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Short Communication

Techniques in the improvement of consumers' taste of *Heterotis niloticus*

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Improvement of the consumers' taste of *Heterotis niloticus* was investigated by salting techniques. Table size fish were degutted, cut into uniform sizes, and soaked in salt solutions at concentrations that ranged from 0 - 100 g/l for 6 h. The salted pieces of *H. niloticus* were allowed to drain for an hour before been subjected to fire wood smoking in a kiln for 48 h. The taste of *H. niloticus* was greatly improved at 50 g/l salt as reported by all members of a 5-man organoleptic taste panel constituted to determine the taste by consuming fish soaked in different concentration of salt solutions. The improvement of the consumers' taste of *H. niloticus* by simple salting methods showed in this study would improve the market value and aquaculture potentials of the species which has been discriminated because of its poor consumers taste, despites its excellent muscle quality.

Key word: *Heterotis niloticus*, taste, salting.

INTRODUCTION

Heterotis niloticus commonly known as African arowana or bony-tongues and as Ecomog fish in Nigeria belongs to the family Ostoeglossidae (Paugy, 1990). Its fast growth rate and an excellent meat quality makes it a good candidate for aquaculture but the poor taste of the fish makes it unpopular among fish consumers. This species is wide spread throughout Africa, where it is native to all the watersheds in Sahelo-Sudanese region, Senegal and Gambia as well as parts of Eastern Africa. This range includes the basins of the Corubal, Volta, Que'me', Niger, Benue and Nile River as well as those of Lake Chad and Lake Turkana. It has been successfully introduced to Cote D' Voire, Cross river in Nigeria, the Sanagal and Nyong river in Cameroon, and Ogooue river in Gabon as well as lower and middle Congo river basin, including Ubanji and Kasai river.

Heterotis consume a variety of food resources ranging from aquatic invertebrates to small seeds. The thick-walled gizzard generally contains sand that probably aids in the digestion of seed coats. It is the only plankton feeder in the family of Osteoglossidae (Paugy, 1990). It is equipped with an epibronchial spiral and suprabranchial organs that enable it concentrate small planktonic food particles (Winemiller and Fiogbe, 2005). It has an auxiliary air breathing organ which enables it to survive in oxygen-depleted conditions. This characteristic and its firm muscle quality have endeared *H. niloticus* to aquaculturist in many African countries. A study carried out in Lake Hlan in Southern Benin showed that it has a peak spawning period between May and August with an approximate number of larvae per nest that ranged from 3953 to 6125 (Adite et al., 2005). The maximum observed length and weight of *H. niloticus* as observed in Lake Kainyi was 100 cm and 10 kg, respectively.

Achionye-Nzeh and Omoniyi (2002) reported low lipid composition (13%) in *H. niloticus* with very thick scale in comparison with *Gnathonemus cyprinoides* (light scale) with high lipid content (26%). Haematological characteristics showed a positive correlation between blood cells, haemoglobin and packed cells volume but no positive correlations was observed between WBC (white

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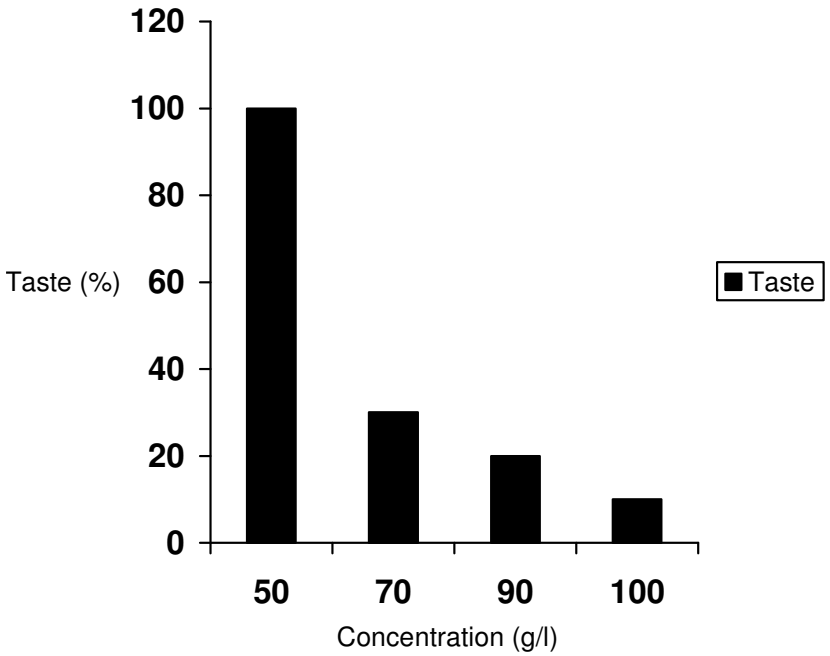

Figure 1. Organoleptic bar of salt concentration (g/l) against the taste of *H. niloticus*

blood cells), RBC (red blood cells) and some physical parameters (length and weight) of *H. niloticus* (Ayotunde et al., 2009).

The objective of the study was to improve the consumers' taste of *H. niloticus* by salting at different concentrations of salt and by smoking; which will increase the market value of the species.

MATERIALS AND METHODS

Heterotis niloticus of table size (1.5 to 2.5 Kg) were purchased from fishermen at Itu Head Bridge in Akwa Ibom State. The fish were slaughtered, scaled and degutted with the help of a kitchen knife; they were cut into uniform sizes of about 50 g and soaked in basins that contained different concentration of the salt solutions (50, 70, 90 and 100 g/l) for a period of 4 h. At the expiration of the salting period, the salted fish were placed on wire gauze and allowed to drain before been subjected to smoking in a smoking kiln along side the unsalted fish of the same sizes that served as control. Smoking was done using red-hot charcoal from fire wood. They were smoked to an average moisture content of 12.02±0.03%. The samples and controls were replicated three times. A panel of 5 consumers randomly selected from among students and staff of the department of Fisheries and Aquaculture was constituted to assist in determining the taste of the salted-smoked and unsalted-smoked fish (organoleptic test).

The taste of the salted fish from different salt concentrations and salting time was determined by different consumers. The taste determination started with the unsalted fish, which served as the control. The control carried the true taste of *H. niloticus* which is said to be tasteless; for one to really know whether the taste of this fish was improved, the organoleptic test was started with the control. At each interval between consumption of fish from each treatment group, a glass of water was served to the consumers to wash down what had been consumed, thereby reduced biases.

Statistical analysis

The homogeneity of the three replicates of the samples was checked by the Mann-Whitney U-test, before data of the replicates were pooled and treated as a group. Significant differences in the taste within the experimental groups were evaluated using the Kruskal-Wallis test and the Mann-Whitney U-test. Significance was accepted when $P<0.05$.

RESULTS AND DISCUSSION

The fish sample with the highest salt concentration (100 g/l) was consumed and was reported by all panel members as been too salty. Samples with 90 g/l salt were also consumed, and the result was that the fish was still salty but not as salty as the 100 g/l. At 70 g/l salt, the report was that the fish was partly salty and partly tasteful. At 50 g/l salt solution, the most favorable panel results were received from all members; that the fish was excellently tasteful and palatable. The taste quality of Ecomog fish processed at this salt concentration was commended by all members in the panel as been wonderfully improved by the salting techniques. There was a significant difference in the taste between the salted and unsalted fish. The result is presented on the organoleptic chart in Figure 1.

H. niloticus is one of the fish species that has great

potentials for commercial aquaculture in Nigeria and other countries within the Sub-Saharan African countries where fish offers about 40% protein intakes of the people (Olatunde, 1989). In addition to the excellent flesh quality, it is a good source of essential amino acids (Monentcham et al., 2009). The greatest set back to the consumers demand of this fish has been the poor taste which affects the market value despites the excellent meat quality and as a result, *H. niloticus* is being used in many places for feed preparation. In a recent study to investigate the physicochemical changes in smoked fresh water fishes stored in ambient temperature, Daramola et al. (2007) reported the best taste and meat quality in *Oreochromis niloticus* and *H. niloticus*.

Addressing this problem (improvement of consumer taste) constituted the primary objective of this study. The salting/smoking techniques demonstrated in this study led to the improvement of the taste of *H. niloticus*. Salting and smoking of fish has long been practiced by traditional fish processors whose aims have been to reduce post harvest losses (Bostock, 1987; Eyo, 2001) of fish and not necessarily for the improvement of taste. Although, no reasons have been given for the poor taste of *H. niloticus*, it could be viewed in the light of the various changes undergone by the fish after death which leads to oxidative damage and microbial infestation. These changes which are controlled by the ambient temperature and humidity, in addition to the nutritive values of the meat also result to poor taste which may be controlled by products of bacterial metabolisms and the activities of moulds. Rancidity in fish has been attributed to oxidation of fat which are observed in fish at onset of spoilage (Connell, 1995). The reason for the poor taste of *H. niloticus* is not fully understood and need to be investigated in a separate study.

Conclusion

Considering its potentials as a good aquaculture candidate, the cultivation of *H. niloticus* should be encouraged. With the cheap and easy to apply techniques of improving its taste which was a limiting factor before now, farmers stand a great chance to boast their economy in table fish production. The species would attract the least cost of production because it utilizes a wide variety of food to attain a good rate of growth within a short time. In addition to hatchery fingerlings production, sourcing of fingerlings of *H. niloticus* from the wild is an additional advantage for aquaculture.

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