

LESSER SARDINE DIVERSITY AND QUALITATIVE ANALYSIS OF FOOD IN *SARDINELLA FIMBRIATA* (CUV. & VAL.)**R. G. Kudale¹ and *Kudale Sangita R²**¹*Department of Zoology, Tuljaram Chaturchand College, Baramati, Savitribai Phule Pune University, Maharashtra, India*E-mail: kudalerg@gmail.com^{2*}*Department of Zoology, Nowrosjee Wadia College, Pune, Savitribai Phule Pune University, Maharashtra, India**Correspondence author's E-mail: kudalesr@gmail.com**ABSTRACT**

Present study deals with the diversity of lesser sardines of Karwar coast and food and feeding habits in *Sardinella fimbriata*. Some species of lesser sardine found abundant and profitable at one coast may be scarce at other coasts. *Sardinella gibbosa*, *S. albella*, *S. fimbriata* and *S. dayi* contributes to the fishery in Karnataka and Goa. From the foregoing studies it is evident that the *S. fimbriata* feeds upon phytoplankton as well as zooplankton. Qualitative analysis of food items, from the gut contents of *S. fimbriata* was done. All the food items or organisms were taken into consideration and identified up to the genus or species level. Individual organisms for each type of food item in the sample were noted down and presented graphically. Dominated and frequently occurred food items were Copepods and Copepod eggs, Crustaceans, their eggs and larvae, *Sagitta*, Molluscs and their larvae, *Trichodesmium*, Diatom and Dinoflagellates and some of the Unidentified and detrital matter.

KEY WORDS: Diversity of lesser sardines, food and feeding, *Sardinella fimbriata* (fringe scale sardine)**INTRODUCTION**

India has made enormous strides in the fishery research and achieved considerable progress during last four decades. Modernization in the fish catching has played an important role in the commercial success and utilization of the fish and fishery resources. Lesser sardines are the major components which contribute to the total Indian marine landings. Since 1947, fish production has been increased more than tenfold. During the period between 1990 to 2010 fish production has shown double output (FAO, 2011). Karwar is one of the major and important fish landing centers located in the Uttar Kanara district. Lesser sardines were found along with oil sardine as by-catch; where *Sardinella longiceps* dominated the catch, together with other lesser sardines- *S. gibbosa*, *S. albella* and *S. fimbriata* at Karwar coast. Food and feeding aspects in Clupeids were studied by Hornell et. al, (1924), food and feeding habits of *S. gibbosa* were studied by Devanesan (1932) and Lazarus (1977a), some aspects of the fringe scale sardine, *S. fimbriata* were studied by Radhakrishnan (1964), and studies on food of the sardines, *S. albella* and *S. gibbosa* was done by Sekharan (1971).

MATERIALS AND METHODS

Karwar is located at 14° 48' N and 74° 07' E, in the Uttar Kannada district of Karnataka state. During present study fish were collected from purse seines, Rampani, Yendi catches from Karwar and fish landing centers Baithkol and Majali. Fresh fish samples of *Sardinella fimbriata*-fringe scale sardine (Cuv. and Val.) were collected fortnightly by random sampling method during the period from December- 2011 to December- 2012. In the morning hours freshly caught specimens were immediately brought to the laboratory in the chill-pack containing ice and studied further. Fish were washed thoroughly and blotted with blotting paper and length-weight measurements were taken. Fish were divided into various length groups, dissected to assess the sex. Gut contents were carefully removed and as far as possible examined in fresh condition and then preserved in 5% formalin for further observations. Total of 295 fishes were examined for

the gut contents analysis. For this study purpose fresh fish from Karwar & Karwar fish market, Baithkol and Majali were collected and considered together in order to get a gross picture of the diet. The food items were identified with the help of a binocular microscope and the food items were grouped as per necessity. For the food content analysis, several methods are followed by various workers. During present study Qualitative method is used to study the stomach contents of *S. fimbriata*.

Qualitative analysis

In this method the food components which were present in the diet of *S. fimbriata* were identified up to the genus or species level depending upon their complete occurrence or an extent of digestion of food material. All the food items or organisms were taken in to consideration. Individual organisms for each type of food item in the sample were noted down and the data was presented. A detail of the species wise identification of some of food items was not possible because of deterioration and partial digestion.

RESULTS AND DISCUSSION

Diversity of lesser sardines

The lesser sardines comprising the various species of *Sardinella* other than *S. Longiceps*. Indian fishery constitutes ten species of lesser sardines: *Sardinella gibbosa* (Bleeker); *S. fimbriata* (Val.); *S. albella* (Val.); *S. dayi* (Regan); *S. sirm* (Walbaum); *S. sindensis* (Day); *S. clupeioides* (bleeker); *S. melanura*, (Cuvier); *Sardinella leiogaster* (Val.) and *S. jonesi* (Lazarus). First seven species contribute as bulk landings, to the commercial catches in various centers other three occurs at irregular intervals at certain selective centers. *Sardinella gibbosa*, *S. albella* and *S. fimbriata* dominates in the commercial catches of Karwar.

Qualitative analysis of food items, from the gut contents of *S. fimbriata*:

All the food items or organisms were taken into consideration and identified up to the genus or species level. Individual organisms for each type of food item in the sample were noted down and presented graphically. It was little complicated to identify and compute the percentage of each food item in the guts of *S. fimbriata* because some of the food items were partially digested.

Copepods and Copepod eggs: *Acartia*, *Temora*, *Pseudodiaptomus*, *Euterpina*, whole Copepods and their fragments, other Copepods and their eggs, egg sacs were seen in the gut contents (Fig.1).

Crustaceans, their eggs and larvae: *Lucifer* (prawn), *Acetes* and *Mysis* (shrimps), *Penilia* (Cladocera), *Evadne*, other crustaceans, their eggs and larvae. Whole Copepods as well as their fragments were found in the semi digested matter (Fig.2&4).

Sagitta (*Chaetognatha*): Whole as well as fragments was seen (Fig.3).

Molluscs and their larvae: Bivalve and Cypris were represented by fragments of their shells (Fig.3).

Trichodesmium (*Cyanobacterium*): Those were occurred in the gut as fragments which were with two or more than two cells (Fig.3).

Diatom and Dinoflagellates: *Cosinodiscus*, *Planktoniella* (*Cosinodiscus*), *Bidduaphia*, *Fragilaria*, *Navicula*, *Nitzschia*, *Pleurosigma*, *Thalassiothrix* and *Ceratium* (Dinoflagellate): Whole Diatoms and Dinoflagellates were seen, those were also present in the form of fragments (Fig. 5&6).



Unidentified and detrital matter: During study, examined guts were with comparatively high percentage of semi-digested and unrecognizable matter.

During the present study, it was observed that the food consisted mainly of constituents like *Acartia*, *Temora*, *Pseudodiaptomus* and *Euterpina* mainly during the period from March to May. *Acetes*, *Mysis* and prawn larvae were found in the diet from September to December. *Cosinodiscus* and other Diatoms found as major part of the diet between months June to September, coincided with the monsoon season. In the gut contents of fish abundant zooplanktonic food was noticed. Most important ones were *Acartia*, *Acetes*, *Mysis*, *Lucifer*, Copepods and their eggs, *Temora*, and Diatom particularly *Cosinodiscus*. It can be concluded that this species feeds on zooplankton and phytoplankton. These observations thus strongly support the earlier observations made by Radhakrishnan (1967). According to Rangarajan (1964), decline in the feeding intensity during pre-spawning and spawning may be attributed to the development of gonads; fully developed gonads mostly occupy the major portion of the abdominal cavity but according to Seshappa *et. al.*, (1955), and Tondon (1961), no such relationship exists between feeding, maturation and spawning. Thus study of food and feeding habits of *S. fimbriata* will be useful for understanding general wellbeing of the fish, distribution or fluctuation in the occurrence of the fish, shoaling behavior of the fish, growth and migration of fish. Knowledge about aforesaid aspects of fishery biology has equal importance in the interpretation of food and feeding habits of fishes, Pillay (1952).

CONCLUSION

Sardinella fimbriata showed diversity in the feeding habit and commonly preferred zooplankton and phytoplankton. Copepods contributed as a bulk part of the diet of *S. fimbriata*. *Acetes* and *Mysis* (shrimps) and prawn larvae contributed diet throughout the year and others contributed frequently.

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