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Food of the pearlspot *Etroplus suratensis* (Bloch) in the Vembanad Lake, Kerala

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Abstract

The food of the pearlspot, *Etroplus suratensis* in the Vembanad Lake was dominated by filamentous algae (43%) followed by detritus (35%), aquatic plants (12%), diatoms (9%) and molluscan shells (1%). Filamentous algae were the major food throughout the year. Feeding intensity was higher during premonsoon months. Well developed dentition, long intestine and other characteristics were related to dietary habits. Relative length of gut varies between 1.12 and 6.81 indicating omnivorous feeding.

Keywords: Pearlspot, Gastrosomatic Index, relative length of gut

Introduction

Knowledge on the food and feeding is helpful for successful culture of fish in extensive and intensive systems. The food and feeding habits of the pearlspot, *Etroplus suratensis* in different habitats have been studied by several authors (Jhingran and Natarajan, 1969; Devaraj *et al*., 1975; De Silva *et al*., 1984; Jayaprakas and Padmanabhan, 1985; Keshava *et al*., 1988; Keenleyside, 1991). The present study focuses on the food preference of *E. suratensis* in Vembanad wetlands.

Material and methods

Samples of *E. suratensis* were collected at fortnightly intervals from the landings of gillnet and scareline fishing, along the Vembanad lake (09°31'N and 09°41'N lat. and 76°21'E and76°26'E long.) during October 2001-December 2003. The catch and effort of these two fishing methods were recorded. A total of 595 guts (length range of fish: 13 to 33.5 cm) were examined following the procedures suggested by Windell and Bowen (1978). The guts along with contents were removed and preserved in 5% formalin. The total length and fullness of the guts were recorded. The gut was exposed and the stomach contents were analysed using the frequency of occurrence and point methods. For the frequency of occurrence, the number of stomachs containing food was quantified and expressed as a percentage of all non-empty stomachs.

The intensity of feeding was assessed based on the state of fullness of the gut and the amount of food contained in it, and categorized as empty, poor, moderate (half-full gut), full and gorged (full and dilated gut) and were represented as stage I, II, III, IV and V respectively. The Gastrosomatic Index (Ga.S.I), *i.e*., the gut weight expressed as percentage of body weight, was also calculated. The contents were isolated and identified as far as possible up to genus or family level. The stomach contents of each fish were sorted into major groups such as filamentous algae, detritus, macrovegetation etc. The Relative Length of Gut (RLG), *i.e.,* the ratio between gut length and body length, was determined following Al-Hussaini (1949).

Results and Discussion

The fishery of *E. suratensis* in Vembanad Lake extends almost for the whole year supported predominantly by two types of fishing practices *viz*., gillnetting in night hours and scareline fishing during day time. The mean value of the catch per unit effort in gillnet fishery was 2.6 kg whereas in scareline fishing it was 16.1 kg. In scarelining,

large fishes are caught from the lake bottom after scaring. The guts of 45% of such fishes were found to be in full and gorged condition.

A comparison of the catch per unit effort indicates that the contribution of *E. suratensis* in day catches is significant as compared to night catches in Vembanad Lake. De Silva *et al.* (1984) observed that *E. suratensis* is a visual feeder and hence, higher catches are possible during daytime. Haroon (1998) observed intense feeding activity by *Oreochromis* sp. during sunlight hours as compared to night hours. Apparently, the diurnal variation in catches also confirms the pattern of diurnal feeding in this species. In scareline fishing, it is believed that brooding and nesting fishes are the ones that are generally caught. Ward and Samarakoon (1981) reported that brooding individual is mostly non-foraging. However, in the present study, an analysis of the fullness of the guts showed that all fishes caught in scarelining were not brooders.

Food composition: The fish is omnivorous, feeding predominantly on filamentous algae (43%), detritus (35%) and other items such as aquatic plants, diatoms, molluscan shells etc. in small amounts (Fig.1). Most of these items occurred throughout the year. Filamentous algae which formed the primary food of *E. suratensis,* were represented by *Spirogyra* and *Oscillatoria* followed by *Lyngbia* and *Fragillaria*. Diatoms were represented mostly by *Pleurosigma, Nitzschia* and *Navicula*. Detritus and digested materials were present as a major food constituent throughout the year.

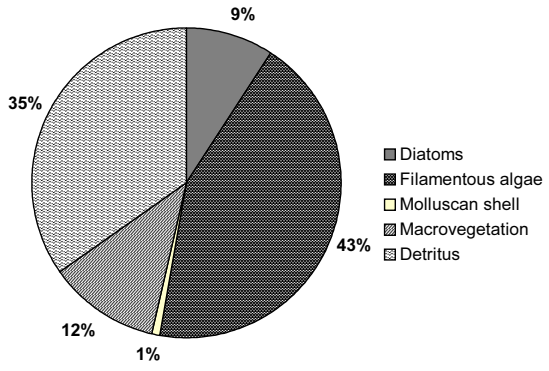

Fig. 1. Diet composition of *Etroplus suratensis* in Vembanad Lake during 2001–2003

According to Hora and Pillai (1962), the pearlspot favours bluegreen algae as food. Ward and Samarakoon (1981) reported that *E. suratensis* is a complete herbivore and De Silva *et al.* (1984) observed it as a predominant macrophyte feeder and not a complete herbivore. The high concentration of detritus in the diet of *E. suratensis* in the Vembanad Lake, as observed in the study, is indicative of its preference for detritus. Detritus play a significant role in the diet of fishes in freshwater systems (Bowen, 1981). Earlier studies also indicated preponderance of aquatic weeds followed by detritus and algae in the diet of the adult *E. suratensis* (Prasadam, 1971; Keshava *et al.*, 1988). Detritus feeders ingest good quantities of sand particles, which act as a grinding mill in the degradation of the plant matter. It appears that *E. suratensis* is predominantly an algal grazer subsisting mostly on filamentous algae and occasionally on small amount of unicellular algae. In open water cage culture experiments, the net cages stocked with *E. suratensis* were found to be devoid of mesh clogging algae and this was inferred to be due to algal browsing/scrapping by the fish (Padmakumar *et al*., 2004). In addition to algae, the fish accept a variety of food items such as copepods, cladocerans, insects and worms (Jhingran and Natarajan, 1969). Menon and Chacko (1956) considered *E. suratensis* as a bottom feeder, as the gut contents were found to contain a fair proportion of substratum materials.

Seasonal variation: The seasonal change in the abundance of food items of *E. suratensis* is a reflection of the availability of food in the environment. During premonsoon months (January - May), filamentous algae dominated the food items, whereas detritus comprising of decayed vegetable matter formed the major item during postmonsoon months (August – December) (Table 1). Submerged aquatic plant matter also formed an important ingredient of food throughout the year, constituting as high as 30% during November and 35% during

Table 1. Monthly composition (%) of food items of *Etroplus suratensis* in Vembanad Lake during 2001-03

Month	Diatoms	Filamentous algae	Molluscan shell	Macro-vegetation	Detritus
January	41.9	33.7	2.3	9.9	12.1
February	14.4	36.6	1.4	34.7	12.8
March	1.3	80.3	0.0	3.8	14.7
April	0.0	52.9	0.0	14.4	32.8
May	3.9	63.2	0.0	0.0	33.0
June	0.0	59.9	0.6	14.7	24.8
July	0.0	44.0	0.0	12.0	44.0
August	0.0	31.5	0.5	12.0	56.0
September	0.8	27.3	3.7	4.9	63.4
October	0.7	23.2	1.4	8.5	66.2
November	40.7	10.2	0.0	29.7	19.5
December	30.0	40.0	0.0	6.8	23.3

February. Low utilization of planktonic food during monsoon months may be due to its poor availability owing to high turbidity, poor photosynthesis and algal productivity. During this period, the fish appeared to subsist heavily on detrital elements abundant in the system. A sizeable reduction in the population of diatoms and algae during monsoon months is a characteristic phenomenon in these backwaters (Kurup, 1993). It may be inferred that the feeding intensity and diet composition of fish are apparently linked to the availability of food in the habitat (Bhatnagar and Karamchandani, 1970).

Feeding intensity and Gastrosomatic Index: Percentage of empty stomach (Fig. 2) indicated lowest food intake during monsoon months (June-July) coinciding with the breeding season (Jayaprakas and Nair, 1981) and intense feeding during premonsoon months. Gastrosomatic Index (Ga.S.I) varied between 3.95 and 5.70 among males and 3.40 and 6.31 among females (Table 2), but the difference between months was not significant.

Relative Length of Gut: The Relative Length of Gut (RLG) in *E. suratensis* (Fig. 3) was found to vary between 1.12 and 6.81 with a mean of 4.3. The structure of alimentary canal has a direct bearing on the food and feeding habit of the fish. The extremely long and coiled gut of *E. suratensis* indicates its adaptation for better digestion and

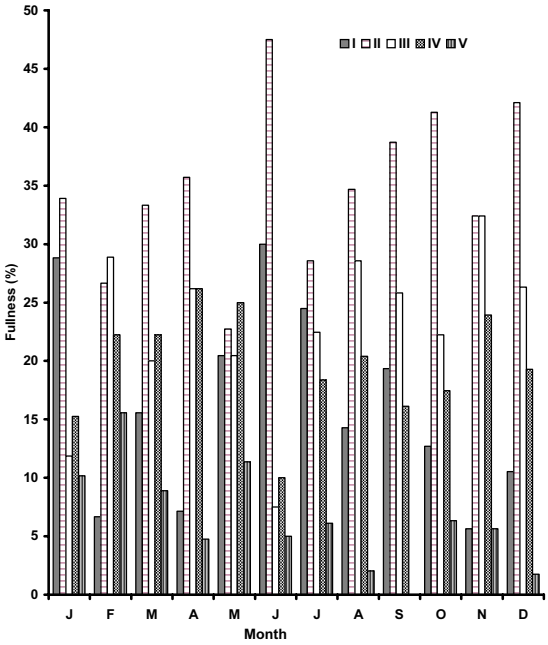

Fig. 2. Fullness of the gut of *Etroplus suratensis* in Vembanad Lake during 2001–2003 (I – empty, II – poor, III – moderate, IV – full, V – gorged)

absorption of the plant and phytoplanktonic matter (Desai, 2003; Serajuddin and Rustam Ali, 2005). Dasgupta (2004) observed that the RLG value increased with the increase of vegetable matter as food and decreased with the increase of animal matter. Generally, the length of the intestine for

Table 2. Gastro Somatic Index (Ga.S.I) of *Etroplus suratensis* collected from Vembanad Lake during 2001-2003

Month	Ga.S.I (N*=595)	
	Male	Female
January	4.26 ± 2.70	3.40 ± 1.27
February	4.92 ± 2.90	6.31 ± 4.02
March	4.82 ± 3.11	4.45 ± 3.12
April	5.10 ± 2.56	5.36 ± 3.25
May	4.12 ± 2.32	3.75 ± 1.86
June	3.95 ± 1.85	3.64 ± 2.61
July	4.63 ± 2.63	4.24 ± 2.25
August	4.17 ± 2.81	4.53 ±2.14
September	4.82 ± 2.90	4.11 ± 2.84
October	4.55 ± 2.21	5.10 ± 3.92
November	5.70 ± 2.43	4.90 ± 2.58
December	4.80 ± 2.23	4.73 ± 2.18

N* = Number examined

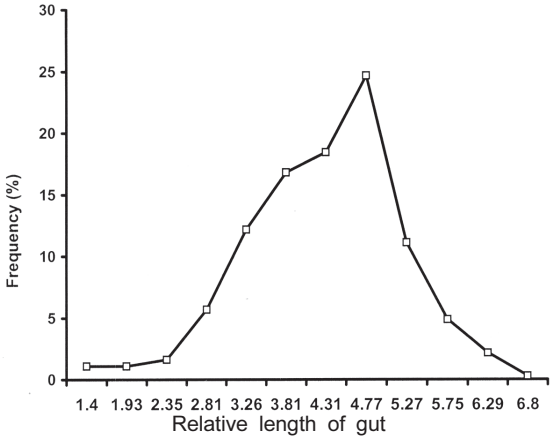

Fig. 3. Relative length of gut (RLG = ratio between gut length and body length) in *Etroplus suratensis* (N = 369)

omnivorous fishes varies between 0.7 and 4 times the length of the animal (Al-Hussaini, 1949). Jayaprakas *et al.* (1979) observed that in *E. maculatus* the length of the intestine is one and three fourth times as long as the length of the fish lending support to the omnivorous feeding habit. According to De Silva *et al.* (1984), the ratio of intestinal length to the total length in *E. suratensis* ranges from 1.02 to 4.95 in euryhaline waters and from 2.45 to 5.54 in freshwater reservoirs and these differences demonstrate the adaptability of the fish to different food.

The dental morphology, dentition and position of mouth in *E. suratensis* is characteristically adapted to its feeding (De Silva *et al.*, 1984). Apparently, the dentition of *E. suratensis* is well suited for exploitation of two major food resources abundant in the tropical, coastal lagoons (Barnes, 1980). The frontal incisiform sharp teeth are adapted for feeding on higher plants (Fryer and Iles, 1972). The pharyngeal teeth are equipped for grinding and crushing molluscan shells similar to those of the cichlid, *Haplochromis placodon* (Greenwood, 1952). The semi - circular nature of the mouth and minimum protractibility of the lips indicates the complex food capturing mechanism by nibbling or scrapping algae from a hard substrate. The selectivity and preference of different food items in different habitats establishes the flexibility of the species to adjust to diverse environmental conditions.

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