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Nutritional and Chemical Composition of Frying, Smoked Dried, Freezing, Solar Dried and Salting of African Mud Catfish

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

An experiment was conducted on Nutritional and chemical composition of frying, smoked, freezing, solar dried and salting of African mud catfish, to monitor nutrient and mineral lost as a result of preservative method, 100 (one hundred) pieces table size African mud catfish was purchased from Kwara state Ministry of Agriculture farm in Ilorin, the fishes were then divided into five (5) portions of twenty (20) pieces each and each portion were preserved by frying, smoking, freezing, solar dried and lastly by salting, after which both proximate and mineral content of the fish samples were then carried out and, it was observed that , the crude lipid of the fried fish was higher ($P<0.05$) followed by freezing, smoked dried and lastly salting which is the least. No significant difference occurred in crude fibre ($P>0.05$), except the smoked dried and freezing that is the least. The moisture content of freezing and salting was better ($P<0.05$) when compared to other methods. The phosphorus (Ph), Pottassium (K), Zinc (Zn), and Magnessiu (Mg) was higher in smoked dried ($P<0.05$) while

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Calcium (Ca) was higher in salting method and therefore we concluded that Frying retained most of the nutrients, followed by solar drying and smoke drying for African mud catfish, but the minerals are better retained by smoked dried fish when compared to others.

Keywords: Chemical composition; fish; catfish; mineral content.

1. INTRODUCTIONS

"Fish is one of the protein foods that needs careful handling" [1]. "This is because fish spoils easily after capture due to the high tropical temperature which accelerates the activities of bacteria, enzymes and chemical oxidation of fat in the fish. Due to poor handling, about 30 – 50% of fish harvested are wasted in Nigeria. These losses could be minimized by the application of proper handling, processing and preservation techniques" [2]. "The purpose of processing and preserving fish is to get fish to an ultimate consumer in good, usable condition. The steps necessary to accomplish this begin before the fishing expedition starts, and do not end until the fish in eaten or processed into oil, meal, or a feed" [3]. "Fish begins to spoil as soon as it is caught, perhaps even before it is taken out of the water. Therefore, the key to delivering a high quality product is close attention to small details throughout the entire process of preparation, catching, landing, handling, storage, and transport. Fish that becomes spoiled or putrid is obviously unusable" [4,7,8]. "Fish that is poorly cared for may not be so obviously bad, but it loses value because of off-flavors, mushy texture, or bad color that discourage, a potential purchaser from buying" [5].

"If customers have bought one bad fish, they probably won't buy another. On the other hand, if you consistently deliver good quality at a fair price, people will become loyal customers" [6].

2. MATERIALS AND METHODS

2.1 Study Site

This study was carried out at the department of agricultural technology garden (Kwara State Polytechnic Ilorin) which is located at Ilorin east local government area of Kwara State, located between latitude and longitude (8^0 5N, 4^0 E) in the transitional zone between the Northern and Southern part of Nigeria.

2.2 Sample Collection

Samples of African mud catfish was procured from Ministry of Agriculture farm, Ilorin. The fish samples were transported in an improvised 50L jerry can containing water (25^0C) to the department of agricultural technology garden where the study was done.

2.3 Frying, Freezing, Salting, Fish Smokig and Solar Drying

Fish samples procured were divided into five portions; one part each for smoking, freezing, salting, smoke drying and the other for solar drying. All fish samples were killed, gutted and rinsed with clean water. All samples were cut in to pieces to hasten the drying process. Samples meant for solar drying were immediately transferred to a glass made solar drying box while Samples meant for smoking were properly smoked in an improved mud smoking kiln, other were fried using groundnut oil, the other part was also well salted and the last portion was kept in freezer at the department of Agricultural technology, Kwara State Polytechnic, Ilorin. All fish samples were mutilated for proximate analysis.

2.4 Analysis of Proximate and Minerals Composition

Analysis of proximate and minerals composition of the fish sample was done at Central Research and diagnostic Laboratory, Tipper garage along University of Ilorin Road, Tanke Ilorin.

2.5 Determination of Dry Matter

The moisture content of each fish samples was determined using the oven dry method [7]. 5g of the samples were placed in weighed crucibles maintained at 80 0C in an oven until constant weights were obtained because the fish samples were not properly smoked dried. The samples were transferred into desiccators to cool to ambient temperature and reweighed. The

difference in weights indicates the dry matter and was calculated as follows;

$$\%\ \text{Moisture content} = \frac{W1 - W2}{W1} X\ 100\%$$

Where;
W_1 = Wet sample
W_2 = Dry sample

2.6 Determination of Lipid Content

The percentage lipid content in the muscles was determined using the soxhlet extraction method of [7]. The percentage lipid was calculated as follows:

$$\%\ \text{lipid content} = \frac{W2 - W3}{W2 - W1} \text{ x } 100\%$$

Where
W1 = Weight of empty extraction thimble
W2 = Weight of extraction thimble plus sample extraction
W3 = Weight of extraction thimble plus sample residue after extraction.

2.7 Determination of Protein Content

The total nitrogen (crude protein) was determined using the Kjeldahl method [8]. About 0.5 g of the fish sample was weighed on a Nitrogen-free paper. The paper was wrapped round the sample and dropped at the bottom of the Kjeldahl digestion flask together with 6-8 glass beads, 4-5 spatulas full of granular mixture of CuSO4 and K2SO4 as catalyst and 20 ml of concentrated H2SO4 was carefully added. The flask was gently heated on a Gerhardt heating mantle in an inclined position in a fume cupboard until full digestion was achieved (when the liquid changed from brown to colorless). The contents of the flask were then transferred to a clean 100 ml volumetric flask, and 25 ml aliquot was used for the distillation and total nitrogen was determined calorimetrically.

2.8 Determination of Ash Content

Ash content of fish samples was determined by incineration in a carbolated Sheffield LMF3 muffle furnace at 50000C (AOAC. 1988). The difference in weight of the fish samples before and after heating was taken as the ash content, the formula is as follows;

$$\%\ \text{Ash content} = \frac{W2 - W0}{W1 - W0} \times\ 100$$

Where;
W_0 = Empty crucible,
W_1 = Dry sample; and W_2 = Ash sample

2.8 Determination of Mineral Content

The method described by association of Official Analytical Chemists (AOAC, 2005) was used for mineral analysis. The samples were ashed at 550^0C. The ash was boiled with 10ml of 20% hydrochloric acid in a beaker and then filtered into a 100ml standard flask. This was made up to the mark with deionized water. The minerals were determined from the resulting solution. Phosphorous was determined calorimetrically using the spectrum 20 (Gallenkamp UK) Kirk and Sawyer (1991) with KH_2PO_4 as the standard. Calcium (Ca) was determined using atomic absorption Spectrophotometer (AAS Model SP9). All values were expressed in mg/100.

2.9 Statistical Analysis

Descriptive statistics, frequency and percentages were used in presenting the data.

3. RESULTS AND DISCUSSION

Table one (1) shows the Proximate composition of African mud catfish preserved with different methods, it was observed that the crude lipid of the fried fish was higher ($P<0.05$) followed by freezing, smoked dried and lastly salting which is the least. No significant difference occurred in crude fibre ($P>0.05$), except the smoked dried and freezing that is the least. The moisture content of solar dried and smoked dried was better ($P<0.05$) when compared to other methods. The phosphorus (Ph), Pottassium (K), Zinc (Zn), and Magnessiu (Mg) was higher in smoked dried ($P<0.05$) while Calcium (Ca) was higher in salting method.

It was noticed that, the dryer the sample, the higher the concentration of both the nutrients and minerals under investigation and this makes the values to be higher in such samples Oladunjoye and Lawal [9], it may also be as a result of fish consumption, absorption and eventually conversion of the ingested feed into flesh Lawal et, al. [10]. therefore the smoked dry African mud fish is higher in minerals than other methods of preservation.

Table 1. Proximate composition of African mud catfish preserved with different methods

Fish sample_Parameters	Frying	Smoked dried	Freezing	Solar dried	Salting
Crude lipid (%)	10.11[a]	7.79b[c]	8.31[b]	3.66[c]	3.11[c]
Crude fiber (%)	6.99[a]	6.11[b]	7.88[a]	7.90[a]	5.99[b]
Crudeprotein(%)	60.15[a]	58.77[a]	49.80[b]	59.30[a]	55.93[b]
Moisture (%)	10.55[b]	9.99[b]	14.99[a]	10.60[b]	12.98[a]
Ash (%)	5.55[b]	6.69[a]	6.55[a]	6.70[a]	5.59[b]
NFE (%)	33.33	29.99	30.30	36.27	31.12

Table 2. Mineral composition of solar dried and smoke-dried African mud catfish

Fish sample_Parameters	Frying	Smoked dried	Freezing	Solar dried	Salting
P (mg/dl)	1.11[c]	3.70[a]	2.92[b]	2.60[b]	1.99[b]
K (mg/dl)	7.55[b]	8.95[a]	7.56[b]	8.90[a]	5.55[c]
Na (ppm)	111.90[b]	125.01[b]	130.90[b]	130.40[b]	169.70[a]
Zn (ppm)	0.77[a]	0.70[a]	0.45[b]	0.70[a]	0.11[c]
Mg (ppm)	2.11[a]	2.80[a]	1.95[b]	1.80[b]	0.99[c]
Ca (ppm)	2.99[c]	2.80[c]	3.00[b]	4.20[a]	3.54[a]

4. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Frying retained most of the nutrients, followed by solar drying and smoke drying for African mud catfish, but the minerals are better retained by smoked dried fish when compared to others.

4.2 Recommendation

Frying, solar drying and smoked drying is therefore recommended to farmers and consumers based on our findings, also the preservation and processing of fishes should be taken seriously by all as to avoid wasting of the fish products.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Eyo EE. Fish processing and utilisation. Paper presented at the national workshop onfish processing, Preservation, Marketing and utilistion, New Bussa. 2004;4-5.
2. Bate EC, Bendall JR. Changes in fish muscle after death. British Medical Bulletin. 2010;(12): 2305.
3. Karube I, Marouka H, Suzuki S, Watanabe E, Toyana K. Journal of Agriculture and Food Chemistry. 2001;32:314-319.
4. Gopakumar K. Enzymes and enzyme products as quality indices. Seafood enzymes, Harrd NF and Simpspn BK, (Eds). Marcel Dekker, Inc.New York, Basel, U.S.A. 2000;337-363.
5. Burt JR. Hypoxanthine a biochemical index of fish quality. Process Biochemistry. 2003;11(10):23-25.
6. Nelson J, Paetz SM, Joseph RT. The Fishes of Alberta, University of Alberta. 2004;654.
7. Bolawa OE, Gbenle GO, Ayodele SO, Adewusi OR, Mosuro A.O. and Apata OS. Proximate composition properties of different fish species obtained from lagos, Nigeria. Internet Journal of Food Safety. 2011;13:342- 344.
8. Huda SS, Brodie LE, Sattar N. Obesity in pregnancy: prevalence and metabolic consequences. InSeminars in Fetal and Neonatal Medicine. WB Saunders. 2010;15,(2):70-76.
9. Oladunjoye IO, Lawal WS, Lawal WS. Performance of Broiler birds fed Vitex donianaand Hibiscus flower by Cukurova 9th International science research

conference held Octerber in Adana Turkey. 2022;9- 112022.

10. Lawal S, Lennard C, Hewitson B. Response of southern African vegetation to climate change at 1.5 and 2.0 global warming above the pre-industrial level. Climate Services. 2019 Dec 1;16:100134.

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