Biochemical Studies on Fish *Harpodon nehereus* Collected from Sassoon Dock, West Coast of Maharashtra to Evaluate its Nutritive Values

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Abstract- *The use of oceanic resources for human consumption has enhanced rapidly worldwide. Sea foods plays an important role as it is of high biological values and provides rich source of nutrition including protein, lipid, fats and minerals to the consumers. Harpodon nehereus (Ham.) is an economic and local fish of west coast of Maharashtra fulfilling the daily nutritional requirements of local coastline population. Due to its property of high accumulation of water, this fish is difficult to export and hence it is highly economic and cheap. Proximate composition acts as important criteria to analyze the nutritional status of the marine fish. The present study aims to evaluate the Biochemical compositions like protein, lipid, carbohydrate and moisture content of Bombay duck, Harpodon nehereus to evaluate its nutritional status during different season of the year. The research was carried out during pre-monsoon, monsoon and post-monsoon season of the year 2016-2018. Moisture content in the muscle tissues ranged between 89.2 to 90.1 gm. %. The total protein varied between 15.55 to 25.77 gm.%, carbohydrate levels were found to be 4.6 to 8.7 gm.% and the lipid content ranged from 0.30 to 0.97 gm.%. The results indicate that the moisture content in the fish is high and an inverse relation exists with lipid. Protein and carbohydrate are high enough to meet the nutritional requirements of consumers. Results showed seasonal variation in the biochemical composition.*

Keywords- Biochemical composition, *Harpodon nehereus*, nutritional status, Sassoon dock.

I. INTRODUCTION

Marine fish foods act as a source of "rich food for poor people" and play an important role in improving food security and nutritional status (Suganthi A, 2015). Marine fishes are also increasingly marketed for their health benefits to consumers (Schmidt, 2006). Consumption of fishes and other marine products has always been a major factor in the economy and nutrition of coastal inhabitants (Sanjay Waghode, 2018; Shingadia Hitesh, 2013; Marichamy. G., 2012). Large population of human beings suffer due to hunger and malnutrition, and fishes form a rich source of food and supply a means to tide over the nutritional difficulties of man. (U.U Modibbo, 2014). Consumption of marine fish provides an extensive source of protein with a high biological value, essential minerals and vitamins (Swati Sucharita, 2015). Fish foods are very important source of amino acids that forms a building block of proteins that are essential for various biological processes like growth, reproduction, biosynthesis of vitamins etc. Marine fish fats are good source of essential fatty acids that are not generally synthesized in the human body (Swati Sucharita, et.al, 2015).

Fish meals contain most important nutritional components and serve as a source of energy for human beings (Sutharshiny and Sivashanthini, 2011). The composition of fish varies with feeding conditions, food supply and growth (Vinaya Kumar, 2012). Fish contributes to food security in many regions of the world, providing a valuable supplement for diversified and nutritious diets (Olopade, et, al, 2015). Pollution in the marine environment affects the existence and metabolic activities of aquatic organisms (Archana Oza and Leena M., 2017'). The assessment of metabolic rate in a vertebrate animal has been considered as the most sensitive parameter of pollution stress since it affects many other factors such as enzyme activities, biochemical activities and other physiological processes (Leena Muralidharan, 2014).

Body composition provides good indicator for the fish quality (Harnandez et. al. 2001). Modern day man is more health conscious and is interested in compelling sea food by looking over its nutritious supremacy and health supporting characteristics than other sources of available food (Swati sucharita, et.al, 2015; Moronkola, et,al, 2011). Hence, the present research work aims to investigate the levels of protein, lipid, carbohydrate and moisture content in the commonly consumed fish, *Harpodon nehereus* collected from Sassoon dock, west coast of Maharashtra during three different seasons of the year. This will provide information regarding the nutritional status of the selected fish.

II. MATERIALS AND METHODS

A. Sampling:

The fresh fishes measuring 26-30 cm in length and 160-180 grams in weight were collected from Sassoon dock immediately after the landing and brought to the laboratory in ice box for further analysis. Collection of samples was done during three different seasons (Pre-monsoon, monsoon and post-monsoon) of the year 2016-18.

B. Proximate analysis:

The Fishes were dissected and the body muscle tissues without skin was taken, labeled separately and kept at -20° C in the freezer for further analyses. Entire experiment including additions of chemicals was performed in a sterile condition and the chemicals used for the analysis were of AR grade.

Total protein content was estimated by Lowry's method (1951), with bovine serum albumin (BSA) as protein standard and 10% muscle tissue homogenate was prepared in 0.9 % saline for test samples. The optical density was read at 620 nm wavelength on a colorimeter.

Total carbohydrate was evaluated by Anthrone reagent method (Hedge & Hofreiter 1962), the absorbance of standards and test samples was read at 620 nm on a colorimeter.

Total lipid was extracted according to Folch method (1957), and determined gravimetrically after solvent evaporation.

Moisture content was determined by AOAC method (2000). Muscle tissue was dried in an oven at 105° C. The dried tissue was weighed again. The moisture content was then calculated from the loss in weight.

C. Data analysis

Protein, lipid, carbohydrate and moisture content of three seasons in fish muscles were analyzed by one way analysis of variance (ANOVA) with significance level $P<0.05$ to find the level of significance by using Microsoft Excel, version 2010.

III. RESULTS AND DISCUSSION

The proximate composition in the muscle tissues of fish, *Harpodon nehereus* was estimated during pre-monsoon, monsoon and post-monsoon season of the year 2016-18 and is presented in Table no.1.

Fish received increased attention as an imminent source of animal protein and necessary nutrients for human diets (Fawole et al. 2007). Protein forms the major quantity of dry matter in fish (Steffens, 2006). Fish diet helps in weight loss due to its low calorie, high protein content. The nature of food has an effect on protein composition in fish. Carnivorous fish gain more proteins through diet thus have higher protein content (Resen, A. K., et al., 2017). The fish *Harpodon nehereus* examined in the present study showed high protein with the mean values ranging from 15.55 to 25.77 gm%. Highest value of proteins was recorded during pre-monsoon (25.77 gm %) and the lowest during the post monsoon season (15.55 gm%). The levels of proteins during different season was found to be in decreasing order where pre-monsoon>monsoon>post-monsoon.

Fish, can be grouped into four categories according to their fat content – lean fish (less than 2%), low (between 2-4%), medium (between 4-8%) and high fat (more than 8%) (Ackman, 1989). In terms of the lipid content, fish species examined can be considered to be in the lean fish category as the fish muscle tissue in the present work showed very low lipid content, varying between 0.30 to 0.97 gm% with the high values being obtained during monsoon (0.97 gm%) and lowest value was found during post-monsoon season (0.30 gm%). declining pattern of lipid profile in the selected fish was observed from pre-monsoon to post monsoon season (pre-monsoon>monsoon>post-monsoon).

The mean value of carbohydrate ranged between 4.6 to 8.7 gm %. High value of carbohydrate was obtained during pre-monsoon (8.7 gm %) and the lowest value was noted during monsoon (4.6 gm %). The carbohydrate content was highest in pre-monsoon which got declined during monsoon season however during post monsoon season the values were increased again. Carbohydrate content in the present study in fish Bombay duck was observed in order pre-monsoon> post-monsoon >monsoon.

The percentage of water in the body composition is a good indicator of the relative energy, protein and lipid content of fish (Aberoumad, and Pourshafi, 2010). In the present study Moisture content was between 89.2 to 90.1 gm %. Maximum values were obtained during monsoon (90.1%) and minimum value was recorded during post-monsoon season (89.2%). Moisture content in the present work followed a seasonal variation in order monsoon>pre-monsoon>post-monsoon.

Similar observations of proximate composition in different marine organisms were reported by various researchers. Archana Oza, 2017 showed high moisture content in various tissues of *Harpodon nehereus* ranging between 80 to 90% during the post-monsoon season. Shingadia Hitesh, 2013 reported 82 to 89 gm% moisture content with high protein and carbohydrate values along with very low lipid content ranging between 0.14 to 0.26 gm % in muscle tissues of Bombay duck from Mumbai coast which showed seasonal variation. Kumar. V et al, 2012 observed high moisture (86 to 88%), protein and low fat (1.7 to 2.0 %) in *Harpodon nehereus* along Sunderban area of West Bengal, India. An crucial effort have been made on the study of the body composition of different marine water fishes by several workers; G.Marichamy et.al, 2012 worked on proximate composition of twenty edible fishes of Parangipettai coastal waters; Suganthi A. et.al, 2015 studied on fish species collected from Muthupet mangroves; proximate composition study was also performed in marine fishes from Chandipur landing centre, Bay of Bengal, India by Swati Sucharita Mohanty, et.al, 2015 and observed rapid fall in lipid content during monsoon and post monsoon season in fish S. sihama and attributed it to reduced amount of food ingestion; Amjed K. Resen, et.al, 2017 studied Chemical Composition of Fishes from Iraqi Marine Waters. The fluctuation in biochemical composition of muscle of fish may also be attributed to alteration in the ecology of sampling site besides season (Waghode S and Muralidharan L, 2018; Chamundeshwari Devi et. al. 2001).

Results statistics reveal that there is no significant difference exists between different season for protein, lipid and carbohydrate composition (P> 0.05) however significant seasonal difference was observed for moisture content (P<0.05) of fish *Harpodon nehereus* in the present study.

FIGURES AND TABLES

Table 1: Proximate composition in muscle tissues of Harpodon nehereus, collected from Sassoon dock, Mumbai coast during pre-monsoon (summer season), monsoon (rainy season) and post-monsoon (winter season).

Parameters	Pre - Monsoon	Monsoon	Post – Monsoon
Protein (gm.%)	25.77 ± 4.09	22.26 ± 5.37	15.55 ± 2.04
Lipid (gm.%)	0.97±0.10	0.60±0.23	0.30±0.08
Carbohydrate (gm.%)	8.7±5.73	4.6±2.83	7.3±5.83
Moisture (gm.%)	89.6±0.51	90.1±0.56	89.2±0.42

Table values are expressed as mean ± std. deviation.

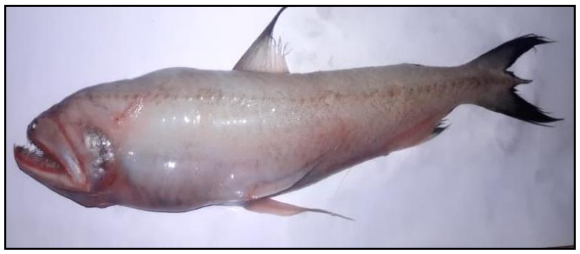
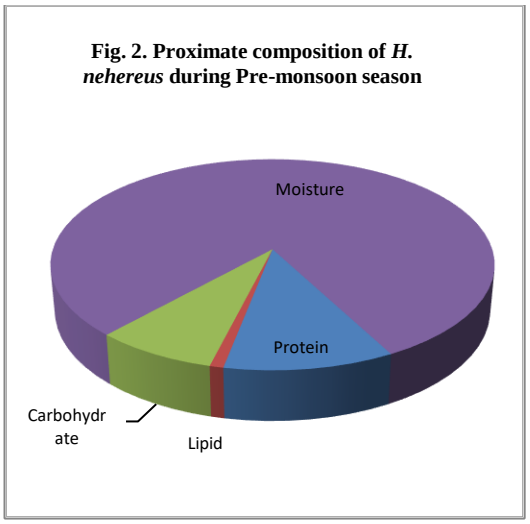
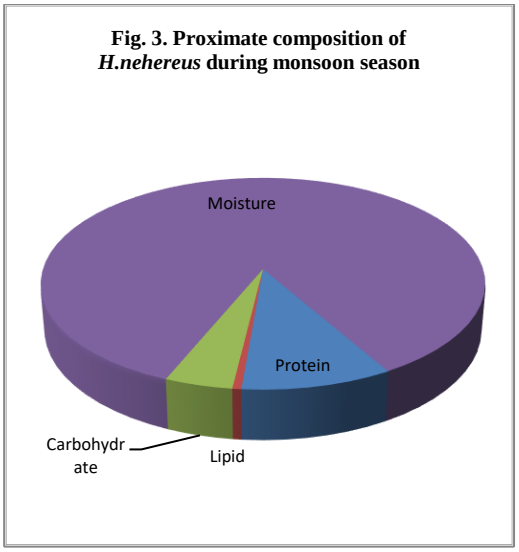
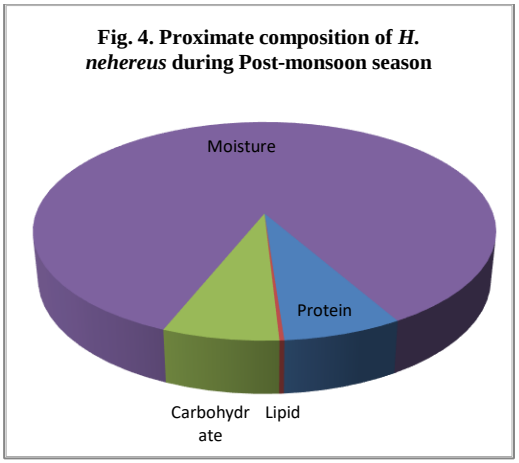


Fig 1: Fresh species of *Harpodon nehereus* collected from Sassoon dock, Mumbai.

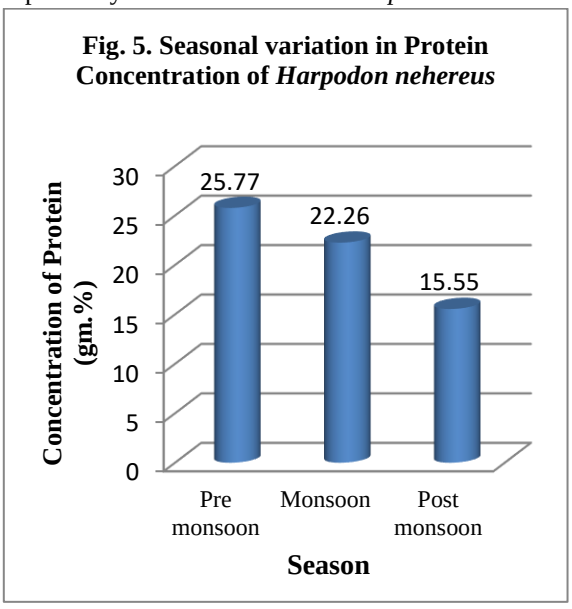
Figures 2, 3 & 4: Pie charts showing the differences in the protein, carbohydrate, lipid and moisture content of *Harpodon nehereus* during different season.

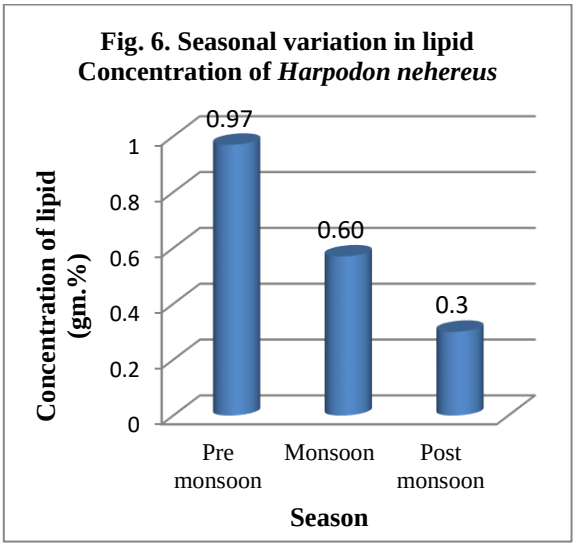


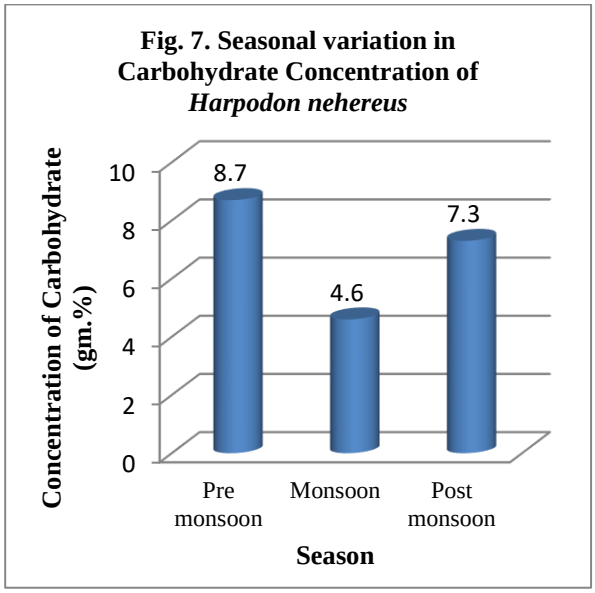


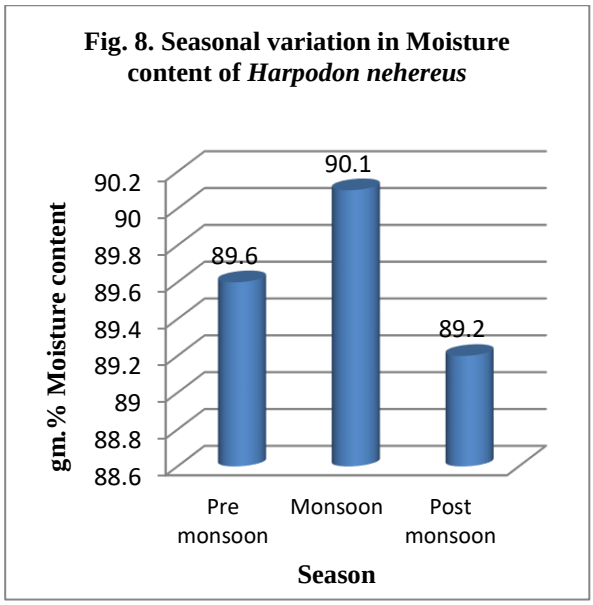


Figures 5-8: Graphs showing the seasonal difference in percentage value of protein, lipid carbohydrate and moisture content respectively in muscle tissues of *Harpodon nehereus*.









IV. CONCLUSION

The Fish moisture tends to decrease with increase in body lipids, in other words inverse relation exists between the moisture and lipid content (Shingadia Hitesh, 2013; Majumdar R K et.al.,2009; Swati Sucharita Mohanty, et.al., 2015). The fish Bombay duck, *Harpodon nehereus* collected from Sassoon dock, Mumbai in the present research work has rich moisture content and very low fat content. Low concentration of lipid in muscles could be due to poor storage mechanism and use of fat reserves during spawning activities. The amount of protein and carbohydrate was found to be rich enough to meet the nutritional demand of the consumers. High tissue protein content may result from equally high protein content

of their diet. Nutritive value of fish varies with season (Varljeen et al., 2003). By looking at the nutritional benefits of the selected fish, authors believe that such marine fishes are the ideal and lean dietic fish food for local populace of west coast of Maharashtra.

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