



# Nutrient quality and shelf life of processed *Metapenaeus* shrimp using different natural preservatives



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## Introduction

• Demand for seafood is increasing while production from captured fisheries is static, due to increasing population, habitat destruction, urbanization, increased demand for protein, climate change, postharvest losses etc. Nigeria coastal water is rich in shrimps, if properly managed it will increase shrimp production, improve livelihood and contribute to fish-food security agenda in Africa. Prawns constitute an important nutritional component of the diet of the rural and urban communities in Nigeria. They are found virtually in all parts of the world including restricted areas where they are regarded as delicacies (Oyekanmi, 2000). Crustaceans have gained tremendous popularity as a source of animal protein, minerals and vitamins either in the fresh or processed forms and compared favourably with other sources of protein such as meat, egg, milk etc (Lawal and Avhurhi, 1990). Shrimps *Metapenaeus* species are caught in large quantities in Nigerian coastal water. Organic acids are acids that can be gotten naturally from the plants leaves, fruits and roots and are antimicrobial in nature. These have been used for a long time as food preservatives, they are readily available easy to use, not expensive and have no toxic carcinogenic, estrogen mimic or mutagenic properties.

## Objectives

These are to evaluate the:

- ❖ chemical and nutritional values of *Metapenaeus* species exposed to different natural preservatives and
- ❖ effect of natural preservatives on the nutritional value of the *Metapenaeus* spp.

## Materials and Methods

### Collection of *Metapenaeus* spp

Freshly processed [smoked, dried] *Metapenaeus* spp were collected from fish folks at Igbokoda in Ondo State and taken to the departmental laboratory of the Department of Fisheries and Aquaculture Technology, Federal University of Technology Akure. The shrimps were divided into five groups subjected to five different natural preservatives, a group to a particular preservative;

- ❑ Neem bark powder (*Azadirachta indica*) – Treatment (Trt) I
- ❑ Root bark of toothache plant (*Zanthoxylum zanthoxyloides*) – Trt II
- ❑ West African brown pepper fruit (*Piper guineensis*) – Trt III
- ❑ Alligator pepper (*Aframomum melegueta*) – Trt IV
- ❑ Vegetable oil – Trt V

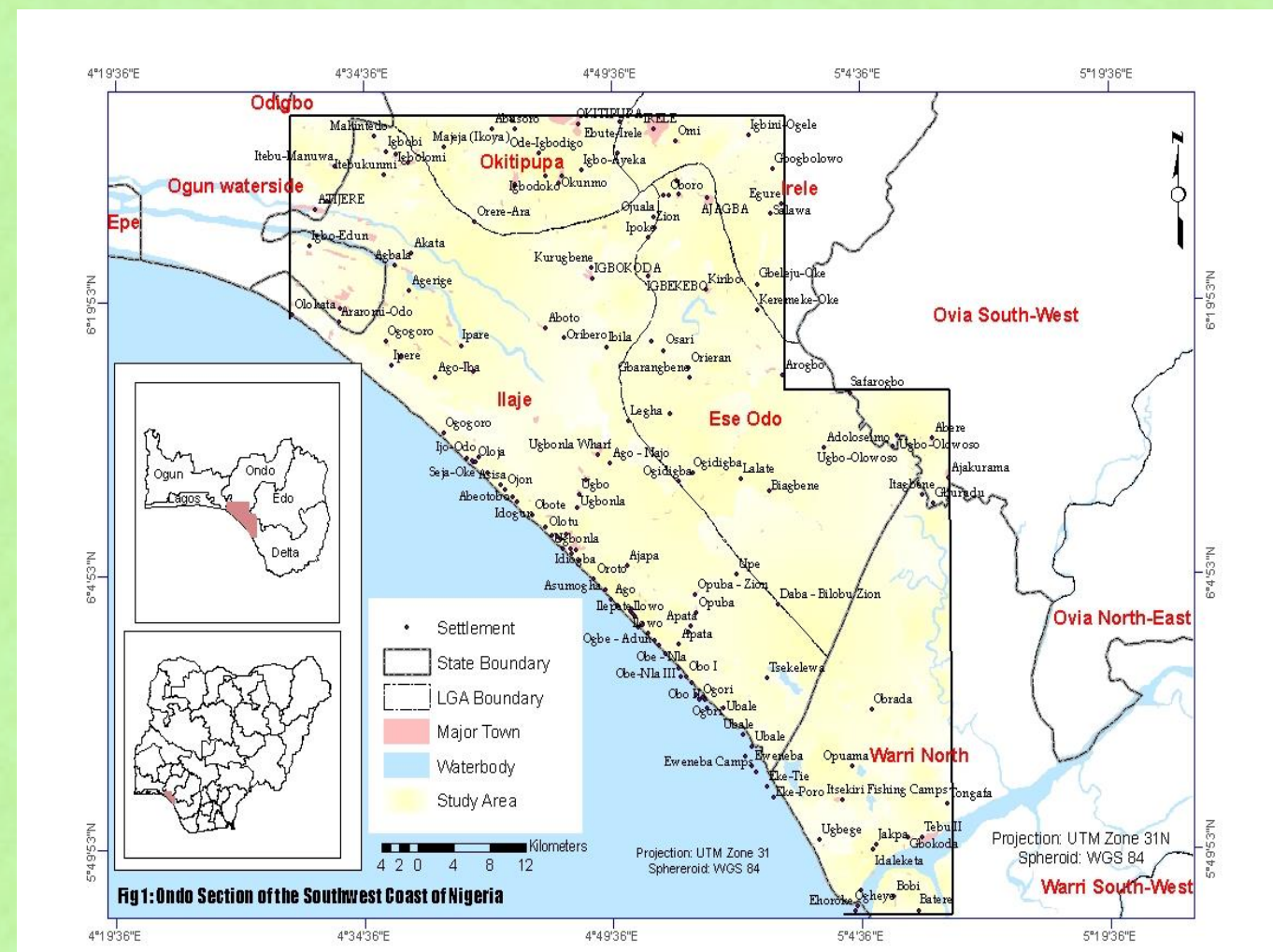


Figure 1: Ondo State coastal water and specimen collection site..

### Proximate Analysis:

- The proximate, minerals Total Volatile Nitrogen (TVN) and Free Fatty Acid (FFA) contents were determined according to Association Official Analytical Chemistry (AOAC,1995), for each treatment after 45 days in storage.
- Data collected were analyzed with Wilcoxon signed ranks test.

## Results and Discussion

### Proximate composition

The Wilcoxon signed ranks test on the proximate composition of the preserved *metapenaeus* spp is shown in the Table below:

Table 1: Summary of the final Wilcoxon Signed-rank test.

	%Moisture	%Ash	%Fat	%Protein	%NFE
Treatment 1	-ve	-ve	-ve	-ve	+ve
Treatment 2	+ve	-ve	-ve	-ve	+ve
Treatment 3	-ve	-ve	-ve	-ve	+ve
Treatment 4	+ve	-ve	+ve	-ve	+ve
Treatment 5	-ve	-ve	-ve	+ve	+ve

## Results and Discussion

The determined TVN at the end of each 45days is represented in Table 2

Table 2 TVN Values

	1 <sup>st</sup> determination	2 <sup>nd</sup> determination	3 <sup>rd</sup> determination
Treatment 1	20.03	22.40	26.60
Treatment 2	19.60	24.50	29.40
Treatment 3	18.90	22.40	23.80
Treatment 4	15.40	15.40	19.60
Treatment 5	21.00	23.10	25.20

### •Mineral Composition (ppm or %oo)

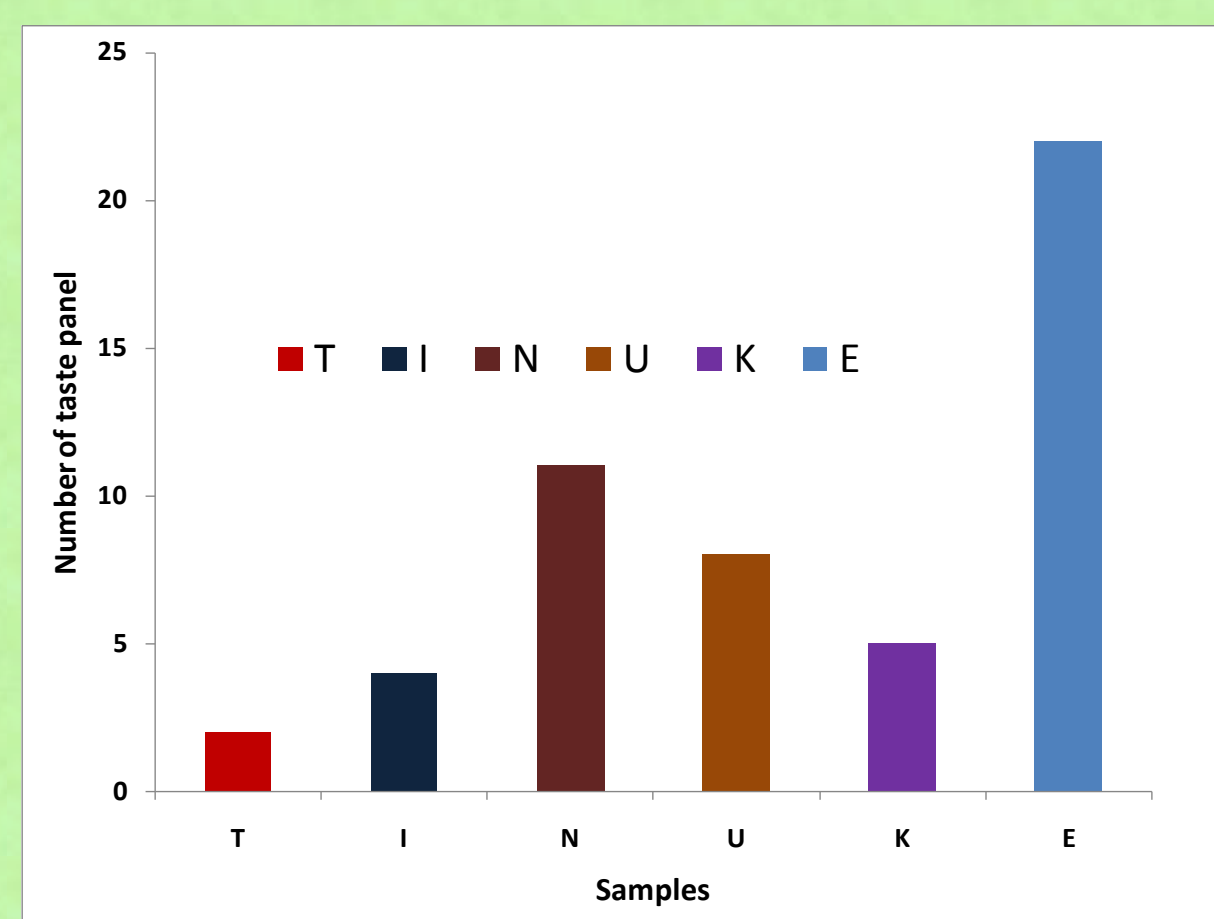
The mineral constituents of the preserved and non preserved *metapenaeus* spp are shown in Table 3a, while the differences in the mineral constituents is shown in Table 3b. Sodium concentration levels dropped in samples preserved with I, II, V to 1,744.30, 825.65 and 3,750.81 (ppm) respectively, while it increased in samples preserved with III and IV; 3,623.18 and 2,086.75 (ppm) respectively. Potassium concentration reduced in all the preservatives, while phosphorous reduced in treatment I, II, IV and V with 49.09, 258.53, 43.41 and 583.05 (ppm) respectively, but increased in treatment III as 269.41 ppm. Calcium and magnesium decreased in all except in specimens with treatment III that increased with 23.900 and 3,500 ppm respectively. TVN of 22.40, 24.50, 22.40, 15.40 and 23.10 (mgN/100g) were recorded at day 45 and 26.60, 29.40, 23.80, 19.60 and 16.10 (mgN/100g) at the end of 90 days for treatment I,II,III,IV, and V respectively with treatment IV having the lowest value.

Table 3.a: Mineral Composition (ppm or %oo)

Table 3 b Mineral Composition (ppm or %oo)

Mineral	Amount					
	Control	Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5
Sodium(Na <sup>+</sup> )	3797.87	2053.57	2972.22	7421.05	5884.62	47.06
Potassium(K <sup>+</sup> )	2377.66	446.43	324.07	517.54	375.00	52.94
Phosphorus(P <sup>+</sup> )	644.33	595.24	385.80	913.74	600.92	61.28
Calcium(Ca <sup>+</sup> )	32300	5700	14800	8400	10000	1200
Magnesium(Mg <sup>+</sup> )	7700	2100	5300	4200	4600	600

Organoleptic Test. The response of 30 taste panels is shown in Figure 1.



Key  
 T= Sample with *Azadirachta indica*  
 I= Sample with *Zanthoxylum zanthoxyloides*  
 N= Sample with *Piper guineense*  
 U= Sample with *Aframomum melegueta*  
 K= Sample with Vegetable oil  
 E= Control

Figure 1: Organoleptic Assessment

## CONCLUSION

The chemical composition data of shrimps being an important constituent of the Nigerian diet is required by the industrialist who uses chemical composition data on labels of canned food, dieticians who are interested in the nutritional content of crustaceans in other to recommend its inclusion in their patients' diet.

- ❖ Shrimps should be properly preserved after harvesting to reduce losses of the nutritive values and the flavor till the time of consumption.
- ❖ Based on the effectiveness of the active ingredient in the preservatives that affect or retard the growth or infestation of *Callosabrychus maculatus*, mould or yeast. West African brown pepper (*Piper guineense*) proved to be the best amongst the preservatives.

## References

- AOAC, 1995. *Official methods of analysis of the Association of Official Analytical Chemists*. 16th edition. Washington, DC, Association of Official Analytical Chemists.
- Lawal, M.A and J.B, Avhurhi (1990): The bacteriology of locally sold shrimps in Nigeria. Nigerian food journal volume 8 pp 101-104
- Oyekanmi, F.B (2000): Nutritional value and flesh yield of some crustaceans in south west Nigeria. M.Tech Thesis FUTA. pp1-2

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