Fig:2). The proximate composition parameters like protein, carbohydrate, lipid, vitamins and minerals varies widely and depends on several factors like species, size, sex, maturity, season and feeding regimes. There was significant increase in protein content in dried fishes and prawn, when compared with raw fish, and prawn which suggests that protein nitrogen content increased with the reduced moisture content in the samples which was in accordance with finding of Tao and Linchan (2008); Ogbonnaya and Shaba (2009) and also due to dehydration of water molecules present between the proteins causing aggregation of proteins. Decrease of moisture content and increase of protein and fat were the most prominent changes in all the fishes after drying and the present trend was in agreement with findings of Chukwu (2009) who too observed that decreased moisture content in the dry samples than the raw samples collected from fish market at in Muscat, Oman.

Carbohydrates are in the form of glycogen, reducing sugars and nucleotides. The carbohydrate of the raw fishes and prawn varied from 0.56 to 0.90% and in dry sample it ranged from 502 to 8.12%. Among the species the lowest value of carbohydrate (0.56%) was recorded in *Penaeus indicus* and the highest value of (0.90%) in *Hilsa ilisha*. The carbohydrate of the dried fishes and prawn varied from 5.02% in *Sardinella longiceps* to 8.12% in *Otolithes ruber*. In all the selected dry samples carbohydrate content were increased and in raw sample glycogen depletion was noted and this result was in line with Eyo,2001 ; Oladipo and Banko,2013 who in his report stated that raw samples presented low protein and carbohydrate and high moisture while decrease in moisture increase in protein and carbohydrate was observed. This coincides with the results obtained in this work indicating that various species of fishes processed are poor source of carbohydrates. Fish processing methods and storage are some factors responsible for difference in protein, carbohydrate and lipid content. The relatively low values of carbohydrates could be due to higher values of moisture contents, due to stress and death, fish tissue spoilage due to temperature, pre rigor and post rigor changes. A good number of similar works on biochemical composition of fishes (Dry and Raw) has been done by many researchers like Islam *et al.*, (2003); Mazumder *et al.*, (2008); Flowra and Tumpa (2012) etc who stated that dry fish tissue presents elevated nutritional significance and therefore was a particularly optional dietary module.

In the selected marine raw fish sample the record fat values were 3.02%, 1.20%, 1.43%, 2.76% and 2.98% and in fresh Indian white prawn it was estimated to be 3.12 % of fat. Among the selected marine fishes Indian anchovy- *Sardinella longiceps* was observed to have maximum amount of fat when compared to other selected fish samples. The quality of fat in percentage was in dry samples were noted to be *Stolephorus commersonnii* (1.60%), *Hilsa ilisha* (7.62%), *Otolithes ruber*(2.0%), *Sardinella longiceps*(1.10%), *Ilisha elongate*(2.82%) and *Penaeus indicus* (0.68%) Figure 4. Increase in fat in raw fish may be due to partial loss of water by evaporation (Saguy and Dana, 2003) and lower in dried samples due to the presence of some catalysts in the fish muscle which favors non-enzymatic lipid oxidation, evaporation of moisture content and hydrolysis. The fat content may be exuding with the moisture evaporation, and temperature could be attributed phenomenon to enhance possible loss of fat due to increase in temperature by long exposure of species. Fat content also varies from species to species and from fish to fish. Beside the high amount of protein, the proportion of the fat of the meat is low (1-7%). The greater the degree of unsaturation greater would be the tendency for fat oxidation (Rancidity). This difference and variation in fat content could also be due to the size of the fish and their nutritional status of the raw samples. The calorific value of selected fish species is based on the nutritional values like proteins, carbohydrates and lipids. If the amount of protein, carbohydrate and lipids are in the recommended limits of FAO then the calorific values of fish are said to be good. The calorific value of the raw marine species varied from 127.6175% (*Sardinella longiceps*) – 279.699% (*Otolithes ruber*) while in dry marine species it was in the range 228.84% (*Sardinella longiceps*) – 312.77 % (*Otolithes ruber*).The lowest calorific value of the raw fish

may be due to the prevalence of unhygienic conditions, improper handling and inadequate preservation of the fishes. The high calorific values of the fish species are within the recommended values of 450-600 Kcal/100g for human and so could contribute to caloric requirement of consumer.

CONCLUSION

Fish, an important protein component in the diets having bioactive properties and beneficial health effects are consumed by the majority of people from the rural poor to the urban rich rather than going for the synthetic mineral concentrates. The measurement of some proximate profiles like proteins, carbohydrate, fat, moisture and calorific values is often required to ensure the food quality to meet the requirements of food regulations and commercial specifications. The proximate profile of the selected edible marine species revealed that dry fish have very good nutritional quality value than the raw species which may be due to inadequate preservation techniques which would imply a substantial shortfall in fish biochemical composition of raw fish and fish availability thereby affecting the protein intake. The collected dry samples were very rich in protein, fat and calorific value so it can be consumed by consumers (infants and elders) all over the world for its nutritional value, taste, aroma and also as an alternative source of dietary nutrient rich animal protein for those who are allergic to dairy products to avoid malnutrition problems in tropic country like India.

REFERENCES

- Chukwu O. and Shaba I. M. (2009).** Effects of Drying Methods on Proximate Compositions of Catfish (*Clariasgariepinus*). *World J. Agric. Sci.* 5 (1): 114-116.
- Eyo A.A. (2001).** Fish processing technology in the tropics. Published by *National Institute for Freshwater Fisheries Research* (NIFFR), New Bussa, and Nigeriastate: 37- 164.
- Flowra A.F. and Tumpa S.A. (2012).** Chemical Composition of five selected Dry fish species in ChalanBeel, Banglaesh. *DAV Int. J. Sci. India.* 1(2): 157-160.
- Folch J.M., Lees A and Stanly, G.W. (1957).** A simple method for isolation and purification of total lipids from animal tissues. *J. Biol. Chem.* 226: 496-508.
- Glucas, I.J. (1982).** Present fish drying techniques in Zambia and suggested improvements. A report prepared for fisheries development project. Rome. *FAO F.J. Zam.* (73/00 / 3 FAO):2 5 P.
- Hedge J.E. and Hofreiter B.T. (1962).** Determination of reducing sugars, methods in carbohydrate chemistry, *M.L Academy press*, New York, 1: 388-389.
- Islam M. A., Hossain B. B. M., Bhuiyan A. S. and Absar N. (2003).** Biochemical composition and nutritional value of *Cirrhinusreba* (Hamilton-1822) of Bangladesh. *J. Biol. Sci.* 11:127-130.
- Kamruzaman A.K.M. (1992).** Qualitative evaluation of some commercially dried fish products of Bangladesh. *M.SC thesis, Department of fisheries Technology*, Bangladesh Agricultural University, Mymensingh, Bangladesh, 37.
- Lowry O.H., Rosebrough N.J., Farr A.L and Dandall R.J. (1975).** Protein measurement with the folin phenol reagent. *J. Biol. Chem.* 193: 265-275.
- Mazumder M.S. A., Rahman M.M., Ahmed A.T.A., Brgum M. and Hossain M.A. (2008).** Proximate composition of some indigenous fish species SIS Bangladesh- sustain crop production *Adv. Biol. Res.* 5 (4): 18-23.
- Mohammed M.O and Karrar A.M.H. (2012).** Effect of salting and drying techniques on treated meat of Khashm El-Banat (*Mormyrusniloticus*) collected from the White Nile in Sudan. *Pak. J. Biol. Sci.* 15(5):259-262.
- Ogbonnya C. and Shaba I.M. (2009).** Effects of drying methods on proximate composition of cat fish (*Clariasgarpinus*). *World J. Agric. Sci.* 5(1): 114-116.
- Oladipon I.C. and Bankole S.O. (2013).** Nutritional and microbial quality of fresh and dried *Clariasgariepinus* and *Oreochromisniloticus*. *Int. J. Appl. Microbiol. Biotechnol. Res.* 1:1-6.
- Olayemi Folorunsho Foline, AdedayoMajekodunmi Rachael, Bamishaiye Eunice Iyabo and AwaguEmenike Fidelis. (2011).** Proximate composition of catfish (*Clariasgariepinus*) smoked in Nigerian stored products research institute (NSPRI): Developed kiln. *Int. J. Fish. Aquacult.* 3(5): pp. 96-98.
- Oparaku N.F. and Mgbenka B.O. (2012).** Effects of electric oven and solar dryer on a proximate and water activity of *Clariasgariepinus* fish. *Eur. J. Sci. Res.* 81(81):139-144.
- Saguy I.S. and Dana D. (2003).** Integrated approach to deep fat frying: Engineering, Nutrition, Health and Consumer aspects. *J. Food. Eng.* 56: 143-152.
- Tao W. and Linchum M. (2008).** Influence of Hot air Drying and microwave drying on Nutritional and odorous properties of Grass carp (*Ctenopharyngodonidellus*) filets. *Food Chem.* 110 (3): 647 – 653.