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SEASONAL VARIATION IN TISSUE BIOCHEMICAL COMPOSITION OF CHOCOLATE MAHSEER (*Neolissochilus hexagonolepis*) UNDER THE CLIMATIC CONDITION OF MEGHALAYA, INDIA

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ABSTRACT
The seasonal variation of proteins, carbohydrates and lipids of *Neolissochilus hexagonolepis* from Meghalaya was determined during January 2014 to December 2014.The study revealed that the species are rich in proteins content so are an important source of animal protein with mean value of 81.07±0.05. The carbohydrate content of the fish tissue was almost similar in all the four seasons with a mean value of 16.07±0.02. The fat content of the tissue of the fish was highest during the breeding season (4.17±0.04) and lowest during the post-breeding (1.90±0.02) and spent season (2.17±0.02).

KEYWORDS: protein, carbohydrate, lipid, breeding season, post-breeding.

INTRODUCTION

Chocolate Mahseer (*Neolissochilus hexagonolepis*) is one of the endangered species of the Mahseer group. The species are most abundant in the northeast part of India (Dasguta, 1994). In Meghalaya, locally known as '*Khasaw*', is considered as to be an important food as well as game fish but due to various natural and anthropogenic factors, the species recorded a sharp decline in recent years (Sarma and Bhuyan, 2007). Fish is generally of high value compared to other protein foods, because of its high protein quality and palatability (Lovell, 1978). Fish meat contains most important nutritional components and serves as a source of energy for human beings (Sutharshiny and Sivashanthini, 2011). Fish is also a vitamin and mineral rich food for young as well as old age people (Edem, 2009). Biochemical composition studies of the fish are of specific interest because fish tissue contains rich nutritive calorific value. Biochemical composition of flesh is a good indicator for the fish quality (Hernandez *et al.,* 2001), the physiological condition of fish and habitat of fish (Shamsan and Ansari, 2010). Fish of various species do not provide the same nutrient profile to their consumer (Takama *et al.,* 1999) and the nutritive value of a fish varies with season (Varljen *et al.,* 2003). So, biochemical evaluation is necessary to ensure the nutritional value and to ascertain the quality of the fish (Azam *et al.,* 2004). Variation of biochemical composition of fish occur due to the spawning cycle and food supply (Love, 1980).In fishes, the biochemical content is related to maturation of gonads and the food supply (Jacquot, 1961; Medford and Mackay, 1978).The biochemical constituents are also influenced metabolism mobility of the fish and geographical area (Stansby, 1962). The present study aims in understanding the seasonal variation of biochemical composition of Chocolate Mahseer under the climatic condition of Meghalaya, India as the fish is known for its high nutritional value.

MATERIALS & METHODS

The present study was based on the specimens of *Neolissochilus hexagonolepis* collected from different rivers of Meghalaya from January 2014 to December 2014. The collected samples were brought to the Hatchery Complex of St. Anthony's College, Shillong for experimentation. The animals were dissected and muscle tissue was taken out. The muscle tissue was weighed immediately and then ground in a mortar using electrical homogeniser using ice bag. The homogenised tissues were used for the determination the biochemical constituents. The protein content of the tissue extract was estimated by Folin-Ciocalteau Phenol method (Lowry *et al.,* 1951). The Anthrone method (Roe, 1955) was adopted for the estimation of carbohydrate in the tissue. The estimation of lipids was done using the method of Zlatkis *et al.,* 1953. The data was prepared according to months and season (spent: January-February; pre-breeding: March-May; breeding: June-August; post-breeding: September-December). The values are expressed as mean ± standard deviation (SD) using standard statistical method.

RESULTS & DISCUSSION

The season-wise variation of the biochemical composition studies (proteins, carbohydrates and lipids estimation) of *Neolissochilus hexagonolepis* were reported and presented in Table 1. It has been observed that the species are rich in proteins content. The protein was highest during the post-breeding season and lowest during the spent season (Table 1 & Fig. 1). The carbohydrate content of the fish tissue was almost similar in all the four seasons during the present study (Table 1 & Fig. 1). From the result it can be ascertained that the fish is an important source of animal protein. The lipid content of the tissue of the fish was highest during the breeding season and lowest during the post-breeding and spent season (Table 1 & Fig. 1).

TABLE 1: Estimation of biochemical composition of *Neolissochilus hexagonolepis*

Maturity stage	Seasons	Protein (%) ± SD	Carbohydrate (%) ± SD	Lipid (%)± SD
Stage I (Immature)	Spent (Jan–Feb)	76.08 ± 0.02	21.74 ± 0.03	2.17 ± 0.02
Stage II (Maturing)	Pre-breeding (Mar–May)	78.43 ± 0.05	17.65 ± 0.03	3.92 ± 0.01
Stage III (Mature)	Breeding (Jun-Aug)	83.33 ± 0.08	12.50 ± 0.02	4.17± 0.04
Stage IV (Spent)	Post-breeding (Sep-Dec)	85.71 ± 0.03	12.38 ± 0.01	1.90 ± 0.02

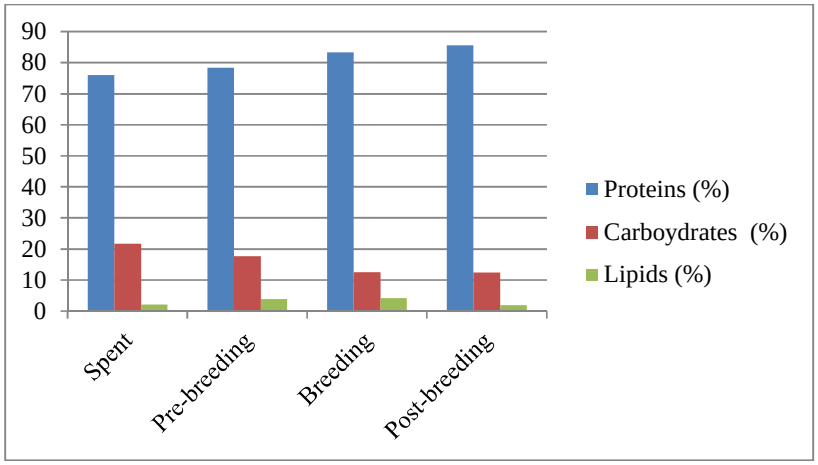

FIGURE 1: Seasonal variation of protein, carbohydrate and lipid contents of *Neolissochilus hexagonolepis*

The present study shows that the protein content of the tissue was highest in all the four seasons indicating that the protein was the major biochemical constituent of the fish meat. This may be due to the availability of protein rich food in that area and shows that protein forms the largest quantity of dry matter in fish. Similar findings were also reported by several workers (Bhuyan *et al.*, 2003; Steffens, 2006; Devi and Sarojnalini, 2013).The low values of carbohydrates recorded in the present study could be due to the fact that a carbohydrate does not contribute much to the reserves in the body. Similar findings were also reported by (Phillips, 1969; Vijayakumaran, 1979; Mathana *et al.*, 2012).The increased in the fat content during the breeding may be due to the fact that the fish is ready to spawn and there is an increase in nutrient sources with the increase in temperature. Similar results were also reported by other workers (Stansby, 1985; Hamre *et al.*, 2003).

The biochemical compositions of the fish vary widely depending upon several factors such as age, sex, season, nutrients and many others, wide variations occurs within the same species also depending upon several factors (Love et al., 1980; Nair and Mathew, 2000).Variation in biochemical composition may also seem to be governed by sexual development, time of spawning, age, season and feeding conditions (Bruce, 1924; Venkataraman and Chari, 1951).

CONCLUSION

The present study revealed the seasonal changes in the biochemical composition of tissues of *Neolissochilus hexagonolepis* in terms of season-wise. The biochemical composition (proteins, carbohydrates, lipids) of the fishes at different period of the year were reported for understanding more about the well-being of the fish. The species is rich in protein content so it is an important source of animal protein. Thus, the rivers of Meghalaya serve as an important source of animal protein for the local people.

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