

FOOD AND FEEDING HABITS OF *ATROPUS ATROPOS* FROM MANGALORE COAST

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ABSTRACT : The study deals with nature and composition of food items, feeding habits, intensity of feeding of *Atropus atropos* from Mangalore region. Analysis of the gut content in both sexes showed that, *Acetes spp.* and semi-digested matter formed the major food items. Fish juveniles, teleosts, cephalopods and copepods also occurred in considerable quantity. The gut content consisted approximately 11.9% fish juveniles, 7.35% teleosts, 25.97% *Acetes spp.* 15.33% cephalopods, 10.66% copepods and 42.18% semi-digested matter during the period 2015- 16. The gut content consisted approximately 10.11 % fish juveniles, 7.97 % teleosts, 27.1% *Acetes spp.* 13.32% cephalopods, 7.7% copepods and 42.98% semi-digested matter during the period 2016 - 17. The present study indicates that *Atropus atropos* is a carnivorous feeder. The active feeding was noticed in most of the months.

Key words : Food and feeding habits, *Atropus atropos*, Mangalore region.

INTRODUCTION

Food is an important factor in the life of fishes for growth, reproduction, maintenance and migration. Variations in the seasonal and diurnal abundance of the favorite food organisms of different fin- and shellfishes of a region may positively influence the movement of the fish stocks. Hence, the study of food and feeding habits becomes imperative to understand the relationship between the fish and food organisms to predict exploitable fishery potential of that region.

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 Mangalore region is not available, which is locally known as "kurchi" (Mangalore) occurred in small quantities in the commercial catches throughout the year. It is an important component from the pelagic catches of Dakshina Kannada coast.

MATERIALS AND METHODS

Fortnightly samples were collected from the Mangalore main fish landing center. A total of 1601 individuals consisting of 704 males, 897 females were used for the study. The methods of Hynes (1950) and Pillay (1952) were followed for qualitative estimation of food items. Feeding intensity in various months was studied by the degree of fullness of the stomach in relation to size of the fish. The fullness of the stomach was classified as full, $\frac{3}{4}$ full, $\frac{1}{2}$ full, $\frac{1}{4}$ full, little (containing traces of food) and empty when practically the stomach did not contain any food. Fishes with full stomach and $\frac{3}{4}$ full were considered to have been feeding actively. Similarly, stomachs with $\frac{1}{2}$ full, $\frac{1}{4}$ full and little were considered to denote poor feeding.

RESULTS AND DISCUSSION

The composition of food components is presented in the Tables 1 A & B. Analysis of the gut content in both sexes showed that, *Acetes spp.* and semi-digested matter formed the major food items. Fish juveniles, teleosts, cephalopods and copepods also occurred in considerable quantity. The gut content consisted approximately 11.9% Fish juveniles, 7.35% teleosts, 25.97% *Acetes spp.* 15.33% cephalopods, 10.66% copepods and 42.18% semi-digested matter during the period 2015-16.

The most important food item observed in the gut content was *Acetes spp.* (25.97%) was recorded in all

the months except August with peak in March (47.7%) and February (38.9%) followed by November (27.1%). The lowest quantity of this item was found during May (6.5%). Semi-digested matter (42.18%) formed the bulk of the stomach content next to *Acetes* spp. The maximum quantity was recorded in the month of May (74.2%) followed by October (57.4%) and January (49.4%). The lowest quantity was recorded in the month of December (18.2%). Cephalopods (15.33%) were another important food items next to *Acetes* spp. and semi-digested matter. They were recorded throughout the study period except in the month October, December, March and May. Maximum quantity was recorded in the month of April (31%) followed by September (26.5%), while it was lowest in the month of February (2.1%). Fish juveniles (11.9%) were recorded in all the months. Highest quantity was recorded in the month of January (20.7%) followed by December (15.6%) and May (14.7%). Lowest quantity was recorded during March (5.7%). Teleosts (7.35%) were slightly larger in size and could be identified. Highest percentage of telosts were recorded in March (16.3 %) and August (15.2%). Lowest percentage in the month of December (2.2%) and January (2.9%). Copepods (10.66%) were recorded only in the months of August, September and March with a peak in the month of August (19.1%) and lowest percentage in the month of March (3.3%).

During August, 2016 – May, 2017 period

The Qualitative and quantitative analysis of gut contents of *Atropus atropos* during August, 2016 – May, 2017 showed more or less similar trend as that of previous year (August, 2015 – May, 2016). Analysis of the gut content in both sexes showed that, *Acetes* spp. and semi-digested matter formed the major food items. Fish juveniles, teleosts, cephalopods and copepods also occurred in considerable quantity.

The gut content consisted approximately 10.11 % fish juveniles, 7.97% teleosts, 27.1% *Acetes* spp. 13.32% cephalopods, 7.7% copepods and 42.98% semi-digested matter.

Acetes spp. (27.1%) was recorded in all the months with peak in December (70.3%) and followed by March (49.6%). The lowest quantity of this item was found during August (3.1%) and May (7.1%). Semi-digested matter (42.98 %) formed the bulk of the stomach content next to *Acetes* spp. The maximum quantity was recorded in the month of May (76.3%) followed by August (60.9%) and October (60.8%). The lowest quantity was recorded in the month of December (16.5%). Cephalopods (13.32%) were another important food items next to

Acetes spp. and semi-digested matter. They were recorded throughout the study period except in the month October, December, March and May. Highest percentage was recorded in the month of April (30.7%) followed by January (24.4%), while it was lowest in the month of August (3.3%). Fish juveniles (10.11%) were recorded in all the months. Maximum quantity was recorded in the month of January (15.9%) and March (15.9%) followed by December (10.5%) and May (9.9%). Lowest quantity was recorded during August (5.3%). Teleosts (7.97%) were slightly larger in size and could be identified. Highest percentage of telosts were recorded in August (19.7%) and September (15.5%). Lowest percentage in the month of December (2.7%) and January (2.9%). Copepods (7.7%) were recorded only in the months of August September, January, February and March with a peak in the month of March (13.2%) and lower percentage in the month of February (2.9%).

Raje (1994) reported on food and feeding habits of *Atropus atropos* from Veraval coast. Empty stomachs were evident in most of the months and low feeding intensity appears to be associated with breeding period during certain months. This species is pelagic, carnivorous feeder. The food items found in gut, in the order of preference were *Acetes* spp., Cephalopods, teleosts, copepods and *Squilla* spp.

Raje (1997) reported on the food and feeding habits of *D. russelli* from Veraval coast. *D. russelli* spp is a pelagic carnivore, feeding mainly on sergestids (*Acetes* spp) followed by fish of *Apogon* spp., *Myctophum* spp. and molluscs. Similar observation was made by Das *et al* (2014) in *Megalaspis cordyla*.

Feeding intensity

The stomach contents of sample collected for the study of food and feeding were classified depending on their relative fullness into full, $\frac{3}{4}$ full, $\frac{1}{2}$ full, $\frac{1}{4}$ full, little and empty. Fishes with full, $\frac{3}{4}$ full and $\frac{1}{2}$ full were considered to have actively fed, whereas those with $\frac{1}{4}$ full, little and empty as poorly fed. Data on the percentage occurrence of these categories are presented in Tables 2A, 2B.

The percentage occurrence of stomach in various degree of fullness during August, 2015 – May, 2016. are presented in Table 2 A.

It can be from the table that, the proportion of fish which had actively fed was the highest in March (57.81%) followed by January (47.19%) and October (44.66%). Poor feeding was observed in the month of May (52.13%) followed by September (40.11%) and October (36.34%). The percentage of empty stomachs fluctuated in all the

Table 1 A : Qualitative and quantitative composition (percentage) of gut content of *Atropus atropus* (August, 2015 - May, 2016).

Months /Gut content	Aug.15	Sep.	Oct.	Nov.	Dec.	Jan.'16	Feb	Mar.	Apr.	May	Pooled
Fish juveniles	9.3	7.5	13.6	13.2	15.6	20.7	9.8	5.7	8.9	14.7	11.9
Teleosts	15.2	3.9	5.6	3.1	2.2	2.9	7.6	16.3	12.1	4.6	7.35
<i>Acetes</i> spp.	0.0	24.7	23.4	27.1	62.0	21.5	38.9	47.7	7.9	6.5	25.97
Cephalopods	17.3	26.5	-	9.6	-	5.5	2.1	-	31.0	-	15.33
Copepods	19.1	9.6	-	-	-	-	-	3.3	-	-	10.66
Semi -digested matter	39.1	27.8	57.4	47.0	18.2	49.4	41.6	27	40.1	74.2	42.18

Table 1 B : Qualitative and quantitative composition (percentage) of gut content of *Atropus atropus* (August, 2016 - May, 2017).

Month/Gut ontents	Aug.16	Sep.	Oct.	Nov.	Dec.	Jan.'17	Feb	Mar.	Apr.	May	Pooled
Fish juveniles	5.3	7.8	7.9	9.4	10.5	15.9	12.4	15.9	6.1	9.9	10.11
Teleosts	19.7	15.5	6.7	4.7	2.7	2.9	10.1	3.8	6.9	6.7	7.97
<i>Acetes</i> spp.	3.1	26.1	24.6	29.3	70.3	22.1	27.9	49.6	10.9	7.1	27.1
Cephalopods	3.3	6.4	-	9.6	-	24.4	5.5	-	30.7	-	13.32
Copepods	7.7	10.5	-	-	-	4.2	2.9	13.2	-	-	7.7
Semi -digested matter	60.9	33.7	60.8	47.0	16.5	30.5	41.2	17.5	45.4	76.3	42.98

Table 2 A : Percentage occurrence of *Atropus atropus* in various degrees of fullness of stomach.

Month	No. of fish examined	Feeding Intensity					
		Full	$\frac{3}{4}$ full	$\frac{1}{2}$ full	$\frac{1}{4}$ full	Little	Empty
Aug.,'15	76	7.12	9.43	12.33	7.12	25.55	38.45
Sep.	83	3.33	14.44	22.12	21.00	19.11	20.00
Oct.	65	9.24	9.21	26.21	18.17	18.17	19.00
Nov.	65	6.77	10.00	22.12	18.26	9.85	33.00
Dec.	73	2.53	3.77	5.73	9.84	19.94	58.19
Jan.,'16	62	4.22	10.11	32.86	13.77	13.77	25.27
Feb.	67	5.17	9.66	17.56	17.55	9.66	40.40
Mar.	84	4.49	7.75	45.57	7.75	17.22	17.22
Apr.	58	8.44	4.00	4.89	8.44	20.11	54.12
May	71	3.46	12.12	17.54	23.35	28.78	14.75

Table 2 B : Percentage occurrence of *Atropus atropus* in various degrees of fullness of stomach.

Month	No. of fish examined	Feeding Intensity					
		Full	$\frac{3}{4}$ full	$\frac{1}{2}$ full	$\frac{1}{4}$ full	Little	Empty
Aug.,'16	63	3.6	5.9	5.9	3.6	25.5	55.5
Sep.	68	4.3	14.4	22.1	12.5	19.1	27.6
Oct.	82	8.8	8.8	27.7	20.6	16.8	17.3
Nov.	92	8.9	11.6	27.9	15.9	16.9	18.8
Dec.	72	2.9	2.9	9.9	7.7	18.4	58.2
Jan.,'17	84	6.9	9.9	27.9	14.9	14.9	25.5
Feb.	102	7.3	11.5	19.7	22.7	27.9	10.9
Mar.	114	5.7	10.6	19.9	20.7	26.8	16.3
Apr.	131	9.7	12.5	14.5	20.4	22.8	20.1
May	89	4.6	13.3	19.1	24.4	26.1	12.5

months with maximum in December (58.19%) and April (54.12%).

Table 2 B, summarises the percentage occurrence of stomachs in various degree of fullness during August, 2016 – May, 2017.

It can be from the table that, the proportion of fish, which had actively fed was the highest in November

(48.4%) followed by October (45.3%) and January (44.7%). Poor feeding was noticed in the month of December (15.7%) followed by August (15.4%). The percentage of empty stomachs fluctuation in all the month while peak in February (50.6%) and May (50.2%).

Manojkumar (2007) studied the food and feeding habits of *Decapterus russelli* along the Malabar Coast.

Decapterus russelli spp 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, respectively. Similar observation was made by Ashwini *et al* (2016).

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