

EFFECTS OF LEMON GRASS (*Cymbopogon flexuosus*) AND MINT LEAF (*Mintha spicata*) ON PROCESSING AND PRESERVATION OF *Synodontis schall*

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ABSTRACT

This study assessed the effect of lemon grass and mint leaf on processing and preservation of *Synodontis schall* during 8 weeks storage at ambient temperature. The fish were divided into four groups namely Samples A,B,C, and D, and treated with lemon grass, mint leaf and a combination of lemon grass and mint leaf respectively while sample D (control) did not contain any of the spices. The fresh pieces of *Synodontis schall* were soaked in respective spice solutions for one hour, and smoke dried in drum kiln for 16 hours. Proximate and sensory evaluations were carried out and fish stored in a closed cartoon and kept under room temperature for eight weeks. The final proximate composition showed the moisture and crude protein as follows; moisture; 10.40%, 9.78%, 9.01%, 9.30%, and crude protein; 77.90%, 75.20%, 70.90%, and 70.35% for samples A, B, C and D respectively. Based on the findings from this study, lemon grass stands a better chance in improving processing and preservation quality of *Synodontis* and it is recommended.

INTRODUCTION

Fisheries and aquaculture make important contribution to the animal protein supplies of many communities in both the industrialized and developing worlds (Nautilus, 1997). At present fish provides about 17 % of animal protein intake and 6.7 % of all protein intakes globally (FAO, 2016). Fish processing is a series of procedures associated with fish and fish products between the time in which fish are caught or harvested and the time in which the final products are delivered to the customer. The processing and preservation of fish are essential since fish is highly susceptible to deterioration immediately after harvest and their lost help to prevent economic losses (Okonta and Ekelemu, 2005). If fish is not sold fresh, preservation methods should be applied to extend its shelf-life. These include freezing and heat treatment (Sterilization, pasteurization, smoking, drying). Efficient preparation of fish is important when top quality, maximum yield and highest possible profits are to be achieved (Davies and Davies, 2009). With continuing growth in population, income and urbanization in Nigeria, consumer theory assures the future demand for good quality fish and other animal products (FAO, 2002). According to Horner (1992), storage life extension of smoked fish can result from a combination of lowered water activity and the uptake by the product of bactericidal and antioxidant components of wood smoke. *Synodontis*, from the family mochokidae is commonly known as upside down catfish. Reed *et al.* (1967) described twenty *Synodontis* species found in Northern Nigeria, while Holden and Reed (1972) indicated that at least twenty one species have been identified in the Niger.

Mint is a member of the Labiatae family and is widely used in herbal medicine and believed to be beneficial in as immunity enhancer (Nanekarani *et al.*, 2012). Mint is mostly consumed after a meal because of its ability to reduce indigestion and intestinal spasms by reducing the gastrocholic reflux (Spirling and Daniels, 2001). The lemon grass (*Cymbopogon flexuosus* (Steud) Wats) is a perennial grass belonging to the family Gramineae and grouped under genus *Cymbopogon*. It is of indigenous origin and is a medicinal and aromatic plant. Lemon grass is well known for its essential oil which contains citral as the major constituent. The citral content varied from 44.3 – 91.4% to 79 – 91.5% (Kuriakose 1995).

MATERIALS AND METHODS

This research was carried out at the Fisheries research farm of Department of Fisheries, Modibbo Adama University of Technology Yola, Adamawa state, Nigeria.

Twenty (20) freshly caught *Synodontis* were purchased from by-pass Market in Jimeta, Adamawa State, Nigeria. The locally available Mint leaves (*Mentha piperita*) and Lemon grass was procured

from the market. The procured mint leaves and Lemon grass was dried, grounded into powder form and stored properly for use. A dried sample of herb was subjected to analysis as per the standard procedures (Liu *et al.*, 2012). The fresh *Synodontis schall* were washed to remove external dirt, dried with disposable towel paper, measured and weighed. They were then eviscerated and washed again in clean distilled water and left to drain. Disposable towel paper was used to facilitate the draining process.

The spice was obtained by soaking 1kg/litre of spice (mint leaf and lemon grass) in water and sieved accordingly. Thereafter, 3.0kg of *Synodontis schall* were removed and put into separate baskets and covered to drain for 5 minutes. After this time, the fish samples were arranged into smoking kiln trays. Smoking was conducted by using smoking kiln and smoked for 16 hours in which turning over were done after 2 hours until constant weight was obtained. Some aspect of the proximate analysis were determined, these includes: moisture, ash, fat and crude protein content using Association of Analytical Chemist Method (AOAC, 2000). Subjective analysis was used for organoleptic characteristics analysis, in which students were used to carry out the tests. 5 members of the sensory evaluation panel were selected for each parameter like flavour, texture, appearance, rancidity, and taste after training on the rudimentary aspects of organoleptic characteristics and how to apportion mark to each parameter. 5 points Hedonic scales was used for the evaluations. Statistical analysis was carried out using ANOVA. The data obtained from proximate evaluations were subjected to Analysis of Variance.

RESULTS AND DISCUSSION

Table 1. Proximate Compositions of Smoked *Synodontis schall* After Storage

	Protein	Fat	Fibre	Ash	Moisture	Carbohydrate
Lemon grass	76.80±7.11 ^a	7.76±4.11 ^b	2.60±6.00 ^a	7.00±6.05 ^b	4.27±4.18 ^c	1.57±2.00 ^c
Mint leaf	74.11±6.02 ^b	7.00±3.03 ^c	2.33±0.50 ^a	7.59±4.89 ^b	5.00±6.23 ^b	3.97±1.50 ^a
Mixture	73.15±7.00 ^{bc}	7.96±3.17 ^{ab}	3.00±0.25 ^a	7.20±4.80 ^b	5.23±0.32 ^{ab}	2.46±0.60 ^b
Control	73.02±7.01 ^c	8.19±4.00 ^a	1.59±0.4 ^b	8.00±4.99 ^a	7.78±4.01 ^a	1.42±0.10 ^c

Note: Means of data on the same column with different superscripts are significantly different (p<0.05)

After eight weeks of storage, Lemon grass treated fish had the highest crude protein and the lowest in moisture (table 1). This could be attributed to increase in the tissue compartment over the period of the storage as a result of the dehydrating effects of the lemon grass. All the three treated samples had higher protein, moisture and lower fat compared to the control treated fish. Therefore it is suggested that, Lemon grass and mint leaf as a natural herb could be used to extend the shelf life of fish, providing the consumer with food containing natural additives, which may be seen as more healthful than synthetic origin.

Table 2. Mean Values of Sensory Evaluation of *Synodontis schall*

Sample	Lemon grass	Mint leaf	Mixture	Control
Appearance	4.25±0.50	4.00±0.81	3.7±0.50	3.25±0.50
Taste	3.75±0.50	4.00±1.15	4.00±0.00	3.00±1.41
Rancidity	4.00±1.15	4.00±0.81	4.40±0.57	4.25±0.95
Flavor	3.85±2.95	3.75±2.95	3.25±2.45	3.50±2.58
Texture	3.75±0.97	4.00±0.00	3.50±1.00	3.25±0.50
General acceptability	3.90±0.34	3.85±0.25	3.80±0.16	3.45±0.10

The result of the sensory evaluation shows that Lemon grass has the highest acceptability and even in terms of texture, colour, and taste. This is closely followed by mint leaf, mixture and control solutions processed and preserved fish (Table 2). Sensory parameter such as taste, texture, aroma, color, and general acceptability were examined after eight weeks of storage and their result and their result is presented in table 2. The results for all the parameters in samples follow similar trends while scores for the control were slightly lower than lemon grass and mint leaf treated fish. This agrees with the findings of Bilgin *et al.* (2008). The pungent smell of lemon grass which repels insects when applied

fresh vanishes when stored for a long period of time while the essential oils present in the lemon grass gives the fish better flavor as shown in the result (Table 2). This may be responsible for the general acceptability in terms of taste. The effectiveness of the species in prolonging the shelf life of the fish product, up to 8 weeks, in agreement with the findings of Onwukike (2010). From the above results it can be deduced that both lemon grass and mint leaf can introduce their antioxidants and antimicrobial benefit to smoked *Synodontis schall* to improve the shelf-life and nutrient values.

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