

Biochemical Composition in Edible Tissues of *Epinephelus malabaricus* (Bloch & Schneider, 1801) from Nagapattinam Coast, Tamil Nadu, India

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Abstract— The present study was undertaken to analyze the biochemical composition in relation to season, sex, and size groups in edible tissues of *E. malabaricus* in Nagapattinam coast, Tamil Nadu, India. Seasonal variations in moisture content ranged between 72.35 and 79.13%, crude protein (68.22 and 73.25%), carbohydrate (2.12 and 5.23%), crude lipid (4.33 and 7.66%) and ash content (5.25 and 8.64%) in all the size groups of both sexes. Among the size groups in both sexes, maximum carbohydrate level was recorded during postmonsoon (50-60 cm: female-5.38%) and minimum during summer (30-40 cm: male-2.85%). Low protein content was noticed in larger size groups and high values in smaller size groups. Most of the size groups in females showed higher protein content than males during all the seasons. The crude protein contents in muscle tissues of the presently studied finfishes showed a relationship with spawning season. High protein levels were observed in muscle during post and pre spawning months and low values during spawning season.

Keywords— Biochemical composition, *E. malabaricus*, protein, carbohydrate, lipid

I. INTRODUCTION

Importance of knowing the biochemical composition of edible organisms was emphasized by Stansby [1]. The nutritive values of organisms will remain supportive in the selection and utilization of a particularly advantageous species and also to know which size group and sex will be more adequate and advantageous for consumption from a nutritive point of view. The obvious application of knowledge on the proximate composition of fish has always been needed by dieticians in institutions concerned with mass feeding and by individuals interested in caloric content of foods for weight control [2, 3].

The information on proximate composition of fish has fundamental importance in the application of different technological processes [3, 4]. Whether a fish is considered to be lean or fatty, the actual lipid content has retribution for the technological characteristics post-mortem [8]. Proximate composition is also important as an aspect of quality of unprocessed material, sensory quality and storage constancy [5] and gives an idea of sexual stage [4, 6].

Many of the previous works about the nutritive value of fishes dealt with changes in relation to the age and size of the fishes [7-9]. Studies on biochemical composition of fishes

are incomplete without information on seasonal variation. Hence, the present study has been undertaken to analyse the biochemical composition in relation to season, sex, and size groups of edible tissues in *E. malabaricus*.

II. MATERIALS AND METHODS

Collection and preparation of samples: The marine fishes were collected regularly during four seasons (premonsoon, monsoon, postmonsoon and summer) from Nagapattinam coast for a period of one year from July 2016 to June 2017. The collected samples were immediately brought to laboratory in an iced condition. The freshness of fishes was examined by observing the brightness of the eyes, colour of the gills and the texture of the muscles. Then the sexes of fishes were identified and grouped into five size groups based on their total length (10-20 cm, 20-30 cm, 30-40 cm, 40-50 cm & 50-60 cm). For the purpose of identification, the publications of Munro [10] and Fischer and Bianchi [11] have been referred.

Biochemical composition: To calculate the moisture content, 1 g of fresh edible tissue was taken and oven dried at a constant temperature of 105°C for 24 hours [12]. Crude protein was estimated by Kjeldahl method [13]. The total carbohydrate in the dried sample was estimated

spectrophotometrically following the phenol sulphuric acid method [14]. The lipid content in the tissue was estimated by the chloroform: methanol extraction method [15]. Ash content was determined gravimetrically by incinerating 1g dried sample in Muffle furnace at about 550°C for 6 hours [12] and the results are expressed in percentage dry weight basis. The results of two way analysis of variance (ANOVA) $P < 0.05$ done to test the differences in biochemical composition among the seasons and size groups of males and females.

III. RESULTS AND DISCUSSION

Chemical composition of fish varies greatly from one species and one individual to another, depending on age, sex, sea environment and season [3, 7, 8]. In the present study, the variations in biochemical composition in relation to seasons, sexes and size groups are shown in Figs. 1-5. Moisture content ranged between 72.35 and 79.13%. Both the size groups of indeterminates (10-20 and 20-30 cm) exhibited low values during premonsoon (74.15 and 76.32%, respectively) and monsoon (74.66 and 76.15%, respectively) and high values during summer (77.82 and 79.23%, respectively). Among the size groups in both sexes, high value was recorded during summer (30-40 cm: male-77.81%) and low value in monsoon (50-60 cm: male-73.13%). Low values were observed in larger size groups and high values in smaller size groups. The moisture content of muscle in all the size groups of males and females was high during spawning months and very low during post spawning months in all the four species studied presently. Similarly, highest percentage of water was observed in muscle during the spawning season of *Clarius batrachus* [16] and *Mugil cephalus* [17].

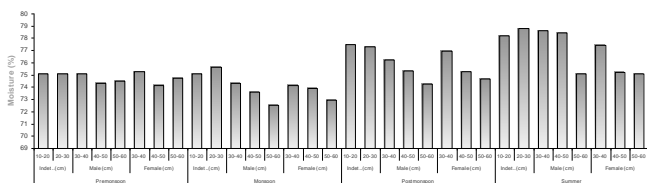


Fig. 1. Variations in moisture content of *E. malabaricus*

Crude protein values fluctuated between 68.22 and 73.25%. Both the size groups of indeterminates (10-20 and 20-30 cm) showed low values during summer (71.05 and 71.13%, respectively) and high values during postmonsoon (74.12 and 74.11%, respectively). Among the size groups of both sexes, there was a high value recorded during postmonsoon (30-40 cm: female-72.85%) and low value during summer (50-60 cm: male-68.31%). Low values were noticed in larger size groups and high values in smaller size groups. Most of the size groups in females showed higher values than males during all the seasons. The crude protein contents in muscle tissues of the presently studied finfishes showed a relationship with spawning season. High protein levels were

observed in muscle during post and pre spawning months and low values during spawning season. This corresponds well with the findings of Bano [16], who also observed a fall in the protein content during spawning in *Clarius batrachus*. Further suggests the accumulation of muscle protein, due to high protein in muscle content during post and pre spawning periods, leads to meet the nitrogen demands of the fish [6, 18].

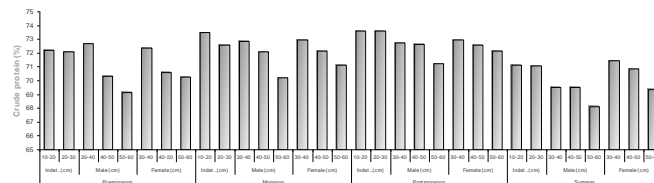


Fig. 2. Variations in crude protein content of *E. malabaricus*

Carbohydrate values varied between 2.12 and 5.23%. Both the size groups of indeterminates (10-20 and 20-30 cm) showed high values during postmonsoon (2.35 and 2.55%, respectively) and monsoon (2.22 and 2.35%, respectively) and low during premonsoon (1.66 and 1.95%, respectively) and summer (1.65 and 1.97%, respectively). Among the size groups in both sexes, maximum carbohydrate level was recorded during postmonsoon (50-60 cm: female-5.38%) and minimum during summer (30-40 cm: male-2.85%). Low values were observed in lower size groups and high values in higher size groups. In the species presently studied, smaller size groups showed less carbohydrate compared to larger forms which may perhaps be due to rapid utilization of carbohydrate during growth and accumulation associated with decreasing growth rate. Love [19] concluded from the amount of lactic acid accumulation after death, that larger fishes carry greater reserves of carbohydrate in *Gadus morhua*.

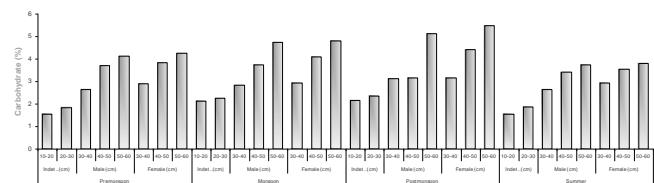


Fig. 3. Variations in carbohydrate content of *E. malabaricus*

Crude lipid values showed variations from 4.33 to 7.66%. The size groups of indeterminates exhibited the following trend: high values recorded in postmonsoon (20-30 cm-5.35%) and low values noticed during summer (20-30 cm-4.06%). Among the size groups in both sexes, high value was observed during postmonsoon (40-50 cm: female-7.71%) and low value during summer (30-40 cm: male-3.92%). Lower size groups exhibited low values and higher size groups showed higher values.

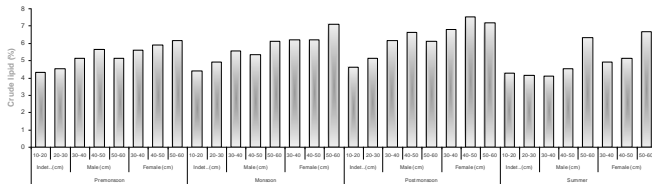


Fig. 4. Variations in crude lipid content of *E. malabaricus*

Ash content ranged from 5.25 to 8.64%. Both the indeterminate size groups (10-20 and 20-30 cm) showed higher (8.19 and 8.24%, respectively) and lower values (8.14 and 8.19%, respectively) of ash in summer and premonsoon season respectively. There was a maximum ash content was observed in *E. tauvina* (8.14%) in summer. Similar kind of reports was observed by many researchers in fishes [16, 20, 21]. The maximum ash content observed in present study might be due to the accumulation of inorganic salts in the muscles and seasonal variations in the food availability for fish [22-24].

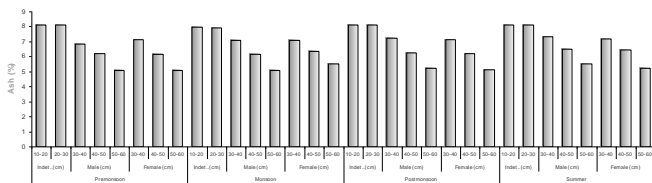


Fig. 5. Variations in ash content of *E. malabaricus*

IV. CONCLUSION

The information on proximate composition of fish has fundamental importance in the application of different technological processes. The present study showed that consumption of *E. malabaricus* during premonsoon and postmonsoon is advantageous in Nagapattinam coast, as good amount of biochemical constituents (crude protein, carbohydrate and crude lipid) were found during these months.

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