FOOD AND FEEDING HABITS OF *OTOLITHES RUBER* (SCHNEIDER) AT CALICUT

K. V. SOMASEKHARAN NAIR

Calicut Research Centre of Central Marine Fisheries Research Institute, Calicut

ABSTRACT

The food and feeding habits of *Otolithes ruber* from the inshore fishing grounds off Calicut were studied. No regular periodicity in feeding was observed. The young ones feed mainly at the surface on *Acetes* and mysids, while the adult fish feeds at the bottom chiefly on prawns and teleosts. The variations in the food composition are discussed in relation to different size groups, seasons and environmental biota.

INTRODUCTION

Otolithes ruber is one of the commonest species among the small sciaenids, collectively termed locally 'Korakkutty,' constituting the sciaenid fishery of the Malabar coast. No detailed studies have been undertaken on the food and feeding habits of the species from Calicut waters, excepting for a brief mention by Venkataraman (1960). Some information on the feeding habits of the species is also available from the works of Jacob (1948), Chacko (1949), Vaidya (1960) and Suseelan and Nair (1969).

MATERIALS AND METHODS

The material for the study was collected by random sampling from the commercial catches at Vellayil fish landing centre, and from the experimental departmental *paithuvala* catches at West Hill during the period 1970 to 1974.

Of each sample, after noting the total length of the individual fish, the stomach was preserved in 5% formalin for further analysis. The intensity of feeding was determined based on the degree of distension of the stomach wall and the amount of food contained in it and were classified as gorged, full, ¾ full, ½ full, ¼ full, trace and empty. The food of the species was analysed by volumetric displacement method and points (volumetric) method (Hynes 1950, Pillay 1952). The data collected were graded according to the index of preponderance (Natarajan and Jhingran 1961).

RESULTS

Feeding indensity

The fish was considered actively fed when the stomachs were gorged, full and ¾ full, moderately fed when ½ full and poor when ¼ full and trace.

In order to see whether there is any seasonal variation in feeding intensity a monthly analysis of the data was attempted, the results of which are given in table 1. The predominance of poorly fed fish in almost all the months of observation ruled out any seasonal intense feeding activity of the species. The percentage of empty stomachs also was high and showed no regular periodicity. The intensity of feeding of the fish in relation to different size groups is given in table 2. The percentage of actively feeding fish was higher in smaller size groups than in higher size groups; while the percentage of fishes with poor feeding activity generally increased with the length of the fish. The occurrence of empty stomachs was also higher in fishes of higher length groups.

Food composition and seasonal variation in food

The relative importance of the different food organisms is given in figure 1 (A). Prawns formed the most important item, followed by teleosts,

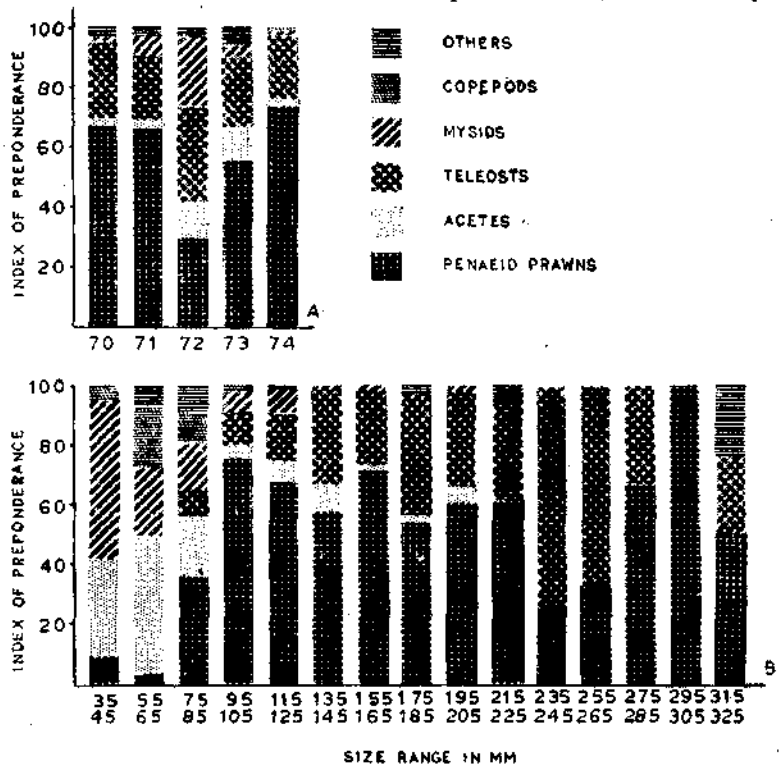

FIG. 1. A Index of preponderance of food items in different years in *O. ruber* during 1970-74. B. Index of preponderance of food items in different size groups of *O. ruber*.

TABLE 1. *Intensity of feeding in* Ootolithes ruber *in percentage in different months during* 1970-74.

	Intensity of feeding	*Jan.*	*Feb.*	*Mar.*	*Apr.*	*May*	*Jun.*	*Jul.*	*Aug.*	*Sep.*	*Oct.*	*Nov.*	*Dec.*
1970	Active.	25.12	8.38	15.78	14.28	——	——	27.27	62.50	——	4.76	9.09	12.50
	Moderate	20.80	8.33	15.78	9.52	——	——	——	——	——	14.28	9.09	25.00
	Poor.	33.28	50.02	36.82	19.04	37.50	——	27.27	25.00	33.32	14.28	18.18	31.25
	Empty.	20.80	33.32	31.62	57.16	62.50	——	45.46	12.50	66.68	66.68	63.64	31.25
1971	Active.	22.56	17.76	8.32	7.68	6.51	33.34	——	26.64	80.00	——	——	13.32
	Moderate	7.52	13.32	12.48	7.68	17.36	——	3.70	6.66	——	——	50.00	53.38
	Poor.	35.72	53.38	66.72	42.32	58.77	66.66	14.80	26.64	20.00	33.33	50.00	26.64
	Empty.					17.36	81.50	81.50	40.06	——	66.67	——	6.60
1972	Active.	9.36	18.56	23.04	46.72	11.90	——	12.24	26.64	——	——	——	75.00
	Moderate	21.84	13.92	7.68	26.64	11.90	——	10.20	19.98	50.00	——	——	——
	Poor.	40.56	25.52	33.28	——	45.22	——	——	——	——	——	——	25.00
	Empty.	28.24	42.00	36.00	26.64	30.98	100.00	55.12	53.38	50.00	——	——	——
1973	Active.	33.33	33.33	7.69	——	8.00	41.65	2.94	——	——	——	42.72	38.08
	Moderate	11.11	33.33	——	——	52.00	16.70	14.70	——	——	——	21.42	6.88
	Poor.	55.56	——	42.84	——	4.00	——	——	——	——	——	7.14	20.64
	Empty.	——	33.34	49.47	——	36.00	41.65	82.36	——	——	——	28.72	34.40
1974	Active.	18.18	4.76	10.71	10.00	10.00	——	25.00	——	——	——	——	34.05
	Moderate	18.18	14.28	17.85	30.00	10.00	——	——	18.18				
	Poor.	9.09	42.82	46.44	30.00	50.00	——	25.00	18.18	——	——	——	15.89
	Empty.	54.55	38.14	25.00	30.00	30.00	——	50.00	63.64	——	——	100.00	36.44

TABLE 2. *Intensity of feeding in* Otolithes ruber *in percentage in different size groups during* 1970-74.

Indensity of feeding	*Size groups in mm.*											
	35	45	55	65	75	85	95	105	115	125	135	145
Active.	66.66	50.00	39.46	46.08	5.70	28.93	18.26	24.90	21.58	25.20	22.08	20.64
Moderate	——	20.00	19.98	19.20	28.50	18.41	21.98	16.60	9.96	16.38	12.48	20.64
Poor.	——	20.00	13.32	15.52	37.30	28.93	29.88	34.86	36.52	31.50	28.98	18.92
Empty	33.34	10.00	26.29	19.20	28.50	23.73	29.84	23.64	31.94	26.92	43.36	39.80
	155	165	175	185	195	205	215	225	235	245		
Active.	9.80	17.93	2.38	9.72	6.51	26.46	8.10	4.00	7.69	14.29		
Moderate.	11.20	13.04	16.66	12.15	15.19	5.88	18.90	8.00	7.69	——		
Poor.	32.20	32.60	26.18	21.87	30.38	14.70	37.80	36.00	15.38	14.29		
Empty.	46.80	36.43	54.78	56.26	47.92	52.96	35.20	52.00	69.24	71.42		
	225	265	275	285	295	305	315	325	335	345		
Active.	——	——	——	——	——	——	——	——	——	——		
Moderate.	14.29	20.00	——	——	——	——	25.00	——	——	50.00		
Poor.	14.29	20.00	22.27	33.34	33.34	40.00	25.00	50.00	——	——		
Empty	71.42	60.00	77.73	66.66	66.66	60.00	50.00	50.00	100.00	50.00		

mysids and copepods. The other items met with in small quantities were decapod larvae, amphipods, crabs, Squilla, *Lucifer*, chaetognaths and molluscs.

In order to understand the seasonal fluctuations of the different food items, the index of preponderance of the various food items for the different months were calculated and are presented in figure 2.

Prawns: Prawns formed the dominant food element in almost all the months of observation. The dominant species of prawns in the diet was *Parapenaeopsis stylifera*. Other species met with in the diet were *Penaeus indicus, Parapenaeopsis acclivirostris, Metapenaeus affinis, M. dobsoni,* and *Acetes* sp.

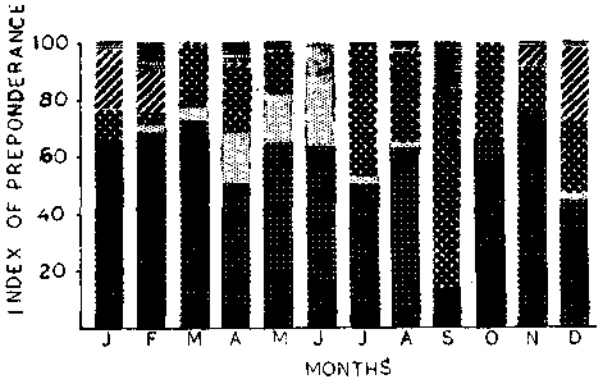

FIG. 2. Index of preponderance of food items in different months in the stomach of *O. ruber* during 1970-74.

Teleosts: Teleosts ranked second in almost all the months, the common species observed being *Anchoviella* sp. followed by *A. heteroloba, Leiognathus* sp., *Bregmaceros mcclellandi, Engraulis mystax, Trypauchen vagina, Otolithes ruber, Johnius* sp., *Trichiurus* sp. and *Cynoglossus* sp.

Mysids and copepods: Mysids formed a significant part of the diet in January, February, April, May and December.

Variation in food in relation to different size groups:

The index of preponderance of the food items in relation to different size groups is given in figure 1 (B). Prawns were the most important item, and occurred in almost all size groups; at smaller size groups, the prawn component was constituted by *Acetes* sp. and small-sized penaeids, where as, at higher size groups the prawns were represented mostly by *B. stylifera,* and *M. dobsoni*. Teleosts were represented in all size groups from 75 mm onwards and though there was slight fluctuations the general trend noticed was an increase in the index with increase in size. Copepods occurred in fishes up to 115-125 mm and

it formed a significant part of the diet in small size groups. Other items of food occurred only in negligible quantities.

Discussion

The young ones of *O. ruber* were found to be largely feeding on zooplankton and pelagic animals at surface, with a gradual change over to a predacious and carnivorous habit, feeding mainly on teleosts and prawns at bottom with increase in size. Jacob (1948) and Chacko (1949) observed that the fish is carnivorous and predacious at surface and midwaters feeding with help of its conspicuous canines. Venkataraman (1960) reported that the fish is mainly a carnivore, teleosts foming the major item of its food. According to Vaidya (1960) the postlarvae and juveniles are surface plankton feeders and the adult carnivorous feeding on crustaceans, teleosts and cephalopods. Suseelan and Nair (1969) reported the fish to be an active carnivore, prawns and teleosts forming the major constituents of the diet. Most of present findings are in concurrence with the earlier observations made on the food of the species. However, in the present investigation no regular fluctuations in the feeding intensity was observed as reported by Vaidya (1960) and Suseelan and Nair (1969) from Bombay waters.

In order to understand the relationship if any, between the ocurrence of the food organisms in the environment and that in the gut, and also to ascertain whether there is any selectivity in feeding in the species, the data of Bhimachar and Venkataraman (1953), George (1953), Seshappa (1953), Seshappa and Bhimachar (1955) and Mukundan (1967) have been used. The main species of prawns and fishes observed in the demersal catches of inshore areas, as observed from the departmental boat-seine (*Paithuvala*) collections, were *P. stylifera, M. dobsoni, M. affinis, P. indicus, Cynoglossus macrostomus, Anchoviella heteroloba, A. tri, Ambassis gymnocephalus,* and *Polynemus indicus* in the order of abundance. In the diet of the fish *P. stylifera,* and *M. dobsoni* dominated among prawns and *Anchviella* sp. and *A. tri* among fishes, thus showing a direct correlation between the availability of the food organisms in the environment and their occurrence in the gut. However, the occurrence of *Cynoglossus macrostomus,* an abundant group in the inshore demersal fish catch, in the gut in very minute quantities is significant which indicates that the fish normally feeds at a level slightly above the bottom. Copepods, which form the most dominant zooplankton group in the Calicut inshore zooplankton (George 1953, Mukundan 1967) were observed in fairly good quantities in some seasons, especially in the gut of juveniles.

Acknowledgements

My thanks are due to Dr. E. G. Silas for his keen interest in these investigations. I am thankful to late Dr. K. V. Sekharan and Shri. T. Tholasilingam for critically going through the paper and giving helpful suggestions.

REFERENCES

BHIMACHAR, B. S. AND G. VENKATARAMAN. 1952. A preliminary study of the fish populations along the Malabar coast. *Proc. Nat. Inst. Sci. India.* 18 (6): 627-655.

GEORGE, P. C. 1953. The marine plankton of coastal waters of Calicut with observations on the hydrological conditions. *J. Zool. Soc. India.*, 5(1): 76-107.

HYNES, H. B. N. 1950. The food of some fresh water stickle backs (*Gasterosteus aculeatus* and *Pygosteus pungitius*) with a review of methods used in the studies of the food of fishes. *J. Anim. Ecol.* 19: 26-58.

JACOB, P. K. 1948. Sciaenids of the west coast of Madras Province. *J. Bombay. nat. Hist. Soc.*, 48(1): 118-124.

MUKUNDAN, C. 1967. Plankton of Calicut inshore waters and its relationship with coastal pelagic fisheries. *Indian. J. Fish.* 14(1):271-292.

NATARAJAN, A. V. AND A. G. JHINGRAN. 1962. Index of preponderance - a method of grading the food elements in the stomach analysis of fishes. *Indian J. Fish.*, 8(1): 54-59.

PILLAY, T. V. R. 1952. A critique of the method of study of food of fishes. *J. Zool. Soc. India.* 4: 185-200.

SESHAPPA, G. 1953. Observations on the physical and biological features of the inshore sea bottom along the Malabar coast. *Proc. Nat. Inst. Sci. India.* 19: 257-279.

SESHAPPA, G. AND B. S. BHIMACHAR. 1975. Studies on the fishery and biology of the Malabar sole *Cynoglossus macrostomus* Day. *Indian. J. Fish.* 2: 180-230.

SUSEELAN, C. AND K. V. SOMASEKHARAN NAIR. 1969. Food and feeding habits of the demersal fishes off Bombay. *Indian J. Fish.*, 16(1 & 2): 56-74.

VAIDYA, V. M. 1960. A study on the biology of *Otolithes ruber* (Bl & Schn). *M. Sc. Thesis. University of Bombay.*

VENKATARAMAN, G. 1960. Studies on the food and feeding relationships of the inshore fishes off Calicut on the Malabar coast. *Indian. J. Fish.* 7: 275-306.