

## Food and feeding habits of *Decapterus russelli* (Ruppell, 1830) along the Malabar coast

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### ABSTRACT

Study on the food and feeding habits of *Decapterus russelli* showed that it is a carnivore, subsisting mainly on crustaceans, fishes, polychaetes, salps, molluscs and miscellaneous items. Crustaceans were the most dominant item in different size groups. The fish showed preference to other food fishes as they grew. The intensity of feeding was high during most of the months. Feeding intensity was high in juveniles followed by immature, maturing and spent fishes.

Study on the food and feeding habits of fishes is important to understand their position in the food web in an ecosystem. In view of its importance, considerable attention is being paid to this subject in recent years.

*Decapterus russelli* is an important resource along the Indian coast. Vekataraman (1960), Basheeruddin and Nayar (1962), Sreenivasan (1979), Raje (1997) and Reuben *et al.* (1992) have reported the food and feeding habits of *Decapterus* spp. Nair (2000) has summarised the work done on food and feeding habits of *D. russelli* from different parts of India. However, a detailed study on the food and feeding habits of this species from Malabar region is not available.

Random samples of *D. russelli* collected at weekly intervals during 2001 - 2002 from Puthiappa and Bey pore formed material for this study. A total of 4413 specimens in the length range of 92-248 mm were analysed. The biological details such as length, maturity stages and food and feeding conditions were examined. The intensity of feeding was determined based on the degree of distension of the stomach and the volume of food

contained in it. The stomachs were classified as heavily fed (gorged, full and  $\frac{3}{4}$  full), moderately fed ( $\frac{1}{2}$  full and  $\frac{1}{4}$  full) and poorly fed (trace and empty). The food of the fish was analysed by index of preponderance (Natarajan and Jhingran, 1961). Since there was not much difference in the food and feeding habits of male and females, the data on both the sexes were combined.

The main food items in the diet of this species were crustaceans, fishes, molluscs, polychaetes, salps and miscellaneous items (Fig.1).

**Crustaceans:** Crustaceans were present in the gut throughout the year and the average index of preponderance was 55.7 and ranked as the most important item of food. The highest index was observed in November (68.4) and lowest in March (33.6). The crustaceans in order of abundance were represented by prawns, *Acetes* spp., *Lucifer* spp., amphipods, squilla (*Oratosquilla* spp.), copepods (*Acrocalanus* spp. and *Calocalanus* spp.), mysids and larvae of crabs.

**Fishes:** Fishes (24.2) formed the second dominant food item of *D. russelli* in almost all

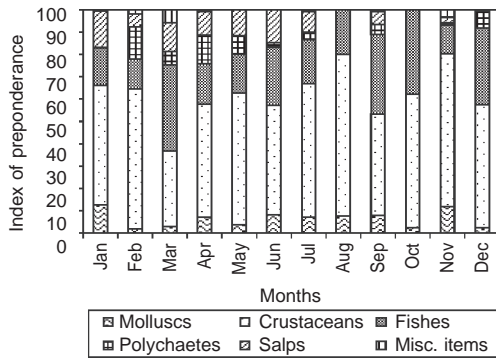


Fig. 1. Index of preponderance of food items in *D. russelli* during different months

the months. Maximum index was in March (38.6) and minimum in November (12.8). *Leiognathus bindus*, *Secutor insidiator*, *Johnieops sina*, *Johnius belangerii*, *J. macropterus*, *Encrasicholina devisi*, *Stolephorus waitei*, *S. indicus*, *Lactarius lactarius*, *Sphyaena obtusata* and fish larvae formed the food fishes of this species.

**Polychaetes:** Polychaetes (4.9) were present in small quantities in most of the months and was represented by *Nereis* spp. Its index was high during January-May (8.1) and least in December (1.2).

**Salps:** The index value of salps was 7.4 and it ranged from 0.5 (December) to 16.3 (January).

**Molluscs:** The average value of index of preponderance for molluscs was 6.3. This diet was constituted by squids, cuttle fishes, bivalves and gastropods which were present in the gut throughout the year.

**Miscellaneous items:** The intake of miscellaneous items indicated that they were not present in all the months. Average index for the study period was 1.4. Maximum index was observed in November (5.9) and minimum in June (0.1). Isopods, ostracods and unidentified food materials were included in this group. Of these, ostracods formed the predominant item, isopods being next in importance.

*Food in relation to length*

Analysis of food items in relation to size of the fish showed that crustaceans were preferred by all length groups (Fig 2). Up to a size of 220-229 mm, crustaceans were the dominant food item. Fishes were absent in the stomach content of the juveniles.

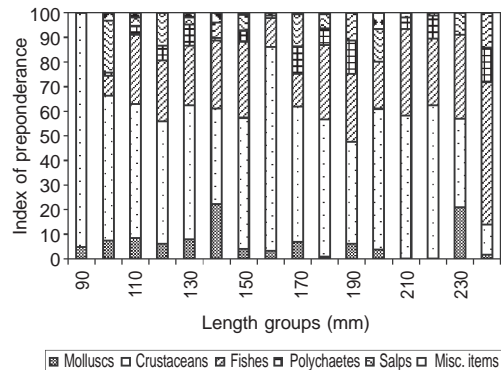


Fig. 2. Index of preponderance of food items in relation to different length groups in *D. russelli*

Salps were present in the stomach from 100 mm onwards. The indices of salps ranged between 3.17 (100-110 mm) and 6.6 (200-209 mm) and in large size groups it occupied only a negligible portion (0.5). In general, as the fish grows, the intake of salps were found to be increasing in fish up to a size of 200-209 mm. The polychaetes were present in the gut from 100-109 mm size fish onwards and the intake of polychaetes was found increasing as fish grows. The index of preponderance of molluscs in the stomach ranged from 0.9 (180-189 mm) to 24.5 (230-240 mm). The miscellaneous items were present in the fishes of 100-110 mm to 200-209 mm.

*Feeding intensity*

Fishes with heavily fed, moderately fed and poorly fed stomachs were observed during most of the months and the average contribution of fishes in these feeding conditions was 34.7%, 41.8% and 23.5% respectively (Table 1). Presence of fishes with heavily fed and moderately fed stomachs during most of the

TABLE 1: Monthly feeding condition (%) of *D. russelli* along the Malabar coast

Months	No. of specimens examined	Heavily fed	Moderately fed	Poorly fed
January	508	56.5	33.3	10.1
February	338	45.3	45.5	9.2
March	470	38.9	40.0	21.1
April	290	42.6	42.4	15.0
May	538	11.8	41.3	46.8
June	308	32.4	31.1	36.5
July	212	45.1	27.6	27.3
August	182	32.8	55.3	11.8
September	364	7.1	60.8	32.1
October	339	59.3	21.7	19.1
November	418	8.9	52.6	38.4
December	446	35.2	50.0	14.8
Average		34.7	41.8	23.5

months indicates that it is an active feeder. Poorly fed fishes had high occurrence during January-February and August. The feeding condition of juveniles, immature, maturing, mature and spent fishes is given in Fig 3. The feeding intensity was found to be more in all the fishes except in mature fishes.

The composition of food items of *D. russelli* of Malabar coast revealed that crustaceans and fishes dominated as the first and second main food item in the order irrespective of sex, maturity or season, though their volume varied in the gut contents of

different length groups. Intake of crustaceans appeared to have relation with the size of the fish. As the fish grows, it was showing preference for fishes as their principal diet.

Salps were preferred by *D. russelli* as third item of food and found in the stomach from 110-119 mm to 200-209 mm. The month-wise variations in the feeding of salps indicate that maximum intake of this item was in January-June. Molluscs were present in highest percentage in the smallest length groups.

Although no pronounced difference was noticed in season-wise feeding intensity, a gradual decrease was observed from post-monsoon to pre-monsoon seasons.

From the above, it is clear that *D. russelli* exhibit a general uniformity of habits and are carnivorous showing primary preference to crustacean diet. With the increase in their size they gradually supplement it with fish. Food items such as polychaetes, molluscs, salps and miscellaneous items formed insignificant proportions of the food spectrum. Studies on *D. russelli* from Indian waters indicated that they are carnivores feeding predominantly on crustaceans and fishes (Vekataraman, 1960; Basheeruddin and Nayar, 1962; Sreenivasan, 1979; Sivakami, 1996; Rajee,

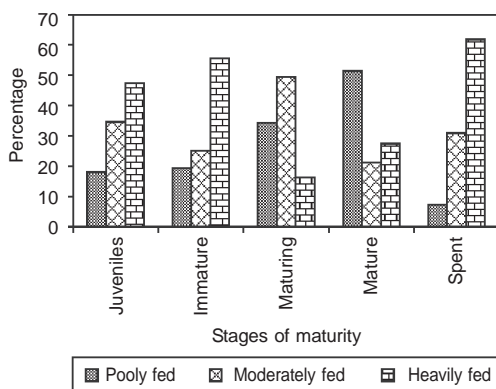


Fig. 3. Feeding intensity of *D. russelli* in relation to different stages of maturity

1997 and Nair, 2000). Squids and cuttlefishes represented the molluscan component in *D. dayi* (Sreenivasan, 1979).

Basheeruddin and Nayar (1962) and Sreenivasan (1979) observed similar trend in *D. russelli* where the planktonic crustaceans formed the main diet in smaller groups and it was replaced by fishes in higher size groups. Devaraj *et al.* (1997) too reported that juveniles of *D. russelli* of 4-12 cm size from the Indian waters fed on *Acetes* spp., copepods and other crustaceans. Magnuson and Heltz (1971) explained that the change in food pattern is dependent on the area of filtration formed by the gill apparatus. In smaller organisms, gill rakers are closely set with small gaps in between and smaller organisms only are sieved, whereas in larger fishes with comparatively larger gaps in between the gill raker, only larger organisms are retained. Moreover, Sreenivasan (1979) has concluded that the smaller fishes cannot move so swiftly to prey upon fast moving organisms and therefore need to rely on plankton. This increase in the number of food items has an adaptive significance in utilizing the food available for survival, whenever the availability of preferred food items is limited. As observed by the previous workers, the present observations also revealed that, with the increase in size, the variety of food items taken by the fish is narrowed, but the particle size of the feed increases. With the increase in size, it shows an affinity towards the column feeding. The preferential feeding on different food items in different size groups may be explained as avoiding direct competition and also because of the rich oil content available in the planktonic crustaceans which is essential for the development of gonad in the sub adult stage (Sivakami, 1996).

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