



Research Article

SEASONAL CHANGES IN PROXIMATE COMPOSITION OF FOUR MAJOR SUN DRIED FISHES OF SHEORAPHULI GOVERNMENT REGULATED MARKET, WEST BENGAL, INDIA

^{1*}Rabindranath Kundu and ²Nachiketa Bandyopadhyay

¹Department of Aquaculture Management and Technology, Vidyasagar University, West Bengal- 721102, India

²Sidho Kanho Birsa University, Purulia-723104, West Bengal, India

Article History: Received 9th April 2018; Accepted 22nd May 2018; Published 13th June 2018

ABSTRACT

The present study was performed to understand the Seasonal Changes in Proximate composition of four major dried fish species available throughout the year at Sheoraphuli Government Regulated Market in the District of Hooghly, West Bengal. The market was surveyed from June 2014 to May 2017 in four seasons each of three months. The samples were collected and estimated the Protein, Lipid, Carbohydrate, Moisture, Ash content. The result of this study revealed that mean percentage of protein, lipid, carbohydrate, moisture and ash content ranged from 69.57 to 48.45%, 7.98-3.17%, 1.15-4.22%, 40.00-14.73%, and 2.13 - 8.7% respectively. The dried fish products available in the Sheoraphuli Government Regulated Market were found to be nutritious. However, the quality of fish collected in the Monsoon season was not in acceptable limit for consumption. Therefore, care should be taken during storage. Packaging may also be improved for better keeping quality to increase the quality of the products.

Keywords: Seasonal changes, Dry fish, Proximate composition, Sheoraphuli market.

INTRODUCTION

Fish is one of the widely available and easy digestible animal proteins. According to Ravichandran *et al.* (2012) for maintaining of healthy body fish protein is widely accepted. Curing of fish is an ancient method of preservation in India that primarily involves two stages viz, salting and drying (Sanjeev & Surendran, 1996). According to Jeya Shakila *et al.* (2003) about 17% of the total fish catch is being used for dry fish production in India. At present, about 1.4 million metric tons of fish which is accounts for about 8.0% of the total world catch is cured and utilized (FAO, 2000; Relekar *et al.*, 2014). The dried fish industry has grown about 35.8% over the previous in India. This ranks second to fresh fish consumption (Padiyar *et al.*, 2003) But some of the cases it does not possible to get the standard quality of dried product due to traditional types of processing and highly perishable nature. Now a

day's consumer make sure the nutritional as well as biochemical quality of the product before taking. Therefore the present investigation was carried out in order to assess the proximate value in different season of four major dried fish species available in Sheoraphuli Government Regulated Market.

MATERIALS AND METHODS

Sampling

Samples from Sheoraphuli Market were collected in each quarter (Jun - Aug, Sept - Nov, Dec - Feb and Mar - May) for consecutive 3 years. Four most popular species of dry fishes namely Bombay duck (*Harpodon nehereus*), Ruli (*Coilia dussumieri*) and Ribbon fish (*Lepturacanthus savala*) and Phasa (*Setipinna phasa*) were collected. Category of sample chosen for this study was dry fish

*Corresponding Author: Mr. Rabindranath Kundu, Research Scholar, Department of Aquaculture Management and Technology, Vidyasagar University, West Bengal, India, Email: rabindranath_bfsc@yahoo.co.in, Mobile: 9432827644

sample as they were available on that day. The samples were taken to the laboratory, stored in air tight zipper bags at room temperature until biochemical investigations.

Sample Preparation

For the analysis samples were taken accurately and each sample was crushed by mortar and pestle. The samples were analyzed for protein, fat, moisture and ash and in each case three replicates were maintained.

Estimation of Protein, Lipid, Moisture, Ash and Carbohydrate

The usual Kjeldahl method was followed to determine the amount of protein in the dried fish muscle and head portion of the body. Lipid content was estimated by the Folch's

method through Soxhlet apparatus. Moisture was determined by drying the sample at + 105°C in an oven.

Ash was determined by muffle drying the sample at 6000 – 7000°C to dry ash. By subtraction ash content was determined (Mertens, 2005) The percentage of carbohydrate was calculated by simply subtracts the total percentage of protein, fat, moisture and ash from 100.

RESULTS AND DISCUSSION

Sheoraphuli Government Regulated dry fish market was situated at Nisterini Temple Road, Sheoraphuli under Baidyabati Municipality under Chinsura Sub-division of Hooghly (Figure 1). Two minutes walking distance from Seoraphuli Railway Station and on the way to Jetty ghat. Latitude: 22.776951 Longitudes: 88.329591.

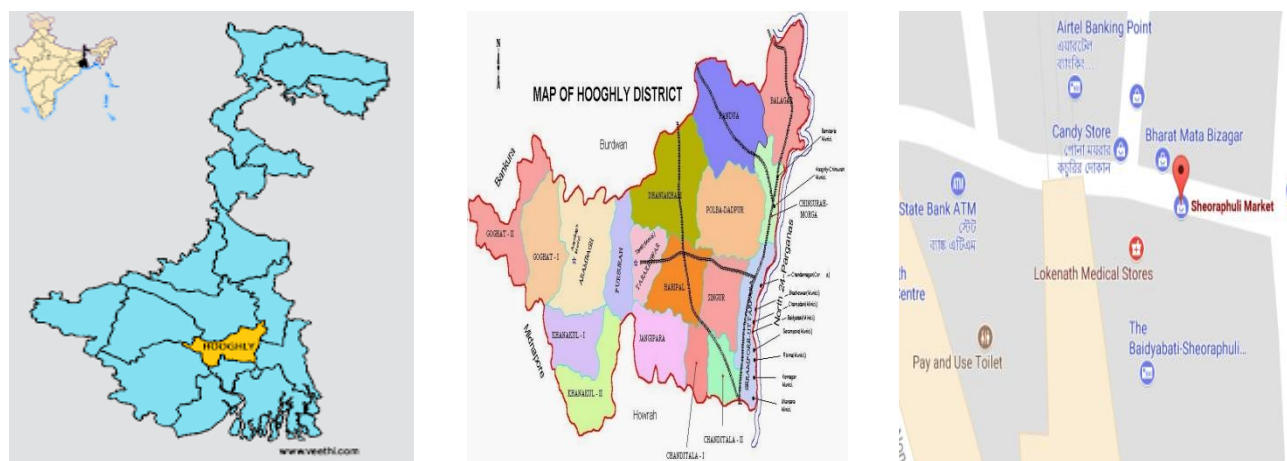


Figure 1. The study Area.

During 2000-2004 there was a big organized market of Dry Fish. But after commencement of Egra Dry Fish market this market became less popular. Only retail business done here now. Warehouses of several middleman vis-a-vis Karbaris available here who take the contract of supply and supplied accordingly from Egra and Kakdwip to North Bengal and outside of Bengal. They are registered under Sheoraphuli RMC.

The proximate composition of four major Dry fishes from Sheoraphuli market (Bombey duck, Ruli, Ribbon and Phasa) were estimated at the laboratory and investigated the mean percentage of Protein, Lipid, Carbohydrate, Moisture and Ash content (Figure 2, 3, 4 & 5).

In the present study, protein level analyzed was 69.57 to 48.45%. According to Love, (1970) principle composition of fish are 16-21% of protein, 0.2-5 % of carbohydrate and 66-81% of water. Rahaman *et al.* (1982) observed average 55.75-64.49% protein in dried marine fishes. Gheyasuddin *et al.* (1980) were found 79.32-85.49% protein in dried fishes. The findings of this study showed

that the average protein levels obtained by dry fishes are very close with the previous studies. The lowest level is very low due to protein denaturation in room temperature for 4-5 months. Because production has been stopped in the month of March and the sample available in monsoon period was of previous year. The protein content of the dry fishes were higher in Oct-Dec that was mainly in winter season varied from 69.57 to 63.50% and showed a lowest value in Apr-Jun that was Monsoon season varied from 48.45 to 62%. This observation is supported by the findings of Siddique *et al.*, (2012) which found highest value in winter i.e. 57.03% and lowest in monsoon i.e. 52.44%.

The mean percentage of lipid of four major Dry fishes (Bombey duck, Ruli, Ribbon and Phasa) from Sheoraphuli Sub-market under Sheoraphuli RMC were done at laboratory and were varied from 7.98- 3.17%. Bhuiyan, (1992) were observed 6.84-9.21% lipid in dried Bombay duck and Sin croaker. Rubbi *et al.* (1987) reported that the lipid content ranging from 0.45-15.51% in dried marine fishes. In the correlation matrix, it is found that lipid is

negatively correlated with moisture content (Table 1-4). The lipid content is highest in Jan-Mar i.e. late winter season and lowest in Monsoon i.e. Apr - Jun, 7.98% and 3.17 % respectively. Siddique (2011) also found the similar result with Bombay duck, Sin croaker and Ribbon fish.

In the present study carbohydrate level varied from 4.22 to 1.15%. Bhuiyan (1992) observed 0.2-0.88% carbohydrate in dried Bombay duck and Sin croaker. Stirling, (1972) observed 1.0-12.5% of carbohydrate in the liver of dried fish samples. Here carbohydrate content found more in late winter season i.e. Jan to Mar and less in monsoon i.e. in Apr-Jun. Siddique *et al.* (2012) also found the similar result with Bombay duck, Sin croaker and Ribbon fish.

Moisture level in the analyzed sample were found ranging from 40 - 14.73%. Bhuiyan, (1992) recorded 6.9 to 14.2% moisture in dried Bombay duck and Sin croaker. The present study showed some sorts of dissimilarity in observation as previous study were conducted on fresh fishes and they analyzed the samples after drying. Therefore the moisture level was highly reduced. In the present study I have collected dry fishes from market as

available and did not dried just before analyze. Sometimes processors did not dry the fishes properly due to loss in weight. This might be another reason for obtaining the higher values of moisture content in the samples. The moisture content in the samples collected in the monsoon season showed higher amount of moisture because in the monsoon season the average humidity is very high in West Bengal especially in coastal West Bengal. Therefore the dried fishes absorbed more moisture from the air and increase the moisture level. However these findings were supported by Siddique *et al.* (2012) who found the same trends in Bangladesh which is almost similar weather condition of West Bengal. In correlation matrix it has found that moisture had a negative relation with protein in every season.

In the present study the ash level of the dry fishes varied from 8.70 - 2.13%. Gheyasuddin *et al.* (1980) found 4.56-9.98% in some marine dried fish samples which is in close quarter with the present study. The Ash content also found highest in late winter season compared to others and lowest in monsoon which is supported by Siddique *et al.* (2012).

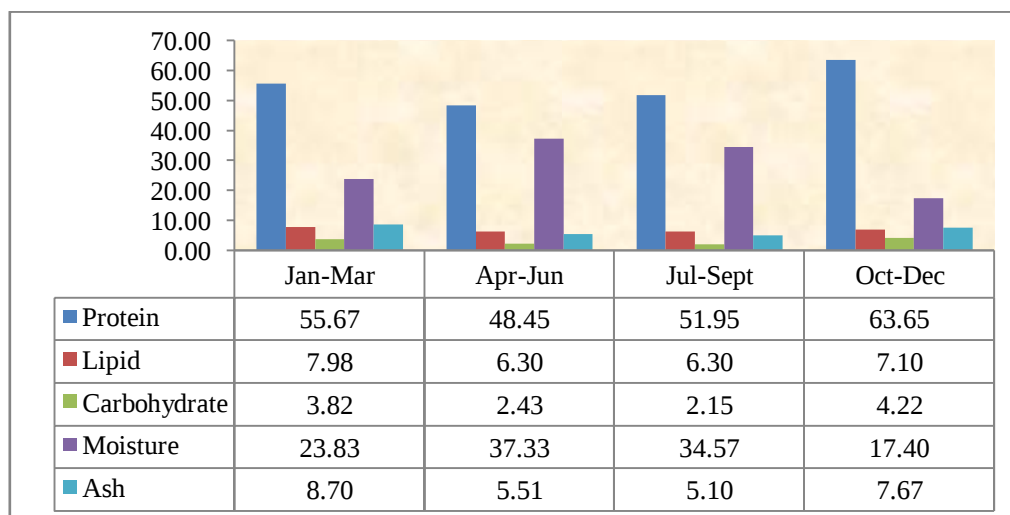


Figure 2. Proximate composition of *Herpadon neherius* collected from Sheoraphuli Market.

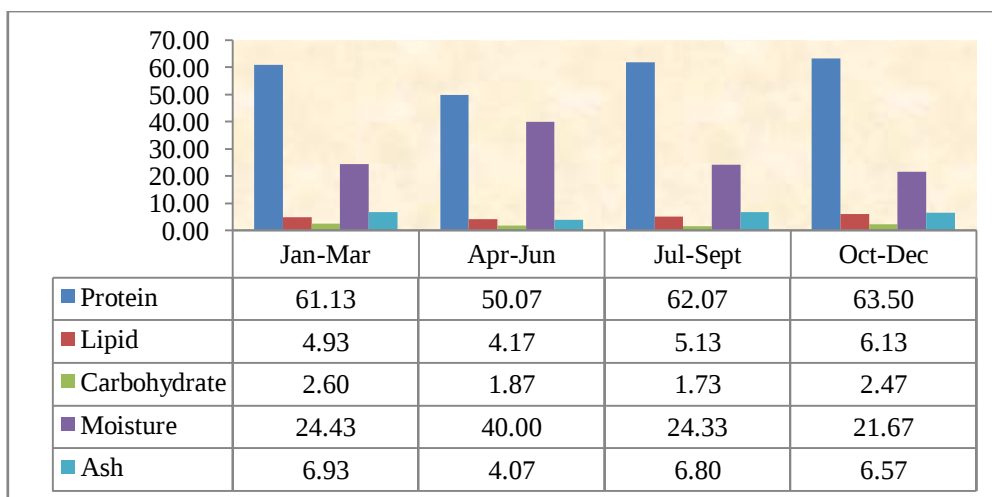


Figure 3. Proximate composition of *Coilia dusumieri* collected from Sheoraphuli Market.

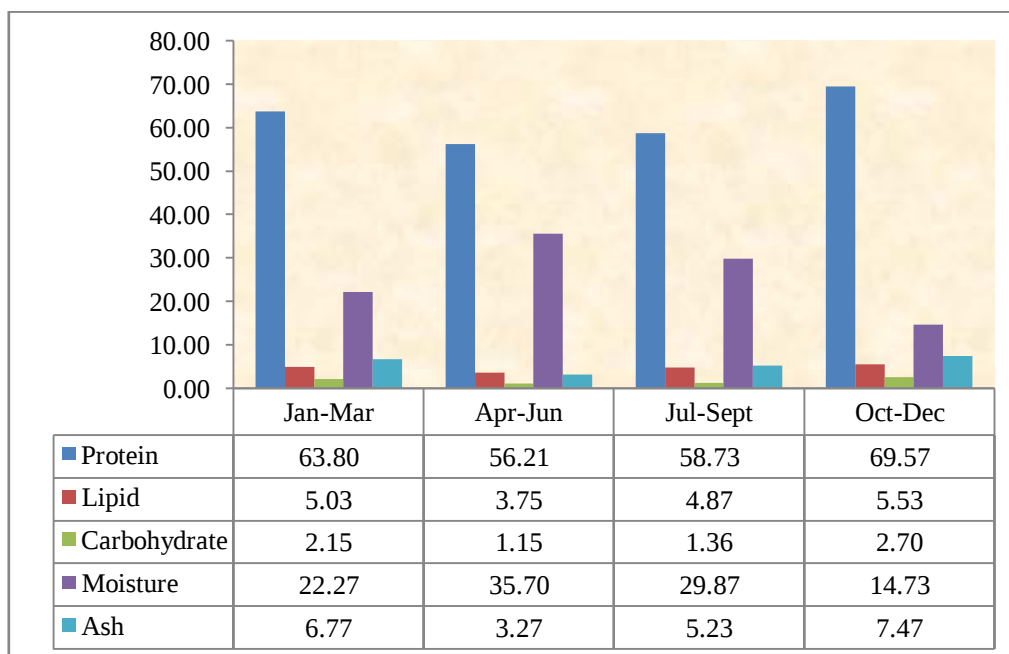


Figure 4. Proximate composition of *Lepturacanthus savala* collected from Sheoraphuli Market.

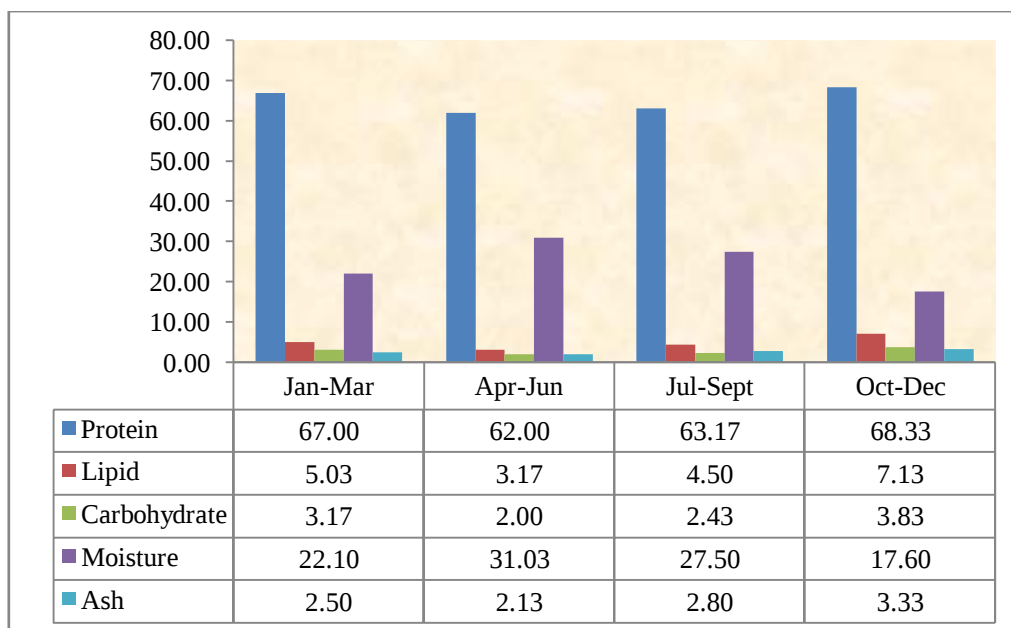


Figure 5. Proximate composition of *Setipinna phasa* collected from Sheoraphuli Market.

Table 1. Correlation (r) between proximate compositions of *Herpadon neherius* collected from Sheoraphuli Market

Content	Protein	Lipid	Carbohydrate	Moisture	Ash
Protein	1.00	-	-	-	-
Lipid	0.52	1.00	-	-	-
Carbohydrate	0.88	0.80	1.00	-	-
Moisture	-0.97	-0.72	-0.96	1.00	-
Ash	0.66	0.97	0.92	-0.84	1.00

Table 2. Correlation (r) between proximate compositions of *Coilia dusumieri* collected from Sheoraphuli Market.

Content	Protein	Lipid	Carbohydrate	Moisture	Ash
Protein	1.00	-	-	-	-
Lipid	0.85	1.00	-	-	-
Carbohydrate	0.46	0.48	1.00	-	-
Moisture	-1.00	-0.85	-0.51	1.00	-
Ash	0.96	0.69	0.46	-0.97	1.00

Table 3. Correlation (r) between Proximate composition of *Lepturacanthus savala* collected from Sheoraphuli Market.

Content	Protein	Lipid	Carbohydrate	Moisture	Ash
Protein	1.00	-	-	-	-
Lipid	0.89	1.00	-	-	-
Carbohydrate	0.99	0.86	1.00	-	-
Moisture	-0.99	-0.93	-0.99	1.00	-
Ash	0.94	0.97	0.94	-0.97	1.00

Table 4. Correlation (r) between proximate compositions of *Setipinna phasa* collected from Sheoraphuli Market.

Content	Protein	Lipid	Carbohydrate	Moisture	Ash
Protein	1.00	-	-	-	-

Lipid	0.91	1.00	-	-	-
Carbohydrate	0.98	0.97	1.00	-	-
Moisture	-0.99	-0.97	-1.00	1.00	-
Ash	0.70	0.93	0.81	-0.81	1.00

CONCLUSION

In the tropical sate like West Bengal where relative humidity is always very high and as a result moisture uptake from atmosphere is very common when all the dried fishes stored in gunny bag and displayed in open mouth gunny bags. Moisture content also varied from species to species. Protein and lipid content was satisfactory in the selected dried fish species. Ash content was somehow little high due to presence of sand as the fish processed in open beaches of coastal West Bengal. Therefore from this result we can conclude that dried fish can provide a satisfactory nutrition to the consumers.

ACKNOWLEDGEMENT

The authors are thankful to the businessman associated with the Sheoraphuli RM for giving necessary support during the sampling and field level data collection. We are thankful to the Department of Fish Processing Technology, West Bengal University of Animal and Fishery Sciences for providing laboratory facilities.

REFERENCES

- Bhuiyan, M. (1992). Proximate biochemical analysis and spoilage pattern of six marine fishes of the Bay of Bengal. Master's Thesis, *Institute of Marine Science and Fisheries, University of Chittagong*.
- FAO. (2000). FAO agricultural data bases are obtainable on the World Wide Web (United Nations Food and Agricultural Organization).
- Gheyasuddin, S., Rahman, A., & Kamal, M. (1980). Nutritive quality of some of the commercial marine fishes of Bangladesh. *Bangladesh Journal of Agriculture*, 5(1), 1-38.
- Jeya Shakila, J., Vijayalakshmi, S., & Jeyasekaran, G. (2003). Effect of delayed salting and drying on histamine and volatile amines formation in sardines (*Sardinella gibbosa*). *Research Publication*, 3, 64-71.
- Love, R.M. (1970). The chemical biology of fishes. With a key to the chemical literature. The chemical biology of fishes. With a key to the chemical literature. *GAB direct*. Academic Press Inc., London: New York, 547.
- Mertens, D. (2005). AOAC official method 975.03. Metal in Plants and Pet Foods. *Official Methods of Analysis*, 18th edn. Horwitz, W., and GW Latimer, (Eds), 3-4.
- Padiyar, P., Phillips, M., Primphon, M., Mohan, C., Babu, G., Mohan, A., Chanratchakool, P. (2003). Extension in shrimp health management: experiences from an MPEDA/NACA program in Andhra Pradesh, India. *Aquaculture Asia*, 8(3), 7-13.
- Ravichandran, S., Joseph, F.S., Kanagalakshmi, R., & Ramya, M. (2012). Variation in nutritive composition of two commercially important marine fin fishes. *International Journal of Zoological Research*, 8(1), 43.
- Relekar, S., Joshi, S., Gore, S., & Kulkarni, A. (2014). Effect of improved drying methods on biochemical and microbiological quality of dried small head ribbon fish, *Lepturacanthus savala*. *International Journal of Fish Aquatic Studies*, 1, 60-66.
- Rubbi, S., Jahan, S., & Begum, M. (1987). Studies on composition and spoilage pattern of seven varieties of marine fishes. *Bangladesh Journal of Applied Science*, 14(1), 59-65.
- Sanjeev, S., & Surendran, P. (1996). Fate of enterotoxigenic staphylococci in fish subjected to curing. *Fishery Technology*, 33(1), 66-68.
- Siddique, M., Mojumder, P., & Zamal, H. (2012). Proximate composition of three commercially available marine dry fishes (*Harpodon nehereus*, *Johnius dussumieri* and *Lepturacanthus savala*). *Food and Nutrition Sciences*, 2(10), 1082-1087.
- Siddique, M.A.M. (2011). The role of perceived risk, knowledge, price and cost in explaining dry fish consumption in Bangladesh within the theory of planned behavior. *Food and Nutrition Sciences*, 2(10), 1082-1087.
- Stirling, H.P. (1972). The proximate composition of the European bass, *Dicentrarchus labrax* (L.) from the Bay of Naples. *Journal of Marine Science*, 34(3), 357-364.