

Acceptability of Meat Crackers with African Hito Meat

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Abstract

INTRODUCTION

Background of the study

Fish-based snack food is popular among Filipinos. Kids love to eat fish crackers as snacks and adults often pair them with alcoholic beverages. Tilapia, a freshwater species, and various marine species are commonly used to make fish crackers. Freshwater aquaculture primarily African hito or *C. gariepinus* is abundant in Zarraga however it is merely used in dishes. Fish has been known to serve as an excellent alternative to meat due to its low cholesterol, high protein, high digestibility, and high polyunsaturated fatty acids such as omega-3 as well as essential amino acids. Fish crackers are a good alternative to other snacks for increasing fish consumption. As a result, developing fish crackers with high nutritional value and sensory acceptability is an appropriate strategy for replacing less nutritious ready-to-eat foods. (Ibadullah et al., 2019) African Catfish is rightfully considered a culinary specialty. Its meat is juicy and firm, rich in protein and healthy fats. Catfish meat is suitable even for children as it does not have any scales, bones, or a typical fishy smell. (Zahrada, 2022) Catfish is low-calorie, high-protein seafood that is a great source of nutrients, including cobalamin, selenium, and omega-3 and omega-6 fatty acids. (Snyder, 2021) The municipality of Zarraga is abundant in African hito (*C. gariepinus*) but is merely used in dishes. Hence, the researcher brought this African hito (*C. gariepinus*) meat as a new variant of flavor for the fish industry.

Keywords: Iloilo State University of Fisheries Science and Technology - Barotac Nuevo Campus

Statement of the Problem:

This study aimed to determine the level of acceptability of crackers with African Hito (*C. gariepinus*) meat. Specifically, the study answered the following questions:

1. What is the level of acceptability of crackers as to 20, 40, and 60 grams of crackers with African hito (*C. gariepinus*) meat in terms of its taste, aroma, texture, appearance, and general acceptability?
2. Is there a significant difference in the level of acceptability of crackers as to 20, 40, and 60 grams of African hito (*C. gariepinus*) in terms of its taste, aroma, texture, appearance, and general acceptability?

Hypothesis

To answer the aforementioned questions, the researcher hypothesized that:

There is no significant difference in the level of acceptability of crackers in terms of appearance, aroma, taste, texture, and general acceptability with proportions of 20 grams, 40 grams, and 60 grams with African hito (*c. gariepinus*) meat.

The 0.05 alpha level was used as the criterion for accepting or rejecting the null hypothesis of significance.

Theoretical Framework

This study is anchored on the Value-added theory. The value-added theory was developed by social scientist Niel Smelser (1963) which relies on the belief that certain conditions are necessary for the development of a social movement. Smelser called his theory a “value-added” approach based on the concept (borrowed from the field of economics) that every step within the production process adds something to the finished product.

Conceptual Framework

The major concept of this study was focused on the level of acceptability of crackers in terms of texture, taste, appearance, aroma, and general acceptability with different proportions of 20 grams, 40 grams, and 60 grams with African hito (*c. gariepinus*) meat.

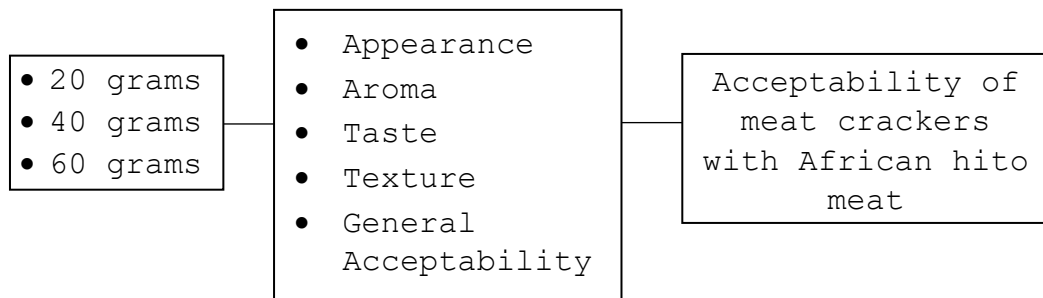


Figure 1. The paradigm showed the relationship between variables.

METHODOLOGY

Research Design

A descriptive research design was utilized as the research design of this study. Day (2001) cited by Castillo (2007) defined descriptive research is an activity involving the collection of data to test a hypothesis or to answer questions concerning the current status of the subject of the study. This method guided the researcher in determining the level of acceptability of crackers when evaluated as to appearance, texture, taste, and general acceptability with proportion content of 20 grams, 40 grams, and 60 grams with African hito (*c. gariepinus*) meat

Locale of the Study

This study was conducted at Iloilo State College of Fisheries, Brgy. Tiwi, Barotac Nuevo.

Respondents of the Study

The respondents of the study were composed of one hundred twelve (112) conveniently selected respondents of Iloilo State College of Fisheries, Brgy. Tiwi, Barotac Nuevo.

Sample Size

The total numbers of respondents were one hundred twelve (112) samples. In the study of Sharif & Nasir (2007, in consumer acceptability studies, considering the average standard error a difference between

sample means of 10% of the sensory scale 112 panelists are required for a particular set of parameters.

Sampling Technique

The sampling technique that the researcher used in this study was a convenience sampling technique. Convenience sampling (also known as availability sampling) according to Saunders, M., Lewis, P. & Thornhill, A. (2012) is a specific type of non-probability sampling method that relies on data collection from population members who are conveniently available to participate in the study.

The researcher preferred to use a convenience sampling technique to stop random people at ISCOF Main Tiwi Campus passing by the booth for a free taste and asking to evaluate the sensory checklist.

Research Instrument

The researcher utilized the adopted sensory 5 point (hedonic) evaluation checklist for data gathering.

In interpreting the scores, the following scale was used:

Range	Description
4.21-5.00-----	Extremely Acceptable
3.41-4.20-----	Highly Acceptable
2.61-3.40-----	Moderately Acceptable
1.81-2.60-----	Slightly Acceptable
1.00-1.80-----	Not Acceptable

Data Gathering Procedure

In the conduct of the study, the researcher asked permission from the research adviser to start the procedure of the research. The researcher prepared the materials and ingredients and then cook crackers with African hito (c. gariepinus) meat as to the proportions of ingredients per treatment. Subject for a taste test on the respondents using sensory evaluation form then collect the sensory evaluation form for analysis.

Ingredients:

2 cups all-purpose flour
1 ½ tsp. pepper powder
1 ½ tbsp. Iodized salt
4 cups water
1 tbsp. sugar
120 grams of African Hito meat

Hito Meat Preparation

1. Scrub the African Hito with salt to remove the slimy substance of the hito fish.
2. Remove the intestines and clean thoroughly the blood inside the stomach, fillet the left and right flesh of the hito fish.
3. Scrape the meat using a spoon to separate it from the skin.

Procedure

1. Using a blender, blend the fish into a paste. Make sure to add water gradually while blending then pour the fish paste into a bowl.
2. Combine all the ingredients. Stir the mixture well until it forms a thick batter.
3. Prepare a steamer. Add water and bring it to a boil.
4. Pour the mixture into the pie plate and spread evenly.
5. Steam until the mixture becomes translucent. Cover the steamer with a clean cloth to prevent water drippings on the pan. Set aside to cool.
6. Slice it into rectangular sizes.
7. Dry thoroughly under the sun.
8. Deep fry in hot oil and let them expand.
9. Transfer to a plate lined with paper towels.

Data Analysis Procedure

The data was tallied, analyzed, and interpreted using Statistical Package for Social Sciences (SPSS). Mean was used to answer the descriptive question in determining the level of acceptability of crackers with African hito (*c. gariepinus*) meat in terms of appearance, aroma, taste, texture, and general acceptability as to 20, 40, and 60 grams. ANOVA was used for inferential statistics to determine the difference between levels of acceptability of crackers with African hito (*c. gariepinus*) meat in terms of appearance, aroma, taste, texture, and general acceptability as to 20, 40, and 60 grams

RESULTS AND DISCUSSION

Level of acceptability of crackers with African Hito

Meat in terms of appearance, aroma, taste, texture, general acceptability, and the total level of acceptability as to 20, grams, 40 grams, and 60 grams.

Table 1 presents the level of acceptability of crackers with African Hito meat in terms of appearance as to 20, 40, and 60 grams. The result showed that in proportion 20 grams has a mean score of 4.24 while 40 grams has a mean score of 4.52 and 60 grams has a mean score of 4.54 which is described as “extremely acceptable” respectively.

The results agreed with the study of Nur Fazliana Md Noh, Rashilah Mohamad, Rozhan Abu Dardak, and Che Rohani Awang entitled “Consumer acceptance and preference towards frozen smoked fish developed by MARDI” show that in terms of physical appearance, frozen smoked African catfish obtained a higher score of 0.53 as compared to frozen smoked dory which obtained a preference index of 0.47.

Table 1. Level of acceptability of Crackers with African Hito Meat in terms of Appearance as to 20 grams, 40 grams, and 60 grams.

Variables	Mean	Description
20 grams	4.24	Extremely Acceptable
40 grams	4.52	Extremely Acceptable
60 grams	4.54	Extremely Acceptable

Table 2 presents the level of acceptability of crackers with African Hito meat in terms of aroma as to 20, 40, and 60 grams. The result showed that in proportion 20 grams has a mean score of 4.25 while 40 grams

has a mean score of 4.53 and 60 grams has a mean score of 4.79 which is described as “extremely acceptable” respectively.

The results agreed with the study of Okorie-Humphrey Chinasa, E. Obasi Neoma, U. Enyi Chukwunwike, O. Ukpong Emem, N. Amuzie Nmesomachi, and U. Udume Bethel entitled “Chemical and Sensory Evaluation of Smoked Fish Treated with Ocimum gratissimum Extract” shows that the Aroma was accepted by the panelist for all fish samples at different concentrations, which resulted in the aromatic flavor contained in the Ocimum gratissimum leaf.

Table 2. Level of acceptability of Crackers with African Hito Meat in terms of aroma as to 20 grams, 40 grams, and 60 grams.

Variables	Mean	Description
20 grams	4.25	Extremely Acceptable
40 grams	4.53	Extremely Acceptable
60 grams	4.79	Extremely Acceptable

Table 3 presents the level of acceptability of crackers with African Hito meat in terms of taste as 20, 40, and 60 grams. The result showed that in proportion 20 grams has a mean score of 4.33 while 40 grams has a mean score of 4.60 and 60 grams has a mean score of 4.79 which is described as “extremely acceptable” respectively.

The results agreed with the study of Okereke and Onunkwo (2014) entitled “Acceptance of Fish Crackers Produced from Tilapia and Catfish” shows that 75% of the panelists preferred fish crackers from catfish to those made from tilapia in terms of taste. There was higher consumer acceptability for crackers from catfish in terms of taste than that made from Tilapia. There was a significant difference observed between crackers from tilapia and catfish.

Table 3. Level of acceptability of crackers with African Hito Meat in terms of taste as to 20 grams, 40 grams, and 60 grams.

Variables	Mean	Description
20 grams	4.33	Extremely Acceptable
40 grams	4.60	Extremely Acceptable
60 grams	4.79	Extremely Acceptable

Table 4 presents the level of acceptability of crackers with African Hito meat in terms of texture as 20, 40, and 60 grams. The result showed that in proportion 20 grams has a mean score of 4.37 while 40 grams has a mean score of 4.55 and 60 grams has a mean score of 4.79 which is described as “extremely acceptable” respectively.

The results agreed with the study of Okorie-Humphrey Chinasa, E. Obasi Neoma, U. Enyi Chukwunwike, O. Ukpong Emem, N. Amuzie Nmesomachi, and U. Udume Bethel entitled “Chemical and Sensory Evaluation of Smoked Fish Treated with Ocimum gratissimum Extract” shows that the samples were accepted by the panelist in terms of texture Smoked Catfish recorded higher texture sensory scores than the mackerel.

Table 4. Level of acceptability of crackers with African Hito Meat in terms of texture as to 20 grams, 40 grams, and 60 grams.

Variables	Mean	Description
20 grams	4.37	Extremely Acceptable
40 grams	4.55	Extremely Acceptable
60 grams	4.79	Extremely Acceptable

Table 5 presents the level of acceptability of crackers with African Hito meat in terms of general acceptability as to 20, 40, and 60 grams. The result showed that in proportion 20 grams has a mean score of 4.42 while 40 grams has a mean score of 4.65 and 60 grams has a mean score of 4.86 which is described as “extremely acceptable” respectively.

The results agreed with the study of (Bakare et al., 2020) entitled “Nutritional, Texture and Sensory Properties of Composite Biscuits Produced from Breadfruit and Wheat flours enriched with an edible fish meal” shows overall acceptability of 5.48 to 6.88 with blends having 80.0%, 20.0%, and 0.00 IQBF, WF and EFM were adjudged to be most acceptable.

Table 5. Level of acceptability of crackers with African Hito Meat in terms of general acceptability as to 20 grams, 40 grams, and 60 grams.

Variables	Mean	Description
20 grams	4.42	Extremely Acceptable
40 grams	4.65	Extremely Acceptable
60 grams	4.86	Extremely Acceptable

Table 6 presents the total level of acceptability of crackers with African Hito meat as to 20, 40, and 60 grams. The result showed that in proportion 20 grams has a mean score of 4.32 while 40 grams has a mean score of 4.56 and 60 grams has a mean score of 4.81 which is described as “extremely acceptable” respectively

The results agreed with the study of (Ibadullah et al., 2019) entitled “Sensory acceptability and fatty acid profile of fish crackers made from Carassius gibelio” shows the overall acceptability score obtained by the sensory evaluation of panelists was very high (8.09 ± 0.25).

Table 6. The total level of acceptability of crackers with African Hito Meat as to 20 grams, 40 grams, and 60 grams.

Variables	Mean	Description
20 grams	4.32	Extremely Acceptable
40 grams	4.56	Extremely Acceptable
60 grams	4.81	Extremely Acceptable

The significant difference of African hito meat crackers were evaluated by the respondents in terms of appearance, aroma, taste, texture, general acceptability, and total level of acceptability as to 20, grams, 40 grams, and 60 grams.

Table 7 presents the ANOVA results of the significant difference in the level of acceptability of Crackers

with African Hito meat in terms of appearance. Results showed that in terms of appearance, it has a p-value of 0.000 which is lower than the p-value 0.05 alpha level of significance which means that there is a significant difference, thus the null hypothesis stated that there is a significant difference in the level of acceptability of crackers with African hito meat is rejected.

Table 7. The significant difference in the level of acceptability of crackers with African Hito meat in terms of appearance.

	Sum of squares	Df	Mean square	F	Sig.
Between groups	20.696	2	10.348	20.167	0.000
Within groups	170.875	333	0.513		
Total	191.571	335			

Table 8 presents the ANOVA results of the significant difference in the level of acceptability of Crackers with African Hito meat in terms of aroma. Results showed that in terms of aroma, it has a p-value of 0.000 which is lower than the p-value 0.05 alpha level of significance which means that there is a significant difference, thus the null hypothesis stated that there is a significant difference in the level of acceptability of crackers with African hito meat is rejected.

Table 8. The significant difference in the level of acceptability of crackers with African hito meat in terms of aroma.

	Sum of squares	Df	Mean square	F	Sig.
Between groups	16.613	2	8.307	16.157	0.000
Within groups	171.196	333	0.514		
Total	187.810	335			

Table 9 presents the ANOVA results of the significant difference in the level of acceptability of Crackers with African Hito meat in terms of taste.

Results showed that in terms of taste, it has a p-value of 0.000 which is lower than the p-value 0.05 alpha level of significance which means that there is a significant difference, thus the null hypothesis stated that there is a significant difference in the level of acceptability of crackers with African hito meat is rejected.

Table 9. The significant difference in the level of acceptability of crackers with African hito meat in terms of taste.

	Sum of squares	Df	Mean square	F	Sig.
Between groups	12.167	2	6.803	12.988	0.000

Within groups	155.973	333	0.468		
Total	168.140	335			

Table 10 presents the ANOVA results of the significant difference in the level of acceptability of Crackers with African Hito meat in terms of texture.

Results showed that in terms of texture, it has a p-value of 0.000 which is lower than the p-value 0.05 alpha level of significance which means that there is a significant difference, thus the null hypothesis stated that there is a significant difference in the level of acceptability of crackers with African hito meat is rejected.

Table 10. The significant difference in the level of acceptability of crackers with African hito meat in terms of texture.

	Sum of squares	Df	Mean square	F	Sig.
Between groups	10.339	2	5.170	11.309	0.000
Within groups	155.946	333	0.468		
Total	166.286	335			

Table 11 presents the ANOVA results of the significant difference in the level of acceptability of Crackers with African Hito meat in terms of general acceptability.

Results showed that in terms of general acceptability, it has a p-value of 0.000 which is lower than the p-value 0.05 alpha level of significance which means that there is a significant difference, thus the null hypothesis stated that there is a significant difference in the level of acceptability of crackers with African hito meat is rejected.

Table 11. The significant difference in the level of acceptability of crackers with African hito meat in terms of general acceptability.

	Sum of squares	Df	Mean square	F	Sig.
Between groups	10.732	2	5.366	12.205	0.000
Within groups	146.411	333	0.440		
Total	157.143	335			

Table 12 presents the ANOVA results of the significant difference in terms of the total level of acceptability of crackers with African hito meat.

Results showed that in terms of the total level of acceptability, it has a p-value of 0.000 which is lower than the p-value 0.05 alpha level of significance which means that there is a significant difference, thus the null hypothesis stated that there is a significant difference in the level of acceptability of crackers with

African hito meat is rejected.

Table 12. The significant difference in the total level of acceptability of crackers with African Hito meat.

	Sum of squares	Df	Mean square	F	Sig.
Between groups	13.801	2	6.900	18.920	0.000
Within groups	121.450	333	0.365		
Total	135.250	335			

Summary of Findings

1. The level of acceptability of crackers with African

hito meat in terms of appearance, aroma, taste, texture, general acceptability, and the total level of acceptability as to 20, 40, and 60 grams.

Results showed that in terms of appearance to 20, 40, and 60 grams, respondents evaluated the product as “extremely acceptable”; while in terms of aroma as to 20, 40, and 60 grams, respondents evaluated the product as “extremely acceptable”. In terms of taste as to 20, 40, and 60 grams, respondents evaluated the product as “extremely acceptable”. In terms of texture as to 20, 40, and 60 grams, respondents evaluated the product as “extremely acceptable”; in terms of general acceptability as to 20, 40, and 60 grams, respondents evaluated the product as “extremely acceptable”, and in terms of the total acceptability as to 20, 40, and 60 grams, respondents evaluated the product as “extremely acceptable”.

2. Level of significant differences between crackers

with African hito meat as evaluated by respondents, in terms of appearance, aroma, taste, texture, general acceptability, and the total level of acceptability as to 20, 40, and 60 grams.

As to the appearance of African hito meat crackers, it has a p-value of 0.000 which is lower than the p-value 0.05 alpha level of significance which means that there is a significant difference, thus the null hypothesis states that there is a significant difference in the level of acceptability of crackers with African hito meat is rejected.

As to the aroma, it has a p-value of 0.000 which is lower than the p-value 0.05 alpha level of significance which means that there is a significant difference, thus the null hypothesis states that there is a significant difference in the level of acceptability of crackers with African hito meat is rejected.

As to the taste, it has a p-value of 0.000 which is lower than the p-value 0.05 alpha level of significance which means that there is a significant difference, thus the null hypothesis states that there is a significant difference in the level of acceptability of crackers with African hito meat is rejected.

As to the texture, it has a p-value of 0.000 which is lower than the p-value 0.05 alpha level of significance which means that there is a significant difference, thus the null hypothesis states that there is a significant difference in the level of acceptability of crackers with African hito meat is rejected.

As to the general acceptability, in terms of 20 Grams, it has a p-value of 0.000 which is higher than the p-value 0.05 alpha level of significance which means that there is a significant difference, thus the null

hypothesis states that there is a significant difference in the level of acceptability of crackers with African hito meat is rejected.

The result showed that the total level of acceptability, as to 20, 40, and 60 grams of African Hito meat in terms of appearance, aroma, taste, texture, and general acceptability has a p-value of 0.000 which is lower than the p-value of 0.05 alpha level of significance which means that there is a significant difference between variables. Thus, the null hypothesis states that there is a significant difference in the level of acceptability of crackers with African hito meat is rejected.

Conclusions

Based on the summary of findings the following conclusions were drawn:

1. African hito meat crackers with 20 grams, 40 grams, and 60 grams in terms of appearance, aroma, taste, texture, general acceptability, and total level of acceptability are all extremely acceptable as evaluated by the respondents.
2. There is a significant difference in the level of acceptability of African hito meat crackers in terms of appearance, aroma, texture, and general acceptability with proportions of 20 grams, 40 grams, and 60 grams as evaluated by the respondents.

Recommendations

Based on the findings and conclusions, the following recommendations were made:

1. Based on the sensory evaluation, African hito meat crackers with 20 grams, 40 grams, and 60 grams obtained an extremely acceptable response for the level of acceptability. Thus, these formulations can be used as a standard formulation in the production of fish crackers.
2. Sufficient drying must be done to reduce moisture content and improved the crispiness of the cooked cracker product. An acceptable cracker should have high expansion and crispiness. Further study may consider oven dryer instead of sundry due to time and weather constraints.
3. Based on the sensory evaluation, crackers have a high market potential. Entrepreneurs and business enthusiasts may use this research in starting a small business.
4. The added combination of African hito meat to the production of crackers was positively developed and created a new fish cracker variant. This study will encourage households and entrepreneurs in producing such products for consumption and business.
5. Further research in terms of African hito meat crackers may conduct a shelf-life study of this product.

REFERENCES

1. Webster's Universal Dictionary and Thesaurus Akonor, P. T., Dzedzoave, N. T., Buckman, E. S., Mireku Essel, E., Lavoe, F., & Tomlins, K. I. (2016). Sensory optimization of crackers developed from high-quality cassava flour, starch, and prawn powder. *Food Science & Nutrition*, 5(3), 564–569. <https://doi.org/10.1002/fsn3.431>
2. And, O., & D.N, O. (2014). Acceptance Of Fish Crackers Produced from Tilapia and Catfish. *IOSR Journal of Environmental Science*, 8(11), 45–48. <https://www.iosrjournals.org/iosrjestft/papers/vol8-issue11/Version-2/I081124548.pdf>
3. Bakare, A. H., Adeola, A. A., Otesile, I., Obadina, A. O., Afolabi, W. A., Adegunwa, M. O., Akerele, R. A., Bamgbose, O. O., & Alamu, E. O. (2020).

4. Nutritional, Texture, and Sensory Properties of composite biscuits produced from breadfruit and wheat flours enriched with edible fish meal. *Food Science & Nutrition*, 8(11), 6226–6246.
<https://doi.org/10.1002/fsn3.1919>
5. Fazliana, N., Noh, M., Mohamad, R., Dardak, R., & Awang, C. (2014). Consumer acceptance and preference towards frozen smoked fish developed by MARDI (Penerimaan pengguna terhadap ikan salai sejuk beku yang dibangunkan oleh MARDI). *Economic and Technology Management Review*, 9, 149–153. [http://etmr.mardi.gov.my/Content/ETMR%20Vol.9b%20\(2014\)/Vol9b_6_.pdf](http://etmr.mardi.gov.my/Content/ETMR%20Vol.9b%20(2014)/Vol9b_6_.pdf)
6. Ibadullah, W. Z. W., Idris, A. A., Shukri, R., Mustapha, N. A., Saari, N., & Abedin, N. H. Z. (2019).
7. Stability of Fried Fish Crackers as Influenced by Packaging Material and Storage Temperatures. *Current Research in Nutrition and Food Science Journal*, 7(2), 369–381.
<https://www.foodandnutritionjournal.org/volume7number2/stability-of-fried-fish-crackers-as-influenced-by-packaging-material-and-storage-temperatures/>
8. İZCİ, L., & BİLGİN, Ş. (2015). Sensory acceptability and fatty acid profile of fish crackers made from *Carassius gibelio*. *Food Science and Technology*, 35(4), 643–646.
<https://doi.org/10.1590/1678457x.6723>
9. Mobdy, H. E. A. -, Abdel-aal, H., Souzan, S., & Nassar, (2021). Nutritional Value of African Catfish (*Clarias gariepinus*) Meat. Undefined.
[https://www.semanticscholar.org/paper/Nutritional-Value-of-African-Catfish-\(Clarias-Meat-Mobdy-Abdelaal/c5febfa87911e7f5cee266da8b76f0238242d8bd#citing-papersOkorie-](https://www.semanticscholar.org/paper/Nutritional-Value-of-African-Catfish-(Clarias-Meat-Mobdy-Abdelaal/c5febfa87911e7f5cee266da8b76f0238242d8bd#citing-papersOkorie-)
10. Humphrey, C., Chukwunwike, E., Ukpog, E., & Amuzie, N.
11. (2022). Chemical and Sensory Evaluation of Smoked Fish Treated with *Ocimum gratissimum* Extract Comparative Study on The Glycemic Indices of Three Yam Cultivars (*Dioscorea Rotundata*, *Dioscorea Alata*, and *Dioscorea Dumentorum*) As Affected by Three Processing Methods Okorie Chinasal, Obasi Nneoma Elechi1*, Unamma Nnenna Cynthia1 and Barber Lucretia Ifeoma2 1Department of Food Science and Technology. Article in *European Journal of Nutrition & Food Safety*, EJNFS.91704(2347-5641), 1–7. <https://doi.org/10.9734/EJNFS/2022/v14i1030544>
12. Umar, F., Oyero, J., Su, I., Hf, M., & Ibrahim, S.
13. (2018). *International Journal of Fisheries and Aquatic Studies* 2018; 6(3): 281-286 Sensory evaluation of African catfish (*Clarias gariepinus*) smoked with melon shell briquettes and firewood.
<https://www.fisheriesjournal.com/archives/2018/vol6issue3/PartD/6-2-4-805.pdf>
14. zahrada, R. (2022). AFRICAN CATFISH - WHOLE FISH - Rybí
15. zahrada. Rybizahrada.cz. <https://www.rybizahrada.cz/en/african-catfish-whole-fish/>