Proximate Composition of *Chelidoperca investigatoris* from Visakhapatnam, East Coast of India

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Abstract: Fresh fishes were used during the whole experiment to determine the proximate composition of *Chelidoperca investigatoris* fish which were collected from the Visakhapatnam fishing harbour, east coast of India, since March 2017 to February 2018. The moisture, protein, fat and ash percentage were 77.52±0.26 %, 19.89±0.26 %, 1.69±0.16 % and 1.04±0.08 %. The highest values of moisture and fat contents were found in monsoon season whereas protein and ash content found more in pre-monsoon season. This study revealed that the inverse relationship was found in between moisture and protein; moisture and fat content respectively. Therefore, this species can play an imperative role to accomplish their nutrient demand of the people.

***Keywords*:** Moisture, protein, fat, ash, *Chelidoperca investigatoris*

I. Introduction

Seafood is an excellent source of nutritional value related to the presence of proteins, fats, vitamins and minerals. As the world population is increasing, the per capita consumption of seafood is also increasing rapidly. The modern day human is interested in taking seafood more in view of its nutritional superiority than all other sources of food accessible. Fishes plays a significant role in the diet of human beings since it is a good source of animal protein. Marine fish muscle contains easily digestible protein and valuable essential amino acids (Venugopal et al 1996; Yanez, 1976). Man lives on land, which occupies a quarter of the surface of the planet and takes most of his food from the land. Approximately 14% of the animal protein consumed by human beings comes from marine fisheries (Pigott and Tucker 1990).

Members of the *Chelidoperca* genus are usually found on continental shelf and slope muddy bottoms in the Indo-West Pacific (Nelson, 2006; Bineesh et al., 2013). Three species of *Chelidoperca*, namely *C. investigatoris, C. occipitalis* and *C. maculicauda* are known from the west coast and east coast of India (Baranes and Golani, 1993; Manilo and Bogorodsky, 2003; Jayaprakash et al., 2006; Sajeevan et al., 2009; Bineesh et al., 2013). However, *C. investigatoris* and *C. maculicauda* are the only valid species of the genus known from the Indian Exclusive Economic Zone (Bineesh et al., 2013).Marine fishery resources are living natural resources which are self renewable with dynamic habitat. Seafood is always in news as it is proclaimed to be most nutritious and healthy food as well as being linked to increasing number of food borne outbreaks across the globe (Rushinadha *et al*., 2016). As the demand for fish is continuously increasing, making the required protein available to the existing population is a challenge (Ramesh *et al*., 2017).

Fishes are widely consumed in many parts of the world by humans due to high protein content, low saturated fat and sufficient omega fatty acids known to support good health (Geetha *et al*., 2016). Body composition is a good indicator of the physiological condition of a fish but it is relatively time consuming to measure. Proximate body composition includes the analysis of water, fat, protein and ash contents of fish (Rani *et al*., 2016). Proximate composition is a good indicator of physiology which is needed for routine analysis of fisheries (Krishna et al., 2017). Seafood is significant in human nutrition because of its unique nutritive value related to the presence of proteins, fats, vitamins and minerals. At present, India is the second largest producer of fish in the world. With an increasing population, the fishing pressure is also increasing in the capture sector (Rao *et al*., 2016). The modern day human is interested in taking seafood more in view of

its nutritional superiority than all other sources of food accessible (Rushinadha and Sreedhar, 2017). Due to the tremendous change in the climate condition, season and industrial growth, there could be wide differences in the biochemical constituents of the fishes. Hence Biochemical studies of fish tissue are of considerable interest for their specificity in relation to the food values of the fish and for the evaluation of their physiological needs at different periods of life (Praveen et al., 2018). The consumer is left with no idea other than the age old conventions to guide him in the selection of nutritious fish due to lack of sufficient data on this aspect of this species.

II. Material and methods

The fish samples were procured from Visakhapatnam fishing harbor, east coast of India. The fish species collected anddirectlykept in ice box and transported to the laboratory for further analysis. Moisture content was determined by using standard AOAC method (AOAC, 2000) for which a known weight (10± 0.5 g) of sample was placed individually in a moisture petri dish and dried in a hot air oven set at 105˚C until constant weights were obtained. The protein content of the fresh fish was determined by micro Kjeldahl method (AOAC, 2000). It involves the conversion of organic nitrogen to ammonium sulphate by digestion of flesh with concentrated sulphuric acid in a micro Kjeldahl flask. The digested sample was diluted, made alkaline with sodium hydroxide and distilled. The liberated ammonia was collected in a boric acid solution and total nitrogen was determined titrimetrically and the percentage of protein in the sample was calculated. The dried samples left after moisture determined were finely grinded and the fat was extracted with chloroform and methanol mixture (AOAC, 2000). After extraction, the solvent was evaporated and the extracted materials were weighed. The percentage of the fat content was calculated. The ash content of a sample is residue left after ashing in a muffle furnace at about 550-600°C till the residue becomes white. The percentage of ash was calculated by subtracting the ash weight from initial weight. The results obtained were analysed statistically by performing ANOVA using MS Excel and Origin pro 8.

III. Results

The monthly variations and seasonal variations of proximate chemical composition which were moisture, protein, fat and ash of the edible part of *Chelidoperca investigatoris* was recorded since March 2017 to February 2018, collected from the Visakhapatnam fishing harbour, east coast of India. It was observed that the proportions of the components of the edible parts varied in seasonal environmental changes.Moisture content found more in the month of November (79.82±0.16 %) and least in the month of June (74.56±0.16 %) shown in table 1, the total mean values of moisture content was 77.52±0.26 % (figure 3). In seasonal wise accumulation, the highest values of moisture percentage were found in monsoon season followed by post-monsoon season and pre-monsoon season which was depicted in table 2.

Protein percentage accumulated more in the month of June (22.06±0.06 %) and less percentage found in the month of September (18.12±0.22 %) which was represented in table 1, whereas in seasonal wise accumulation, more amount of protein content was found in pre-monsoon (21.70±0.26 %) season followed by post-monsoon (19.35±0.31 %) season and monsoon (18.62±0.22 %) season which was depicted in table 2and the total mean values of protein content was 19.89±0.26 % (figure 2).The total mean value of fat content was 1.69±0.16 % (figure 3), in monthly wise variation, more amount of fat content was found in the month of July (2.13±0.23 %) and less in the month of March (1.12±0.05 %) which was represented in table 1, while in seasonal wise variation, more amount of fat content was found in the month of monsoon (1.84±0.19 %) season followed by post-monsoon (1.63±0.15 %) season and pre-monsoon (1.61±0.15) season (table 2).Ash content was found more in the month of June (1.81±0.12 %) followed by January (1.65±0.11 %) and May (1.65±0.11 %) observed in monthly wise variation, whereas in seasonal wise observation, more amount of ash content found in pre-monsoon (1.14±0.08 %) season followed by post-monsoon (1.11±0.07 %) season and monsoon (0.87±0.08 %) season. The total mean value of ash value observed as 1.04±0.08 % (figure 3) respectively. In this study, inverse relationship was observed in between moisture and protein; moisture and fat which was shown in figure 1a and 1b respectively.

IV. Discussion

Proximal chemical composition in seafood edible part were presided by numerous factors, including species, feed and season, growth stage (Yanar et al 2004; Rao et al., 2016). The values obtained on proximate composition (moisture, protein, fat and ash contents) of the selected fish *Chelidoperca investigatoris* analysed in this study were in-line with those reported elsewhere (Tawfi, 2009; Pirestani, 2010; Nurnadia et al., 2011; Rushinadha and Sreedhar, 2017). For moisture content, the highest contents were found 79.82±0.16 % and the lowest value was obtained 74.56±0.16 %. The percentage of protein found similar kind of values in *C. gariepinus* 19.64% and in *Cirrhinusreba* 19.74% found by Osibona (2006) and Mridha et al. (2005), whereas Gheyasuddin et al. (1979) found the low protein percentage in silver pomfret (*Stromateuscinereus*) 16.70% and Ribbon fish (*Trichiurushaumela*) 16.6% respectively.

Based on the lipid content, *Chelidoperca investigatoris* were distinguished as lean fish, where the lipid content was lower than 1 – 2 % for fresh weight (Tawfik, 2009; Sutharshiny and Sivashanthini, 2011b).Crude ash content varied little between species and was low in comparison with the finding of Pirestani (2010) and Nurnadia et al. (2011), who found values of up to 3.3%. Ash is a measure of the mineral content of some food including fish (Omotosho et al., 2011). The concentration of minerals and trace elements that contribute for the total ash contents are known to differ in fish depending on their increasing weight, feeding behavior or length of fish (Hassan, 1996) season, ecosystem, environment and migration even within the same area (Abdallah, 2007).

Moisture and fat percentages in edible part of seafood are inversely related and their amount is approximately 80% with other components accounting for the remaining 20% (FAO, 1999). Seafood are noteworthy division of a healthy diet where they have high quality protein and other indispensable nutrients and are squat in saturated fatty acids and may have omega-3 fatty acids (Geetha et al., 2016). According toStansby (1954) and Salam et al (1995), variation in proximate composition of fish flesh may vary with species variation, season, age and feeding habit of the fish. Generally moisture content shows inverse relationship with lipid content also found in the *Chelidoperca investigatoris* (figure. 1a and 1b). This inverse relationship has also been correlated with our current study and other studies reported in marine fishes such as, *P. seudosciaenaaeneas* and *Johniuscarutta* (Rao and Rao, 2002), *Mullus barbatus* (Lloret et al., 2007). The inverse relationship has also been reported in marine fishes such as *Mugil cephalus* (Das, 1978); *Sardasarda* (Zaboukas, 2006) and freshwater fishes *Mystusseenghala* (Jafri, 1968) and *Ophicephalus punctatus* (Jafri and Khawaja, 1968).

This study provides the information of proximate composition of *Chelidoperca investigatoris*collected from the Visakhapatnam fishing harbor, east coast of India. The current study indicated that this fish species analysed contain significant protein and lipid percentage and hence can be exploited commercially for meeting nutritional necessities.

Conclusion

There were many possible factors such as size, sex, maturity of samples that can affect the differences in proximate composition of marine fish. Sampling procedures also played important role in the differences of the findings. There was also certain information in previous studies that was insufficient to be used for comparison with the current study. The proximate values obtained from this study would be useful to help the consumers in choosing fish and shellfish based on their nutritional values besides providing an update to food composition database.

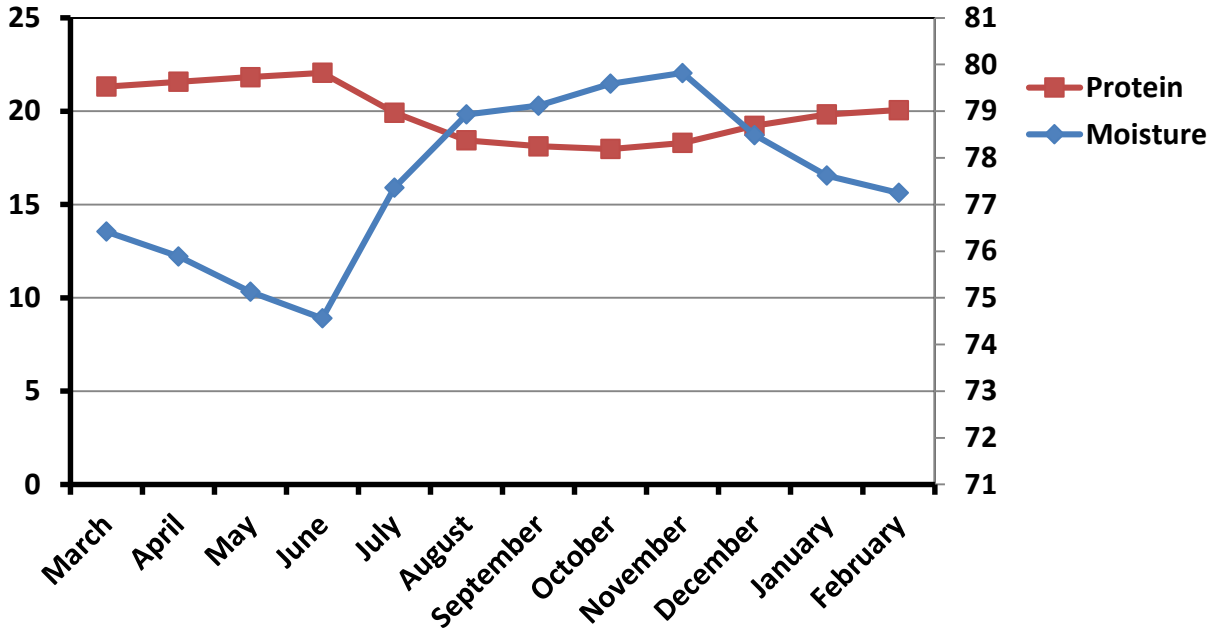

Figure 1a : Inverse relationship between moisture and protein

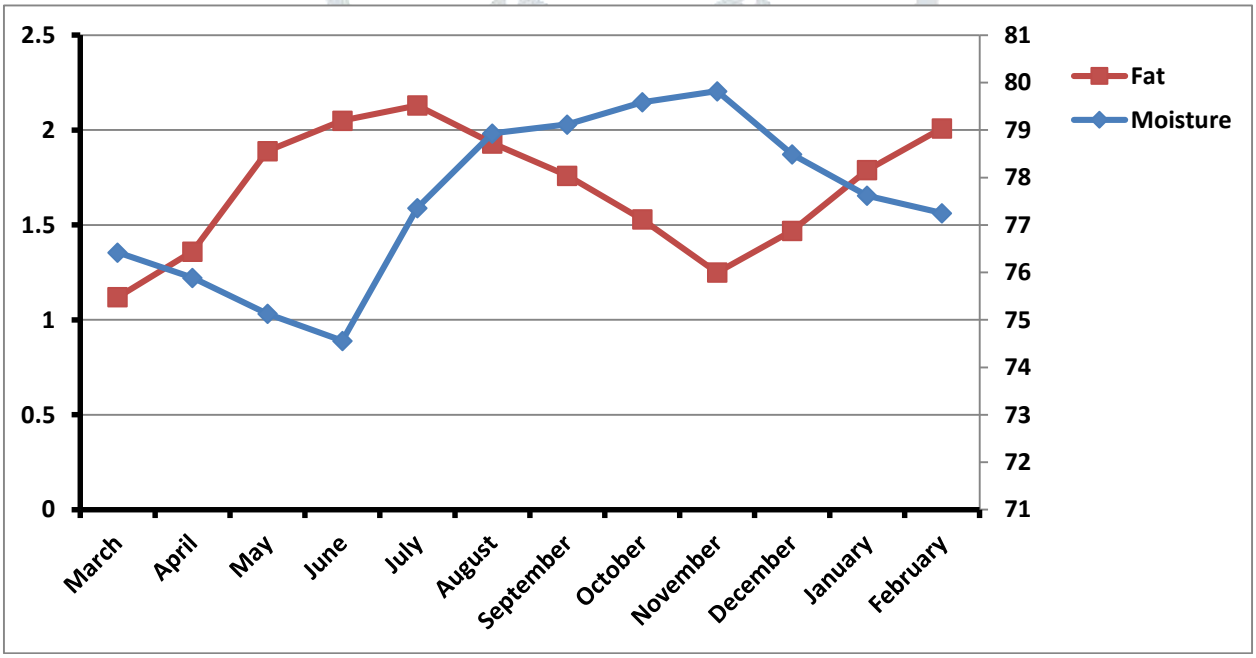

Figure 1b : Inverse relationship between moisture and fat

Table 1: Proximate composition of Chelidoperca investigatoris from Visakhapatnam fishing harbour, east coast of India

	Moisture	Protein	Fat	Ash
March	76.42±0.05	21.32±0.21	1.12±0.05	0.59±0.05
April	75.89±0.12	21.58±0.35	1.36±0.11	0.82±0.03
May	75.13±0.06	21.83±0.43	1.89±0.24	1.34±0.11
June	74.56±0.16	22.06±0.06	2.05±0.19	1.81±0.12
July	77.36±0.32	19.92±0.38	2.13±0.23	1.19±0.15
August	78.93±0.46	18.44±0.19	1.93±0.28	0.76±0.05

September	79.12±0.25	18.12±0.22	1.76±0.05	1.26±0.08
October	79.59±0.39	17.98±0.08	1.53±0.18	0.27±0.03
November	79.82±0.16	18.30±0.11	1.25±0.24	0.63±0.04
December	78.49±0.42	19.22±0.47	1.47±0.18	0.82±0.09
January	77.62±0.13	19.83±0.53	1.79±0.05	1.65±0.11
February	77.25±0.53	20.06±0.14	2.01±0.13	1.32±0.05

Table 2: Seasonal variation of proximate composition

	Moisture	Protein	Fat	Ash
Pre-Monsoon	75.50±0.10	21.70±0.26	1.61±0.15	1.14±0.08
Monsoon	78.75±0.36	18.62±0.22	1.84±0.19	0.87±0.08
Post-Monsoon	78.30±0.31	19.35±0.31	1.63±0.15	1.11±0.07

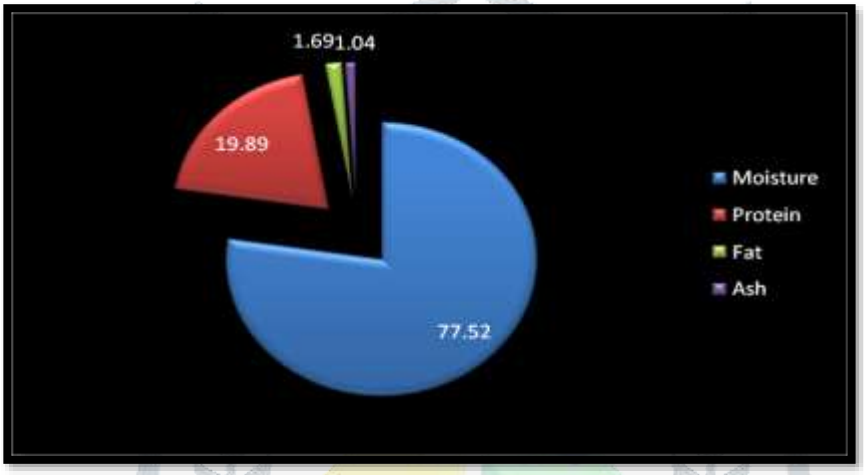

Figure 2: Overall mean values of proximate composition of *Chelidoperca Investigatoris*

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