



## PROXIMATE COMPOSITION AND ORGANOLEPTIC ASSESSMENT OF

### SMOKE CURED *Distichodus Rostratus* (GUNTER 1864) PRE-TREATED WITH LEAF EXTRACTS OF *Carica Papaya*.

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#### Abstract

The work was carried out at fish processing laboratory of the Department. Ten samples of *Distichodus rostratus* obtained from hospital water-side market, Yenogoa, Bayelsa State were made into 4 groups (T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>) weighed to obtain the carcass weight, eviscerated and weighed again to obtain the dress weight (0.00g, 250.00g, 500.00g and 800.00g) of cut and pulverized. *Carica papaya* leaves were mixed with 10 liters of water to which 300g of salt have been added and soaked for 24 hours under ambient conditions. The mixtures were sieved to obtain 0.00%, 2.50%, 5.00% and 8.00% of the leaf extracts. T<sub>1</sub> was soaked in 0.00%, T<sub>2</sub> in 2.50% for 1

hour before curing with wood smoke in a brick kiln for 4 hours. Cured fish was left overnight to cool and was weighed to obtain the dry weight

#### KEYWORDS:

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before being packed in sterile polythene bags for storage. The weights taken were used to compute the weight loss after curing. The mean weight loss for all treatments is 67.00%. Result of the proximate composition of *Carica papaya* leaf extract pre-treated smoked fish were not significantly (p>0.05) different

(moisture:  $10.76 \pm 0.02\%$ ,  $12.00 \pm 0.01\%$ ,  $12.12 \pm 0.11\%$  and  $11.88 \pm 0.04\%$ ; protein:  $64.78 \pm 0.01\%$ ,  $63.24 \pm 0.02\%$ ,  $63.97 \pm 0.03$  and  $62.88 \pm 0.31\%$ ; fat:  $11.50 \pm 0.20\%$ ,  $10.99 \pm 0.30\%$ ,  $10.50 \pm 0.03$  and  $9.80 \pm 0.05\%$ ; ash:  $6.85 \pm 0.08\%$ ,  $5.76 \pm 0.22\%$ ,  $5.34 \pm 0.13\%$  and  $4.98 \pm 0.05\%$ ; NFE:  $12.76 \pm 0.05\%$ ,  $13.50 \pm 0.11\%$ ,  $13.98 \pm 0.16\%$  and  $14.02 \pm 0.03\%$  respectively. Generally, there were no significant ( $p > 0.05$ ) differences among all treatments in different sensory parameters tested. These results showed that pre-treatment of fish with *Carica papaya* leaf extracts of prior to smoking did not change the proximate composition adversely or hamper consumer acceptance.

## Introduction

Dried fish plays an important role as a major source of animal protein by contributing over 50% of the animal protein in Nigeria, especially to the rural populace (Miller, 2003). Fresh water fish makes up about 69.6% of the fish consumed in Nigeria while 30% of such comes from *Distichodus rostratus* culture (Fish network, 2009). *Distichodus rostratus* is one of the most cherished fish cultured in Nigeria with good flavour and high Feed Conversion (Garibaldi, 1996).

Smoke curing is the predominant means of fish preservation in the third world. Unfavourable environmental conditions shorten the shelf life of smoke cured fish (Fakeye *et al.*, 2007). Vital nutrients, chemical spoilage, microbial spoilage and consequent economic losses are associated with this problem (Imaga *et al.*, 2009). This results in scarcity of protein and fish mongers and Artisanal fishermen do not reap the full benefits of their effort (Nisar *et al.*, 2011).

Deleterious results have been obtained from use of synthetic materials to check microbial and chemical spoilage of fish (Ayoola and Adeyeye, 2010). Due to this problem, attention has been turned to spices and other plant materials that are user friendly and medicinal too in the processing and preservation of fish and meat products (Ahmed *et al.*, 2010). Several of these including *Carica papaya*, make the long list that serve as food, medicine and grow well in the West African sub region.

*C. papaya*, a member of the family *Caricaceae* is palatable feedstuff whose leaves, fruits and by-products are used to feed domestic animals (Eyo, 2001 and Doughari, 2006). Extracts of different parts of the plant have antibiotic

properties (Baskaran *et al.*, 2002 and Fakeye *et al.*, 2007). The enzyme, Papain from *C. papaya* is still in use as a meat tenderizer of which the leaves contain 2% of the enzyme. Latex from the plant is known to heal wounds while the leaves are used in dressing wounds. The plant does not contain cyanogenic glycosides and is thus safe for inclusion into edible products (Imaga *et al.*, 2010). Extracts of dried leaves of the plant have demonstrated antioxidant properties (Doughari *et al.*, 2007 and Ona, 2002).

*Distichodus rostratus* (Grass eater) is commonly landed by artisanal fishermen and it is a common fish commodity on the table of fish mongers in fish markets (Idodo, 2003) and therefore deserves to be well preserved since they are caught in large quantities. Literature search does not show that *C. papaya* leaves have been used in fish preservation.

The aims of this work were to investigate the effect of *Carica papaya* leaf extract on proximate composition of cured fish (*Distichodus rostratus*), (Gunter 1864) and to investigate the effect of *Carica papaya* leaf extracts on organoleptic properties of cured fish (*Distichodus rostratus*), (Gunter 1864).

## **MATERIALS AND METHODS**

### **Sample Collection**

10 Specimens of *D. rostratus* of mean weight  $1120 \pm 0.45$ g were purchased from Yenogoa, Bayelsa

State and transported to the fish processing laboratory of Imo State Polytechnic, Umuagwo, Ohaji, South eastern Nigeria, in a 20 liter ice chest filled with crushed ice but without direct contact to avoid microbial cross contamination.

### **Sample Preparation**

Fish were sorted into four groups ( $T_1$ ,  $T_2$ ,  $T_3$  and  $T_4$ ), weighed, degutted, washed and weighed again to obtain the dress weight. The extracts were made by soaking 250g, 500g and 800g of squashed *C. Papaya* leaves in 10 liters of water to which 300g of salt had been added for 4 hours. These were soaked for one hour as follows:  $T_1$  + 3% brine,  $T_2$  + 3% brine + 2.5% *C. papaya* extract,  $T_3$  + 3% brine + 5% *C. papaya* extract and  $T_4$  + 3% brine + 8% *C. papaya* extract.

### **Biological Evaluation.**

The biological evaluation was done by obtaining the carcass weight of fish. The fish samples were then cleaned and degutted. The weight after

evisceration was then obtained as dress weight. The weight of the cured fish was also obtained as weight after smoking. These data were used to compute the biological evaluation as shown below.

The weight loss was computed as follows:

Dressed weight = Carcass weight – weight of offals

Total weight loss = Carcass weight – weight after smoking

% weight loss = (Total weight loss / Carcass of fish) x 100.

### Sensory evaluation

The steamed spiced smoked fish were submitted to ten trained test panelist from the Polytechnic to evaluate the sensory qualities of Taste, Aroma, Appearance and General Acceptability. These parameters were assessed on a Seven (7) Point's Hedonic Scale using the modified criteria of Eyo, (2001). Tests were in triplicates for each treatment.

### Fish Processing

The extract pre-treated samples were then drained on muslin and cured with wood smoke for 4 hours with turning at intervals to prevent charring and promote even curing, according to the methods of (Agbabiaka 2010 and 2016). Cured fish was left under ambience for one day. Fish was weighed to obtain dry weight before being wrapped in sterile polythene bags and storage in refrigerator until analysis.

### Statistical Analysis

Analysis of variance (ANOVA) test and DMRT for mean separation were used (Duncan) were used.

### Results and Discussion

TABLE 1: Weight characteristics of smoked cured fish, *Distichodus rostratus* pre-treated with leaf extracts

Samples	Live weight	Dressed weight	Weight	Total	Weight Loss
T <sub>1</sub>	800	600	317	483	60.3
T <sub>2</sub>	1500	1200	453	1047	69.8
T <sub>3</sub>	1400	1200	352	1048	74.8
T <sub>4</sub>	1800	1500	661	1139	63.2

Mean weight loss = 67.0%

**Keys:**

T1 = Fish sample treated with 3% brine

T2 = Fish sample treated with 2.5% *Carica papaya* leaf extract and 3% brine.

T3 = Fish sample treated with 5% *Carica papaya* leaf extract and 3% brine

T4 = Fish samples treated with 8% *Carica papaya* leaf extract mix with 3% brine.

**Table 2: Proximate Composition of *Distichous rostratus* pre-treated with different doses of *Carica papaya* leaf extract.**

Proximate composition	0% leaf extracts Pre-treatment	2.5%	5%	8%	SEM
Moisture content (%)	10.76 $\pm$ 0.02	12.00 $\pm$ 0.01	12.12 $\pm$ 0.11	11.88 $\pm$ 0.04	ns
Protein content (%)	64.78 $\pm$ 0.01	63.24 $\pm$ 0.02	63.97 $\pm$ 0.03	62.88 $\pm$ 0.31	ns
Fat (%)	11.50 $\pm$ 0.02	10.99 $\pm$ 0.30	10.50 $\pm$ 0.03	9.80 $\pm$ 0.05	ns
Ash (%)	6.88 $\pm$ 0.01	5.76 $\pm$ 0.22	5.34 $\pm$ 0.13	4.98 $\pm$ 0.05	ns
NFE (%)	12.76 $\pm$ 0.05	13.50 $\pm$ 0.11	13.98 $\pm$ 0.16	14.02 $\pm$ 0.03	ns

+ Standard error bearing no letters are not significantly ( $p > 0.05$ ) different as shown in Table 2.

**Table 3. Sensory Attributes of Leaf Extracts Pre-treated Smoked Cured *Distichodus rostratus*.**

Samples	Aroma	Taste	Appearance	Mouth Feel	General Acceptability	
T1 DR (a)	6.6 <sup>a</sup>	5.6 <sup>a</sup>	6.0 <sup>a</sup>	7.6 <sup>a</sup>	7.0 <sup>a</sup>	
T2 DR (b)		5.8 <sup>a</sup>	4.8 <sup>a</sup>	5.6 <sup>a</sup>	6.8 <sup>a</sup>	7.2 <sup>a</sup>
T3 DR (c)		6.7 <sup>a</sup>	5.4 <sup>a</sup>	5.8 <sup>a</sup>	6.9 <sup>a</sup>	7.8 <sup>a</sup>
T4 DR (d)		7.0 <sup>a</sup>	5.0 <sup>a</sup>	6.9 <sup>a</sup>	7.8 <sup>a</sup>	7.9 <sup>a</sup>

Standard error mean bearing the same letters are not significantly ( $p > 0.05$ ) different as shown in Table 3.

The results of the weight characteristics of *Carica papaya* leaf extract pre-treated smoke cured *Distichodus rostratus* is presented in Table 1. The range of the weight loss is 60.2% - 74.8%. The mean weight loss is 67.0% and this range is in agreement with the 65.00% recommended by Cardinal *et al.*, (2001).

The ranges of the moisture content of the treated and untreated samples are 10.10 + 0.00% - 12.99 + 0.12%. This range of moisture is in conformity with the reported range for a shelf life of three to nine months in proper storage given that mould growth is possible above 12% moisture (Jallow, 1995). Moisture content values of 10% - 12% and 10.74% - 12.11% (Extracts) have been reported for *P. guineense* pre-treated sample (Akinwumi and Fesobi, 2010).

Bene and Heck (2002) noted that the proximate composition of traditionally smoked fish is dependent on the degree of dryness and quantitatively they are related to the moisture content. Moisture content is a measure of available water and water activity (AW) in cured products and therefore serves as the basic parameter for the technical description of cured products with respect to assessing their stability to microbial invasion, enzymatic activity, hydrolytic reactions, rancidity development and with certain limitations, providing useful information to insect infestation (Eyo 2001).

Taste, Appearance, Aroma, Mouth-feel and General Acceptability are summarized in (Table 3). The appearance were not significantly different ( $p>0.05$ ) among all treated samples, the sensory evaluation revealed that products pre - treated with steam extracted *Distichodus rostratus* retained consumer acceptability in all attributes measured ( $p>0.05$ ).

## **CONCLUSION**

The results obtained in the microbial evaluation of *C. papaya* prove that a host of bacteria present in numerous numbers on fish smoked cured by the various available methods (Abidemi-Iromini *et al.*, 2011 ) are absent in *C. papaya* extract pre- treated smoke cured *D. rostratus*. This presents a new future

in fresh fish handling and processing which leaves man with the option of taking full advantage of the bactericidal potency of *C. papaya* in prolonging the shelf life and also putting the anti-oxidative properties of this plant to full use in preventing oxidative rancidity of smoke cured fish.

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