

Original Research Article

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Food and Feeding Biology of Brackish Water Fish *Epinephelus diacanthus* along the South Konkan Coast of Maharashtra, India

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ABSTRACT

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The Spinycheek grouper (*Epinephelus diacanthus*) is a marine species usually associated with rocky bottoms and reefs. Groupers are one of the most important carnivorous fishes of coral reefs, feeding mainly on the crustaceans and fishes. The present study revealed the food and feeding biology of *Epinephelus diacanthus* collected from the South Konkan coast of Maharashtra. The percentage of dietary concentration and feeding intensity was investigated from October 2017 up to June 2018. The results were promising and revealed the information on the food consumption of fishes in the study area and helped to understand the fish's feeding biology.

Introduction

The spiny cheek grouper, *Epinephelus diacanthus* (Valenciennes, 1828) is a demersal species belonging to the family Serranidae, which are commonly known as groupers, rockcods, and hamours, a group of percoid fishes in the order Perciformes. It is distributed on the continental shelf of the north-western Indian Ocean from the Gulf of Aden to Sri Lanka and Madras (India), but is not known from the Persian Gulf or the Red Sea (Heemstra and Randall, 1993), and in the eastern Indian Ocean off Thailand (Chen *et al.*, 1980; Monkolprasit *et al.*, 1997) and Hong

Kong (Ni and Kwok, 1999). In Omani waters, the spinycheek grouper occurs on mud and muddy sand bottom from very shallow waters of about 2 m deep down to 110 m (Abdelsalaam 1995). Knowledge on food and feeding biology which provide insight into feeding habit will help in devising appropriate management measures for the fishery. Similarly within the context of high culture potential of *E. diacanthus* in India understanding its biology is vital.

Materials and Methods

E. diacanthus samples were collected from the Harnai, Ratnagiri, Purngad, Vijaydurg,

Malven and vengurla fish market at monthly interval and were brought to the laboratory for analysis. The present study is based on the total of 362 individuals ranging in the size range from 80 to 190 mm total length (TL). Qualitative analysis was done as per the procedure given by (Hyslope 1980). Quantitative analysis was carried out by using gravimetric methods method. The gravimetric method consists of the estimation of the weight of each of the food items, which is usually expressed as percentages of the weight of the total gut contents as in other quantitative methods. The number of each item was recorded and expressed as a percentage of the total number of all food items in the sample studied.

Results and Discussion

Food composition

The gut content analysis indicated that crab, fishes, shrimps items formed the main food items of the species. The average proportion of the gut contents for the entire study period was crab (37.39%), fishes (31.88%), and shrimps (30.37%). It is mentioned in Table 1.

Food composition in various months

Month wise composition of food items is presented in Table 2 and Figure 1. Crab were observed in all months with peak in October (62.16%) followed by June (57.21%), November (56.21%) and the lowest quantity was found during February (22.15%). Fishes were recorded in all the months with peak in October (44.21%) followed by January (37.45%) and November (35.42%). The lowest quantity was noted during June (22.95%). Shrimps were observed in all the months with peak abundance in October (52.51%), followed by November (42.52%), April (35.54%). The lowest quantity was found during May (21.45 %).

Food composition in various size groups

Percentage composition of various food items in the stomach contents by gravimetric method of *E. diacanthus* in various size groups are given in the Table 3. Crabs were noted almost in all size groups of fishes. The maximum percentage was found in the size group 90-100 mm (36.32%) followed by 70-180 mm (29.23%) and 100-110 mm (28.75%) and lowest in the size groups of 80-90 mm (18.75%). The highest percentage of fishes was observed in the size group 180-190 mm (45.08%) while the lowest was noted in size group 90-100 mm (22.32%). Maximum amount of shrimps were encountered highest in the size group 140-150 mm (33.89%) and lowest in the size group 150-160 mm (14.49%).

Feeding intensity

Monthly variations in the fullness of stomach in *E. diacanthus* are given in Table 4 and Figure 2. During the entire study period, 17.26% of the stomachs were noted to be full, 15.32% were three quarter full, 20.80% stomach were half occupied, 17.62% were occupied up to a quarter and 28.99% were empty stomachs. The highest percentage of full stomachs were observed in June (35.75%) and November (23.65%). Maximum number of three quarter full stomachs were found in November (22.46%) and half-full stomachs in October (35.26%). November recorded the highest percentage of one quarter full stomachs. While more empty stomachs were found in February (45.20%).

The present observation on the qualitative and quantitative nature of the stomach contents suggests that *E. diacanthus* feed mainly on crab (37.39%), fishes (31.88%), and shrimps (30.37%). The present study revealed that *E. diacanthus* is a carnivorous feeder.

Table.1 Food composition of *E. dicanthus* during the study period

Food Items	Percentage
Crab	37.39
Fishes	31.88
Shrimps	30.73

Table.2 Percentage composition of food items in the stomach of *E. dicanthus* from October 2017 to June 2018

Food Items	October	November	December	January	February	March	April	May	June
Crab	62.16	56.21	28.21	31.19	22.15	23.07	25.04	31.26	57.21
Fishes	44.21	35.42	29.15	37.45	32.38	24.44	34.15	26.78	22.95
Shrimps	52.51	42.52	26.00	22.41	26.65	24.48	35.54	21.45	25.00

Table.3 Percentage composition of food items in the stomachs of *E. dicanthus* in various size groups from Oct. 2017 to Jun. 2018

Size groups in (cm) TL	Crab	Fishes	Shrimps
80-90	18.75	41.16	15.54
90-100	36.32	22.32	22.73
100-110	28.75	33.82	19.45
110-120	21.80	36.78	26.64
120-130	21.58	25.79	31.58
130-140	20.42	22.53	32.00
140-150	21.67	27.98	33.89
150-160	25.45	42.00	14.49
160-170	22.41	42.73	18.95
170-180	29.23	35.15	18.39
180-190	19.68	45.08	18.79

Table.4 Month wise distribution of degree of feeding intensity of *E. dicanthus*

Month	Full %	3/4 %	1/2 %	1/4 %	Empty %
October	22.94	11.57	35.26	27.15	40.12
November	23.65	22.46	28.31	31.28	36.21
December	11.27	14.25	13.22	12.41	23.28
January	12.04	15.45	15.45	15.20	15.35
February	11.45	14.12	17.23	13.58	45.20
March	13.47	12.25	15.68	12.01	40.10
April	11.24	17.86	18.45	11.24	28.15
May	13.55	13.28	16.55	14.25	16.00
Jun	35.75	16.65	27.05	21.46	16.52

Fig.1 Food composition in various months

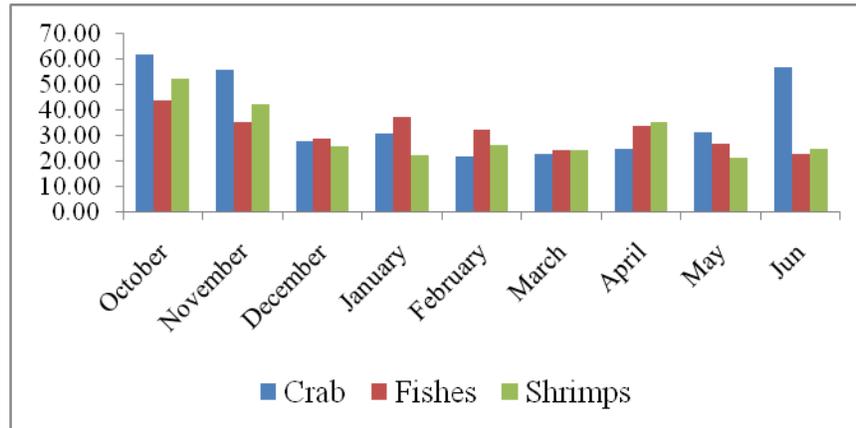
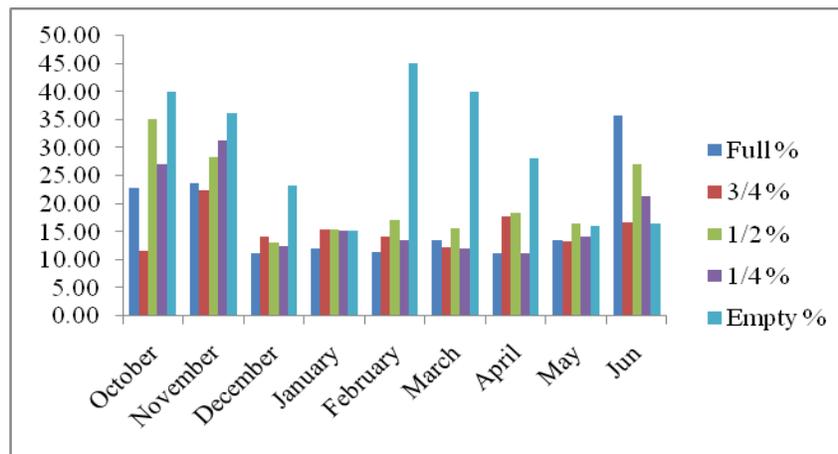


Fig.2 Feeding intensity



The food of *E. diacanthus* was dominated by crabs, fishes and shrimps. It indicated that those species were available abundantly throughout the season. *E. diacanthus* is a demersal fish in the South West Coast of India, which prefers to live on rocky habitats and as such they are abundant in the Wadge Bank, Quilon Bank and Gulf of Mannar. Here the sea bottom is mostly rocky without crops of rocks forming ideal habitats for grouper.

Major food items for *E. diacanthus* were reported to be crabs, fishes and shrimps during most of the months. As Smith (1961) observed in other groupers, *E. diacanthus* also swallows its food without chewing it and so it was fairly easy to identify the organisms present in the fish

feeds by Sight Job (1940) observed that even the disposition of the mouth of perches like *E. tauvinais* more suited for browsing and pecking off food from the ground. Premalatha (1989) studied the food habits of *E. aereolatus*, *E. chlorostigma*, *E. bleekeri* and *E. diacanthus* and reported that the diet composition of *E. aereolatus* was mainly small crustaceans; fish scales and cuttle bones were also met with in them.

In the present study of *E. diacanthus* consumed size groups the crabs ranged from 90 to 180 mm size groups. Fishes were found in sizes which ranged from 90 to 190 mm size groups. Shrimps were about 140 to 160mm size groups respectively. The highest percentage of full

stomachs in *E. diacanthus* was noted during the month of June, October and November in the present study. The highest percentage of empty stomachs was seen in the month of October to February. Investigations on the food and feeding habits will throw more light on the migratory and shoaling habits of pelagic species of fish and it is particularly important for a species of high commercial value such as the grouper.

It is concluded that *E. diacanthus* is a carnivore mainly feeding on crabs, fishes and shrimps.

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