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Food and Feeding Habits of Malabar Butter Catfish, *Ompok malabaricus* (Valenciennes, 1840) from the Chalakudy River, Kerala, India

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Abstract

Ompok malabaricus (Valenciennes,1840) commonly known as Malabar butter catfish is endemic to the rivers originating from Western Ghats, peninsular India. This paper documents the diet pattern and feeding intensity of *O. malabaricus* from Chalakudy River, Kerala, India during June 2018-May 2019. Stomach contents were analyzed using the numerical, frequency of occurrence and volume methods. The study revealed *O. malabaricus* as an omnivorous feeder consuming mainly on fish parts, molluscs, crustaceans, insects, plant matter, sand/mud, algal matter and miscellaneous items. The result of feeding intensity revealed that feeding activity of *O. malabaricus* is reduced during the monsoon period, which is considered as the breeding season of the fish. The present study provides the fundamental information on the feeding profile of *O. malabaricus* endemic to the Western Ghats, which could be helpful for developing proper culture practices under captivity.

Keywords: Siluridae, Endemic fish, Feeding intensity, Gut contents

1. Introduction

Studies on the food and feeding habits of fishes is important for assessing their ecological role and understanding their place in the food web chains. Food is an important factor in aquatic environments greatly impact the distribution, behaviour, growth, reproduction and migration of organisms (Priyadharsini *et al.*, 2012). The food availability and feeding habits of fishes vary between seasons and gut contents of fish during different seasons in a year provide detailed information on variations in the feeding habit as well as indirect knowledge on the availability of types of food in the ecosystem (Remya *et al.*, 2013). Details regarding the food and feeding habit of fish in their natural surrounding gives cues for the selection of appropriate cultivable species and for the development of their successful culture practices (Manon and Hossain, 2011).

Catfishes of the genus *Ompok* (La Cepède, 1803) are medium-sized members of the family Siluridae, usually found in lakes and large rivers throughout India and Southeast Asia and a very important group of fishes having immense commercial importance (Ng and Hadiaty, 2009). The Malabar butter catfish *Ompok malabaricus* (Valenciennes,1840) a rare silurid cat fish, locally known as *Chotta vala* is endemic to the rivers originating from Western Ghats mountain range of peninsular India (Abraham, 2011). The population of *O. malabaricus* is severely declining due to an array of stress factors like habitat degradation, overexploitation, pollution, dynamiting, poisoning and other destructive fishing practices (Vijayakumar, 2010) and the species currently assessed as Least Concern (LC) category as per IUCN assessment (Abraham, 2011). The fish is nocturnal and generally present in midland areas with slow flowing runs and pool water. The food and feeding habits of *O. malabaricus* collected from Chalakudy River, Kerala, India is explained in this paper.

2. Materials and Methods

Chalakudy River is the fifth longest river (144 km) in Kerala State, flowing through the Western Ghats, a global biodiversity hotspot of India (Myers *et al.*, 2000). The river originates in the Anaimalai and Nelliampathy hills and drains in to highland, midland and lowland areas of the state. It joins with the Periyar River at Elanthikara, before debouching in to the Arabian Sea. The river is formed by the confluence of five major tributaries, viz. Parambikulam, Anakkayam, Sholayar, Kuriarkutti and Karappara tributaries. Chalakudy River basin with an area of 1,448.73 km^2. Chalakudy River is one of the heavily altered river in Kerala and six dams have been constructed across the tributaries and main river system.

Samples of the present study were collected from commercial catch of Chalakudy River between June 2018 to May 2019. A total 137 fish specimens having a length range of 115 to 275 mm were collected using gill nets and seine nets. After their capture, fish specimens were quickly transferred to ice box, preserved with sufficient quantities of ice to keep the samples in fresh condition and brought to laboratory, cleaned and wiped out before further analysis. Total length was measured for each of the individual fish to the nearest of 0.1 cm and total Body weight (wet weight) were measured to the nearest of 0.01 g. The specimens were dissected and guts were preserved in 10% buffered formaldehyde.

The feeding intensity was visually evaluated based on percentage of stomachs in different degrees of distension, which were grouped into different categories such as gorged, full, 3/4 full, 1/2 full, 1/4 full and empty (Pillay,

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1952). The wet weight of the gut was also measured using analytical balance to the nearest 0.01 g. Gastrosomatic index (GaSI) was calculated by the following Desai (1970) formula:

Gastrosomatic index (GaSI) = (Weight of the gut/Total weight of the fish) x 100

For dietary analysis, gut contents were diluted with distilled water and carefully transferred to a counting chamber for microscopic determination. Various food items were separated and were identified and enumerated under stereoscopic microscope (10x magnification). Food items in the stomach were identified to the lowest possible taxonomic level. The most important food items in the gut contents were determined by using index of relative importance (IRI) (Pinkas *et al.* 1971) by the formula:

IRI*i* = (%N*i* + %V*i*) %O*i*,

where, N*i*, V*i* and O*i* represent the percentage of number, volume and frequency of occurrence of prey 'i' respectively. To calculate the seasonal difference in diet preference, the study period was classified into three major seasons, as monsoon (June-September), post-monsoon (October-January) and pre-monsoon (February-May).

3. Results and Discussion

3.1 Feeding intensity

The feeding intensity is calculated on the basis of the average volume of the gut and the percentage of occurrence of the fullness of the gut in different months (Jayaprakash, 1974). Month wise feeding intensity of *O. malabaricus* is provided in Fig 1. On the basis of gut condition, fishes were classified as active feeders (gorged and full), moderate feeder (3/4 and 1/2 full) and poor feeder (1/4 and empty). The highest percentage of gorged and full stomachs was noticed during the month of April (55%) and the lowest in October (10%). The highest amount of empty stomach was found during September (25%) and no empty stomach was noticed in April. Among the 137 guts observed, only 14 fishes had empty stomachs. The feeding intensity was generally low in the monsoon season (June to September) which coincided with the breeding season of *O. malabaricus* (Arthi *et al.* 2013). The low feeding activity during peak breeding season may be attributed to fully developed gonads, limiting the space in the stomach for intake of food. Most active feeding period of fish was noticed in fishes having gonads in their maturing and ripening stages (second and third stage of the breeding cycle). The fish feeds more voraciously because of higher energy demand associated with gonad development during this stage. Seasonal variations in the feeding intensity in fishes are influenced not only by the maturation of gonads but also the non-availability of preferred food in the habitat (Shobana and Nair, 1980). High percentage of fishes with full gut indicating the good food availability during the season (February-May) in the waterbody where the fish species have been living (Ikusemiju and Olaniyan, 1977).

3.2 Gastro-somatic index (GaSI)

Gastrosomatic index is also used to estimate the feeding intensity of fishes. Monthly fluctuations in the gastrosomatic index of *O. malabaricus* are shown in Fig 2. Wide variations in GaSI values were noticed during the study period. The minimum and maximum GaSI values were noticed during July (1.98) and April (3.4) respectively. High feeding activity was noticed in pre-monsoon (February-May) and post monsoon (October-January) seasons, while low feeding activity was observed during monsoon (June-September). The low feeding activity during the spawning season may be attributed to the completely developed gonads, permitting limited space in the abdominal cavity for the intake of food. The intensity in food intake was increased after spawning and the reason is that the fishes need more food and energy for their growth and development. Similar kind of observation on low GaSI value during the breeding season has been observed earlier in native cat fishes like *Horabagrus brachysoma* and *Mystus tengara* (Sreeraj *et al.*, 2006; Gupta and Banerjee, 2014). The high feeding activity during the pre-spawning season may be related to the food abundance or to store energy for spawning (Serajuddin *et al.*, 1998; Kanwal and Pathani, 2012).

3.3 Diet composition

The gut content analysis of *Ompok malabaricus* indicated that species is omnivorous in nature and mainly feeding on fish parts, molluscs, crustaceans, insects, plant matter, sand/mud, algae matter and miscellaneous items. Scales, gills and bone parts of juveniles and adults of *Puntius* sp, *Aplochelius* sp, *Amblypharyngodon* sp etc. could be identified as main fish items in the gut. Scale eating is a common habitat among other species cat fishes too (Khan *et al.* 1998). Juveniles and larvae of prawns, crabs, copepods were the main crustaceans in the stomach. Bits of leaves, roots, seeds and stems of aquatic plants constituted the major share of plant matter. Algal matter is mainly composed of blue green algae (*Anabaena* sp, *Oscillatoria* sp, *Microcystis* sp and *Spirulina* sp), diatoms (*Pinnularia* sp, *Fragillaria* sp, *Cymbella* sp, *Navicula* sp and *Nitzschia* sp) and green algae (*Spirogyra* sp, *Ulothrix* sp and *Pediastrum* sp). Molluscs is represented by parts of snail, which is an evidence for bottom feeding habit of fish. Besides the above food items, the occurrence of sand and mud particles in large amount was noted, which also indicates the bottom feeding activity. The sub terminal mouth of the fish assists in a benthophagic feeding nature. Sand and mud particles could be accidently ingested while feeding on other food items, particularly crustaceans and molluscs. The presence of small fish parts and crustaceans in the stomach of *O. malabaricus* may be related to the differential digestive property of specific prey items. Crustaceans and fish parts, particularly scales, gills and otoliths resist digestions and are reported to be identifiable in fish guts over a long period when compared to many other food items (Wootton, 1990).

For different food items, index of relative importance revealed that fish parts (29.9) were the most dominant food items, followed by crustaceans (23.16), plant matter (16.54), sand/mud (6.57), molluscs (5.54), algal matter (4.79) and insects (4.32) (Fig. 3). Month-wise %IRI for different food items indicated that fish parts were the dominant food items in most of the months except January, February and April, where crustaceans dominated the gut contents. The highest composition of fish parts was reported in the month of June (34.81%) and lowest during

April (23.7%). Percentage of crustaceans composition were highest in the month of January (32.36%) and lowest during September (14.79%). The occurrence of plant matter was observed round the year with maximum value during the month of May (22.87%) and minimum value in January (10.92%). The percentage of sand /mud was recorded high during September (14.09%) and low in May (3.05%). The highest percentage composition of fish parts was reported in monsoon season (31.32%) and the lowest during pre-monsoon season (29.07%) (Fig. 4). Crustaceans composition were highest in pre-monsoon season (27.43%) and lowest during monsoon (15.65%). The percentage composition of plant matter was highest in pre-monsoon (18.82%) and lowest in post-monsoon (12.88%). Environmental components play a crucial role in the distribution of food organism in the different habitats and such differences in the availability of food organisms in different habitats are reflected in the diet composition of fishes (Bhakata *et al.*, 2019).

O. malabaricus consume a variety of food items and it can be termed as euryphagous feeder and this type of feeding habits has already reported in several cat fishes in India such as *Horabagrus brachysoma*, *Hemibagrus punctatus* and *Mystus tengra* (Prasad and Ali, 2008; Gupta and Banerjee, 2014; Raja and Perumal, 2018). This type of feeding habit is considered to be an important approach for survival and has an advantage over fish species compering for specific food items (Olojo *et al.* 2003). A similar type of feeding habits was reported in another silurid catfish species of the same genus *Ompok bimaculatus* in Chalakudy River (Kurian, 2002). Based on the feeding habits of related species within the same genus *Ompok*, *O. malabaricus* is carni-omnivore, subsisting both on animal and plant matter from its surroundings. Qayyum and Qasim (1964) reported that the adults of *O. bimaculatus* mainly feed on fishes with insects forming the secondary food item from North Indian river system. Bhuiyan and Islam (1991) reported the occurrence of fishes, crustaceans, protozoans, insects and algae in the gut of *O. pabda.* Inasu *et al.* (1997) recorded the role of pharyngeal teeth in the feeding of some native catfishes (*O. bimaculatus, Wallago attu, Horabagrus brachysoma, Mystus oculatus* and *Heteropneustes fossilis*) and indicated that all these species are feeding on live prey such as fishes, crustaceans, insects etc. and the pharyngeal teeth help in feeding live organisms. The present work agrees fully with the above report as *O. malabaricus* feed mainly on live organisms like crustaceans, insects and fishes.

The present study provides an important information on the feeding habits of endemic silurid catfish *O. malabaricus* from Chalakudy River of Western Ghats of India. The euryphagous feeding habits of *O. malabaricus* and increasing demand in local markets makes this species a potential candidate for aquaculture. Studies on captive breeding and feed formulation is essential before adopting this species in commercial scale aquaculture practices.

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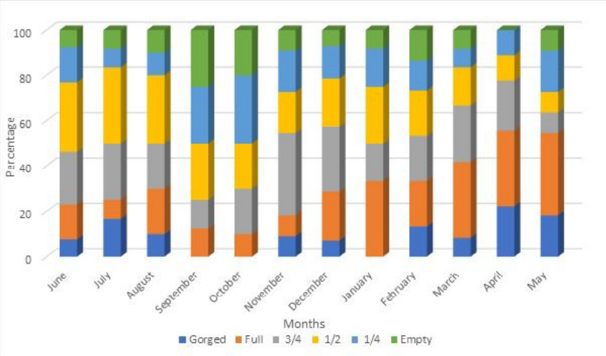

Fig. 1. Month wise feeding intensity of *O. malabaricus* from Chalakudy River

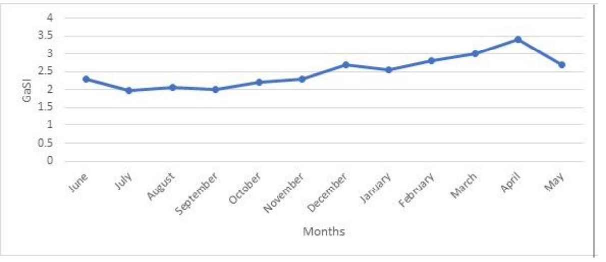

Fig. 2. Month wise estimated gastrosomatic index of *O. malabaricus* from Chalakudy River

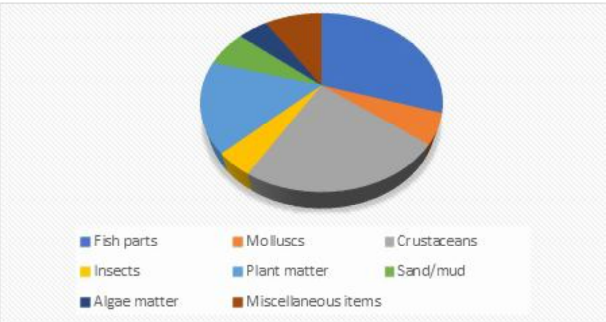

Fig. 3. Index of relative importance of different prey items of *O. malabaricus* from Chalakudy River

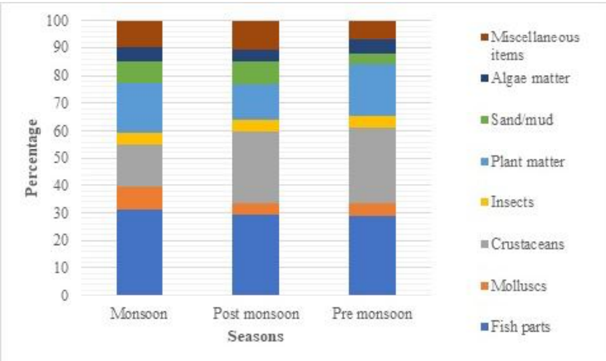

Fig. 4. Seasonal variation in index of relative importance of food items of *O. malabaricus* from Chalakudy River

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