



Proximate composition of some tropical fish species

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ABSTRACT

Four tropical fish species (*Clarias gariepinus*, *Selar crumenophthalmus*, *Scomber scrombus*, and *Pseudotolithus senegalensis*) usually available and consumed in Nigeria were analysed for proximate composition. The moisture, protein, fat and ash contents of the fishes were determined using loss in weight, micro-Kjedahl, dry-ashing and solvent extraction methods. The average moisture contents of the fishes varied from 67.44 to 68.46 (g/100g) with *P. senegalensis* having the highest moisture content followed by *S. crumenophthalmus*. The protein contents of the fishes ranged from 21.28 to 21.65 (g/100g). The minimum and maximum protein values were reported for *S. crumenophthalmus* and *S. scrombus* respectively. All the fish types were found to be high in fat concentration and they could, therefore, be termed as oily or fatty fishes. *Scomber scrombus*, *C. gariepinus* and *S. crumenophthalmus*, however, had significant higher amounts of fat (9.27, 9.02 and 8.94 g/100g respectively) than that (8.55 g/100g) of *P. senegalensis* at $P < 0.05$. The mean values of the ash were relatively the same for the four fish species ranging from 1.43 to 1.47 (g/100g). The four fish species are good sources of protein.

Key words: Tropical Fishes, Moisture, Protein, Fat, Ash.

INTRODUCTION

The human body needs nutrients to enable it function effectively and to maintain health; such nutrients are sourced from foods. Food nutrients include water, carbohydrates, proteins, fats, vitamins and minerals amongst others. Fishes are known to provide protein, fat and vitamins which are of great benefit to human health as it has been proven by many scientists including Job *et al.* [1]. Fish provides 22% of the protein intake in sub-Saharan Africa [2]. Fish protein is of high quality since it has an almost ideal proportion of essential amino acids. The protein in fish is easily digestible, as it contains less collagen fibre than the protein found in meat; this helps the body to maximally utilise its protein. The fats found in fish contain unsaturated fatty acids which do not pose a threat to the heart as they help reduce blood triglycerides [3].

Some authors have reported on the proximate composition of fish species [4], [5], [6], [7]. However, information on proximate composition of some fish species is scanty. Thus, there is still a need to research on the proximate composition of such fish species. This project was designed to determine the moisture, protein, fat, and ash contents of four tropical fish species which are readily available and consumed in Nigeria. It is important to determine the chemical composition of fishes as this will provide vital information in developing nutrients balance, cost effective diets and practical feeds for fish farming.

MATERIALS AND METHODS

Sample collection and preparation

Four fish samples comprising of African mud catfish (*Clarias gariepinus* Burchell, 1822), Jack fish (*Selar crumenophthalmus* Bloch, 1793), Atlantic mackerel (*Scomber scrombus* Linnaeus, 1758) and Cassava croaker (*Pseudotolithus senegalensis* Valenciennes, 1833) were used for this study. All the samples were identified using

standard taxonomical texts/keys. They were purchased in the raw, uncooked form from frozen foods retail outlets within the Akure metropolis, Ondo State, Nigeria. Cleaning, eviscerating, filleting and deboning were carried out on the samples. All the samples were lyophilized (SB4 Freeze drying machine, UK), milled (Sharp blender, Model HR 2815), wrapped with aluminium foil and packed into labelled plastic containers. The samples were stored at a temperature of -20°C prior to analysis.

Chemical Analysis

The moisture contents of the fishes were determined before freeze-drying the samples. This was done using a forced air oven at 105°C first for five hours and then repeated for 30 minutes interval until a constant weight was obtained. The loss in weight was calculated as the moisture content [8]. Fat was quantified using the procedure of A. O. A. C. [8] with n-hexane ($68.5^{\circ}\text{C} - 69.1^{\circ}\text{C}$) as solvent. The protein content of each fish was assayed by the micro-Kjeldahl method as reported by Kirk and Sawyer [9]. The gram of nitrogen obtained was multiplied by the factor of 6.25 to obtain the protein content of each fish sample. The ash content of respective sample was determined by dry-ashing the samples at 550°C for 24h [8]. Data obtained for protein, ash and fat were corrected for moisture and presented on wet weight basis.

Statistical Analysis

All samples were analysed in triplicates and data were subjected to one-way analysis of variance (ANOVA). Post hoc analysis was done by the use of Duncan's Multiple Range Test and means were separated at $P < 0.05$ using the Statistical Package for Social Scientists computer software package [10].

RESULTS AND DISCUSSION

The results of the proximate composition expressed in g/100g edible portion, are presented in Figures 1, 2, 3, and 4. The moisture contents of the fish samples are presented in Figure 1. The fish species had moisture contents within the range of 67 to 68.10 (g/100g). The moisture content in decreasing order is from *P. senegalensis*, *S. crumenophthalmus*, *C. gariepinus* to *S. scrombus*. The average moisture content of the fishes was 68.05 (g/100g) (68.05%). The values obtained in this study are within the values reported by Boran and Karacam [11] for shad (57 to 68%) and for horse mackerel (65 - 75%) from the Black Sea of Turkey.

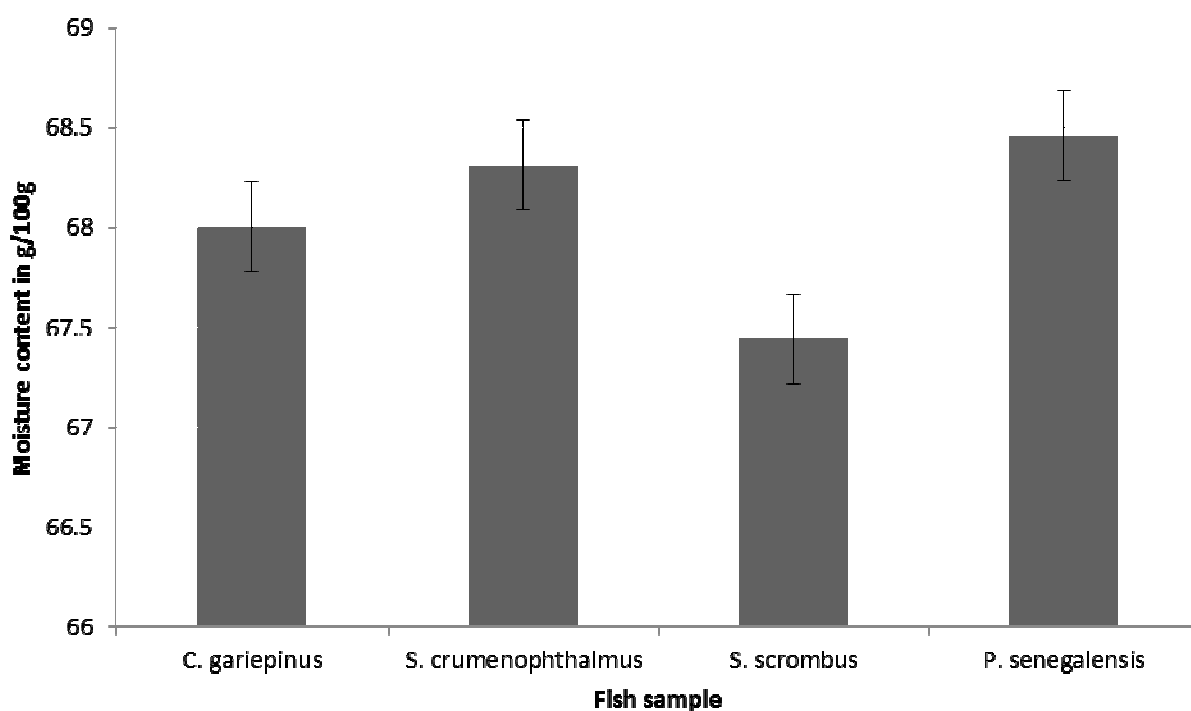


Figure 1: Moisture Contents of Fish Samples

The protein contents of the fishes in this study are within the range of 21.28 to 21.65 (g/100 g) (Fig. 2). These values indicate that they are high protein sources for the consumers. The minimum and maximum protein values are reported for *S. crumenophthalmus* and *S. scrombus* respectively. These values are above those of other fishes. Palani *et al.* [12] discovered that the protein content of fatty fishes that landed in the Thoothukudi Coast of India was 14%. Amounts of protein in five species of marine fish consumed in Gabon ranged from 16% to 20% [13]. Gokoglu *et al.*

[4] documented (19.8 - 29.0) % for rainbow trout (*Onchorhynchus mykiss*) subjected to various cooking methods. Some freshwater and marine Thai fishes in the raw state were reported by Puwastein *et al.* [14] (1999) to have their protein contents ranging from 17 to 22 g/100 g.

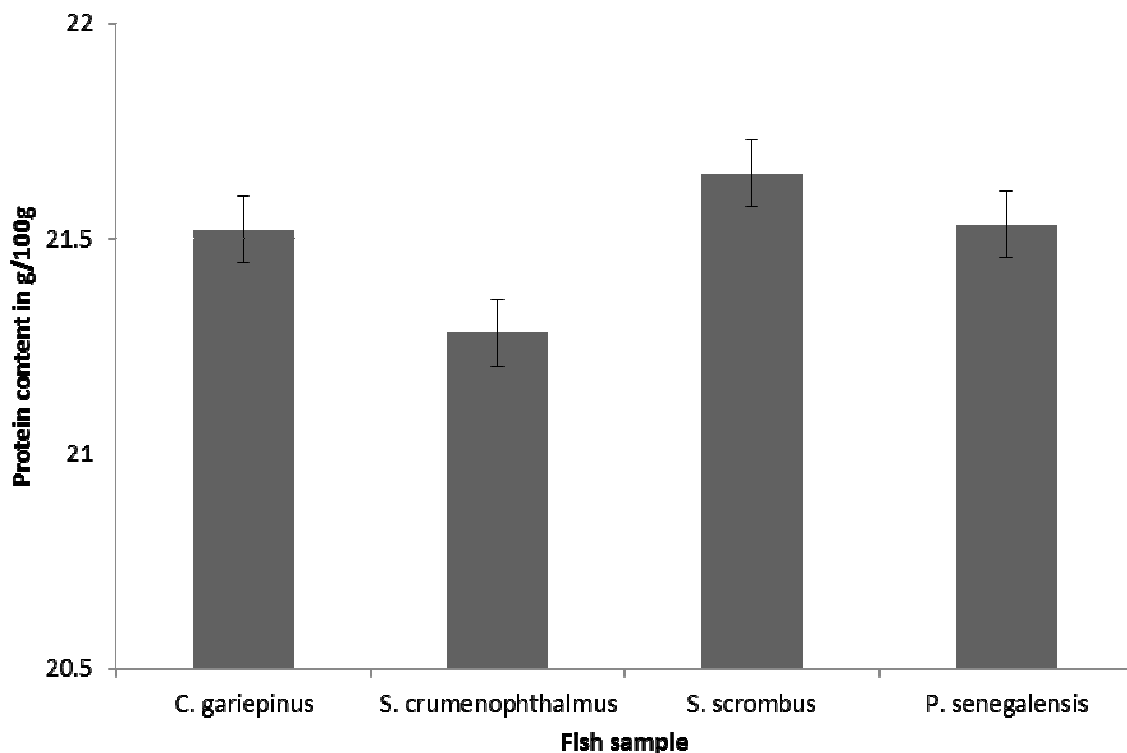


Figure 2: Protein Contents of Fish Samples

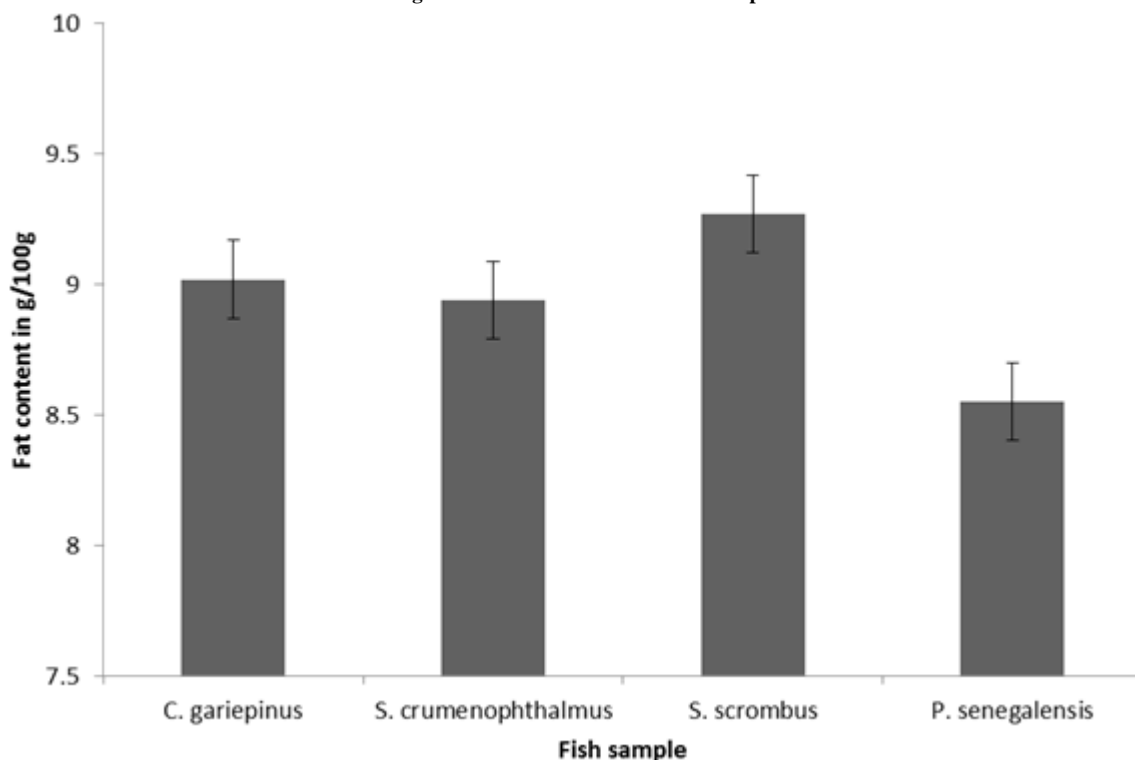


Figure 3: Fat contents of Fish samples

All fish types were found to be high in fat content. *Scomber scombus*, *C. gariepinus* and *S. crumenophthalmus*, had significantly higher fat contents (9.27, 9.02 and 8.94 g/100g respectively) than that (8.55 g/100g) *P. senegalensis* at $P < 0.05$ (Fig. 3). They could, therefore, be termed as oily or fatty fishes. However, fats or lipids from fish should not

be of great health concern as they have been known to contain polyunsaturated fatty acids, which help to fight coronary heart diseases [14], [15].

The average value of the ash contents for the four fish species is 1.45 (g/100g) (Fig. 4). This value closely agrees with the range of ash values (1.35 - 1.66%) obtained for rainbow trout by Gokoglu *et al.* [4]. It is also within the values (0.95 – 2.50%) reported for silver catfish by Weber *et al.* [7], but is lower than 2.5 - 6.25% obtained in raw mince of five different Indian fish species [16]. The variation noticed could have been due to variations in age, sex, and environment [17].

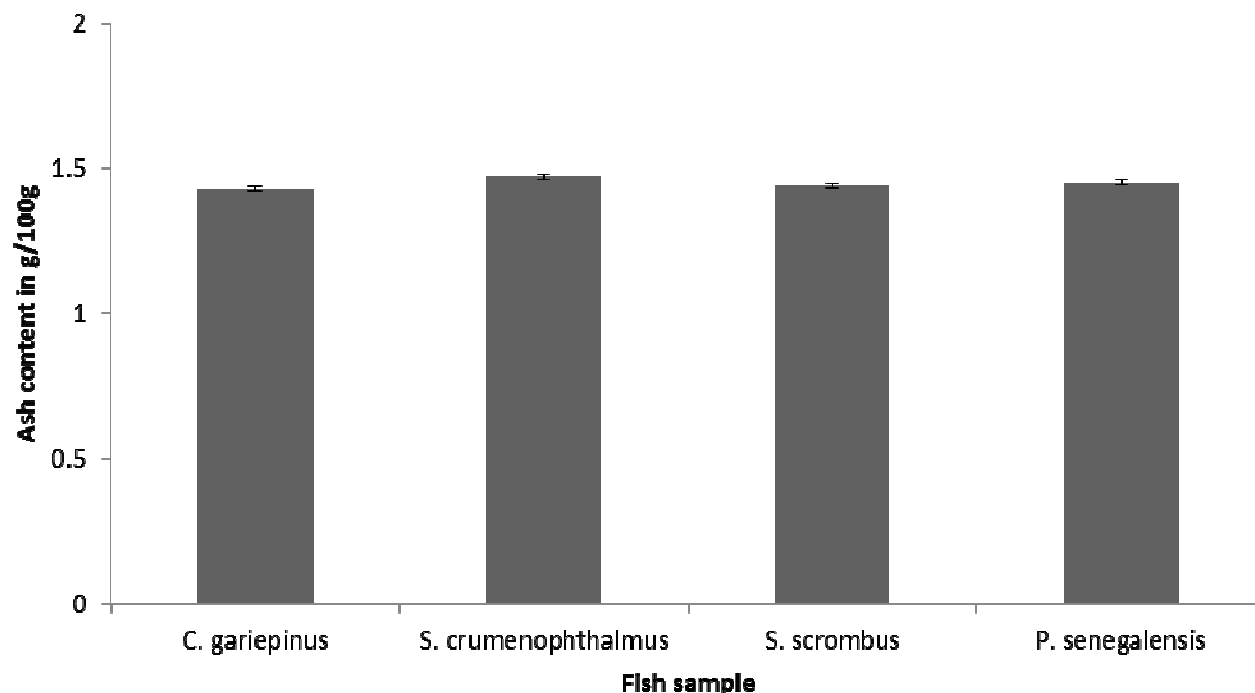


Figure 4: Ash content of Fish samples

CONCLUSION

The four tropical fish species analysed in this research are high in protein and can also be considered as oily fishes. The fish species differed significantly ($p < 0.05$) in the moisture, protein and fat contents, but the ash contents were similar. The obtained data from this study will supplement the information on Nigerian food composition tables.

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