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Proximate Composition and Organoleptic Properties of Fish Cured with Two Energy Sources.

Ebochuo, V.C*[1]; Emuka, E.C[1]; Onyeme, O[1]; Ezennadi, P.O[1] and Ahaotu, E.O[2]

[1]Department of Fisheries and Marine Technology, Imo State Polytechnic Umuagwo, Ohaji, Nigeria [2]Department of Animal Production Technology, Imo State Polytechnic Umuagwo, Ohaji, Nigeria.

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Abstract

The proximate composition and organoleptic properties of silver catfish (*Bagrus filamentosus*) cured with *Alchornea cordifolia* wood and Kainji Gas Klin (KGK) were determined. Fourteen pieces of *Bagrus filamentosus* weighing between 500g and 600g were purchased, killed, deguted and washed to remove blood and slime. The fish were divided into two groups. Each group were immersed in ten liters of water that was mixed with 300g of salt to get 3% brine solution and allowed to stand for an hour respectively. The first group was cured with *Alchornea cordifolia* wood while the second group was cured with Kainji Gas Klin (KGK) for four hours respectively. Cured samples were allowed to cool at ambient temperature for 12 hours and were packed in a sterile black polythene bag before being sent for proximate and organoleptic analysis. The result of the proximate analysis showed that fish cured with Kainji Gas Klin (KGK) had significantly ($P<0.05$) higher dry matter than the same fish cured with *Alchornea cordifolia* wood (92.40b+/-0.10 and 90.00a+/-0.10). Fish cured with Kainji Gas Klin (KGK) had significantly ($P<0.05$) lesser moisture content than

same fish cured with *Alchornea cordifolia* wood (8.90b +/-0.02 and 14.40a+/- 0.01). Fish cured with *Alchornea cordifolia* wood had insignificantly higher (P>0.05) protein content than Kainji Gas Klin (KGK) cured fish (59.98 +/- 0.09 and 61.11b +/- 0.10). Fish cured with *Alchornea cordifolia* wood had significantly (P<0.05) higher lipid content than fish cured with Kainji Gas Klin (18.71a+/-0.08 and 10.10b +/-0.10). The result of the organoleptic analysis showed that the parameters taste and appearance for *Bagrus filamentosus* cured with wood and gas were significantly (P<0.05) different scores. However, aroma, mouth feel and general acceptability so treated fish were not significantly different (P>0.05). The two sources of energy could be used to cure fish since the parameters examined fall within the recommended ranges.

Introduction

Fish is extremely perishable food item (Anyanwu, 2009 and Agbo *et al*., 2002). The resultant effect is the easy decomposition of the fish at ambient state (Akinola *et al*., 2006). Various factors are responsible for fish spoilage. Once fish is caught and upon comatose series of changes which include enzyme action (autolysis) chemical action (oxidative change) and microbial degradation begin to take place in the fish.

This reason for fish processing is to give the product a form which is attractive to the consumers and to extend the storage life of fish. Davies (2005) suggested appropriate processing technologies to enable maximal use of raw material and thus contribute to increase in economic profitability, The poor handling and preservation practice after capture affects the degree of spoilage of the fish (Akinneye *et al.,* 2007). Fish is a major source of protein and its harvesting, handling remains sources of livelihood for millions of people as well as providing foreign exchange earning to many countries (Alyufaili and Opara, 2006).

Different types of processing methods include drying, smoking, freezing, chilling and brining but the most prominent fish preservation is smoke curing. This could be adduced to the fact that most of the fishing communities have no access to electricity in order to preserve through freezing their products. Electricity therefore is fast becoming a less reliable source of energy for fish processing and preservation Akinola *et al.,* 2006).

Bagrus filamentosus is a common commercial catch in Nigerian fresh waters especially in the Southern states of Nigeria. Most fish that cannot be sold as fresh fish are preserved by fishermen and fish mongers to extend their shelf-life. Through smoke curing, the energy sources used in this study are *Alchornea cordifolia* wood and Kainji gas kiln as control.

Alchornea cordifolia is a common member of the flora in Southern Nigeria. This plant is used for its medicinal uses, fodder and also for the supply of energy for cooking. Since gas is not within the reach of artisanal fishermen and fish mongers, *Alchornea cordifolia* could be utilised as a common energy source for smoking fish.

This study however determined the proximate composition of smoke cured *Bagrus filamentosus* processed with *Alchornea cordifolia* wood and natural gas and also the organoleptic properties of smoke cured *Bagrus filamentosus* processed with *Alchornea cordifolia fuel* wood and natural gas respectively.

MATERIALS AND METHODS

This study was conducted in the fish processing and preservation unit of the fisheries laboratory, Department of Fisheries and Marine Technology, Imo State Polytechnic Umuagwo, Nigeria.

EXPERIMENTAL MATERIALS

The experimental materials used include smoking kiln, Kainji gas kiln, machete, bowls, weighing balance, dissecting kits, gas, salt, water, fish (*Bagrus filamentosus*) and *Alchornea cordifolia fuel* wood.

COLLECTION AND PREPARATION OF FISH SAMPLES

Samples of *Bagrus filamentosus* were obtained from hospital water side market in Yenogoa, Bayelsa State, Nigeria. Fourteen (14) pieces of *Bagrus filamentosus* weighing between 400 grams and 600 grams were weighed on a

manual weighing balance (Capacity brand: 20kg, Camry Emperors, made in China). Fish was killed, degut, washed and weighed. The fishes were divided into two groups. Each group was immersed in ten liters of water that was mixed with 300 grams for an hour before curing with *Alchornea cordifolia fuel* wood and gas. After smoking and gas curing, the fishes were weighed.

ORGANOLEPTIC ANALYSIS

Wood cured fish and gas cured fish were submitted to a ten man panel for sensory analysis using a seven point Hedonic scale to ascertain the following parameter:- taste, aroma, mouth feel, appearance and general acceptability according to the methods of Eyo (2001).

STATISTICAL ANALYSIS

The differences in proximate composition between smoke cured fish and gas cured fish was determined using student t- while the difference in organoleptic parameters between smoke cured fish and natural gas cured fish were determined by using Tukey test respectively.

BIOLOGICAL EVALUATION

The biological evaluation was done by obtaining the carcass weight of the fish. The fish samples were then cleaned and eviscerated. The weight after evisceration was then obtained as the dress weight. The weight of the cured fish was also obtained as weight after smoking.

RESULTS

Table 1. Weight Characteristics of *Bagrus filamentosus* cured with *Alchornea cordifolia fuel* wood and Kainji Gas Kiln

Samples	Live Weight	Dressed Weighing Weight after Smoking	Weight Loss	Total Loss	% Weight
A	500	400	170	330	66.0
B	600	500	207	393	65.5

Average Weight Loss (%) = 65.7

Table 2. Proximate Composition of *Bagrus filamentosus* cured with *Alchornea cordifolia fuel* wood and Kainji Gas Kiln

T. S	% DM	%MO	%C.P	%LI	%Ash	% C.F	NFE
T_1	$90.00^a \pm 0.10$	$14.40^a \pm 0.01$	$61.11^b \pm 0.10$	$18.71^a \pm 0.08$	$11.50^a \pm 0.01$	$4.30^a \pm 0.02$	$2.30^a \pm 0.05$
T_2	$92.40^b \pm 0.10$	$8.90^b \pm 0.02$	$59.98^a \pm 0.09$	$10.10^b \pm 0.10$	$5.40^b \pm 0.02$	$1.50^b \pm 0.03$	$2.56^a \pm 1.02$

DM= Dry Matter; MO= Moisture; C.P= Crude protein; LI=Lipid; C.F= Crude fibre, NFE= Nitrogen free extract.

Where the same superscripts appear in the same column, there is significant different at (P<0.05).

T1= *Alchornea cordifolia fuel* wood curing

T2= Kainji Gas Kiln curing (KGK)

Table 3. Organoleptic Parameters of *Bagrus filamentosus* cured with *Alchornea cordifolia fuel* wood and Kainji Gas Kiln

	PARAMETERS				
Treatments	Taste	Appearance	Aroma	Mouth feel	General Acceptability
Wood	4.00 ± 0.40^a	4.07 ± 0.42^a	6.05 ± 0.38^b	5.47 ± 0.38^a	6.53 ± 0.04^b
Gas	6.00 ± 0.30^b	5.72 ± 0.25^b	6.34 ± 0.27^b	5.32 ± 0.37^b	6.51 ± 0.28^b

The study showed that *Bagrus filamentosus fish smoked with* cured with Kainji Gas Kiln had significantly (P<0.05) higher dry matter than the same fish cured with *Alchornea cordifolia fuel* wood as shown in table 1 above. Fish cured with Kainji Gas Kiln had significantly (P<0.05) lesser moisture than fish smoked with *Alchornea cordifolia fuel* wood as shown in table 2. The parameters' taste and appearance for *Bagrus filamentosus* cured with *Alchornea cordifolia fuel* wood and gas were significantly (P<0.05) different. However, aroma, mouth feel and general acceptability of the treated fish were not significantly different (P>0.05).

DISCUSSION

The average moisture loss (65.7%) from the cured *Alchornea cordifolia fuel* wood and Kainji Gas Kiln is similar to the value of less than 65.00% recommended by Bene and Heck (2005). The values recommended by Ebochuo and Oparaejiaku (2017) are e\within the range of 10-12% with corresponds with the value obtained from this study.

Results in crude protein showed that KGK produced a significantly lower product than the wood cured product. This confirms the findings of Eyo (2001) that different processing methods affect nutritional value of processed food. Emuka *et al.,* (2015) stated that oven drying, solar drying, smoking and boiling had different impacts on nutritional values of *S. Clarias Trachrus trecae* and *C. gariepinus* so treated. Emuka, *et al.,* (2015) further stated that processing methods which lowers the lipid values help to prevent oxidation and rancidity in fish preservation. Richardson and Goff (2001) advanced that the amount of heat from heat source significantly denatured the fibre in the muscle of peanid shrimps.

CONCLUSION

Alchornea cordifolia fuel wood which is abundant qualify for use in fish smoking. Both sources do not exceed of fall below the operating standard in Nigeria.

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