

# Food and feeding habit of pony fish, *Leiognathus splendens* (Cuvier, 1829) off Ratnagiri coast, Maharashtra

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**ABSTRACT:** In the present study, Food and Feeding habit of pony fish, *Leiognathus splendens* (Cuvier, 1829) from Ratnagiri coast were done. The fishes studied ranged between 6.1 to 12.5 cm. in Total length (TL.) during the period February 2012 to January 2013. The food composition of *L. splendens* comprised with zooplankton 40.76%, mollusca 6.33%, phytoplankton 2%, crustacean remains 13.53%, nematodes 0.97, sand grains 3.43%, semi digested matter 30.46% fish scales 2.54%. The present study indicates that *L. splendens* is a zooplankton feeder. In all size groups of pony fishes ranging from (6.1– 12.5 cm) food items such as zooplankton, mollusca, phytoplankton and crustacean remains, nematodes, semidigested matter were found in different proportions. About the feeding intensity, greater percentage of fishes had stomach with considerable quantity of food indicating active feeding during month of February, March, November & December. While moderate feeding was noticed during May, August, September. And poor feeding was observed during the month of September and October.

**Keywords:** *Leiognathus splendens*, Food and feeding habit of pony fish, Maharashtra, India.

## INTRODUCTION

The pony fish, *Leiognathus splendens* (Cuvier, 1829) is widely distributed in the Indo-Pacific region. They are silvery in colour, generally small (< 200mm SL.) and laterally compressed. They derive their common name ponyfish or slipmouth from their highly protractible mouth, which protract either dorsorostrally, rostrally, or ventrorostrally (Chakrabarty and Sparks, 2010). The silverbelly or pony fish belonging to the Kingdom-Animalia, Phylum-Chordata, Class-Actinopterygii, Order-Perciformes, Family- Leiognathidae, The fishes of the family Leiognathidae (Silverbellies, pony fishes or slip mouths) commonly called as Splendid Silver- Belly: (English), Kaaral or KilliKaaral: (Tamil), Karah: (Telgu), Kanai, Kuruchi: (Kannada), Thalimullan: (Malayalam), Karali, Tikata, Kap: (Marathi), Tunka Chandee: (Oriya). Synonyms- *Equula splendens* Cuvier; 1829; Day, 1878; *L. splendens* Munro, 1955; FAO. 1974.

Although it is commercially important and has wide distribution along the Indian coast, no detailed information on the biology is available from Indian waters (Jayabalan, 1986).

A total of 21 species of silverbelly are known from the seas around India. Almost all are known from southern Tamil Nadu, the dominant species being *L. dussumiri*, *L. jonesi*, *L. splendens*, *L. brevirostris* and *L. equulus*. In the northern Tamil Nadu and along Andhra Pradesh about 12 species are known to contribute to the fishery of which *L. bindus*, *L. splendens* and *Secutor insidiator* are most dominant accounting for nearly 70-80% of the silverbelly landings (Murty *et al.*, 2003). Along the Indian coast, the silverbelly are abundant only along the south-east coast, especially in the Gulf of Mannar and Palk Bay (Ayyappan *et al.*, 2011). The feeding habit of the silverbellies is governed by the nature of their mouth. (Ayyappan *et al.*, 2011). The most important item of food of the species includes polychaetes, copepods, amphipods, bivalves, gastropods and foraminiferans. No significant variations in the food of the fish from different place in different seasons have been found. The feeding habits of this fish also do not change with age. The fish was found to feed more actively in the month of January, February, April and November at Kilakarai. (James and Badrudeen, 2011). With large fish feeding predominantly on benthic invertebrates. Members of the genus *Gazza*, with their canine teeth, feed on small fishes and shrimps, while *Secutor* spp., with their upwardly projecting mouths, feed only on organisms living in the water column. Thus, the silverbelly, to a very large extent, avoid competition for food. Several species spend at least part of their life in estuaries, thereby further reducing the competitions for food. (Ayyappan *et al.*, 2011). The silverbelly are relatively short lived species (>2 years) in comparison to several others in Indian seas. (Murty *et al.*, 2003) These fishes are known to undertake diurnal vertical migration staying at the bottom daytime moving up to surface water during night time (Murty *et al.*, 2003). Species like *L. jonesi* undertake diurnal vertical migration. The 0-year class (<60mm.) of *L. jonesi* occupy the column water in day time and descend to the bottom in the night time. The adults (>60mm.) remain in the bottom during day time and ascend to the column in the night. When at bottom, they feed on benthos and when at column/surface, they feed on plankton. The three dimensional feeding strategy (benthic, column and estuarine) makes it a successful group (Ayyappan *et al.*, 2011). In view of the above, the present paper would definitely throw some light on these aspects. The Food and feeding habit of pony fish studies during the period February 2012 to January 2013 will provide a baseline data on this fish distribution along the Ratnagiri coast of Maharashtra.

## MATERIALS AND METHODS

The present study is based on the total of 400 fish specimens in the size range of 6.1 to 12.5 cm. Total length (TL.) in which 154 males and 206 females and 40 indeterminants. The samples were collected from the fish landing Centre Mirkarwada of Ratnagiri, at weekly intervals during February 2012 to January 2013. Sampling for June – July could not be collected due to ban on fishing during monsoon. The Mirkarwada landing centre of Ratnagiri (160 59' 42" North and 730 16' 14" East) located in coastal region of Maharashtra along the west coast of India was selected for the present study. In this sampling station samples of *L. splendens* landed from the purse seine and trawl were procured. The specimens of the different size groups were

randomly collected from the catches. The qualitative analyses were carried out to study the feeding habits of *L. splendens*

It was done as per the procedure given by Qasim and Jacob (1972). Qualitative analysis consisted of identification of all organisms encountered in the stomach. The identification was done by using compound microscope. Identification of individual item in the content was not always possible due to the semi-digested condition of food material in the stomach.

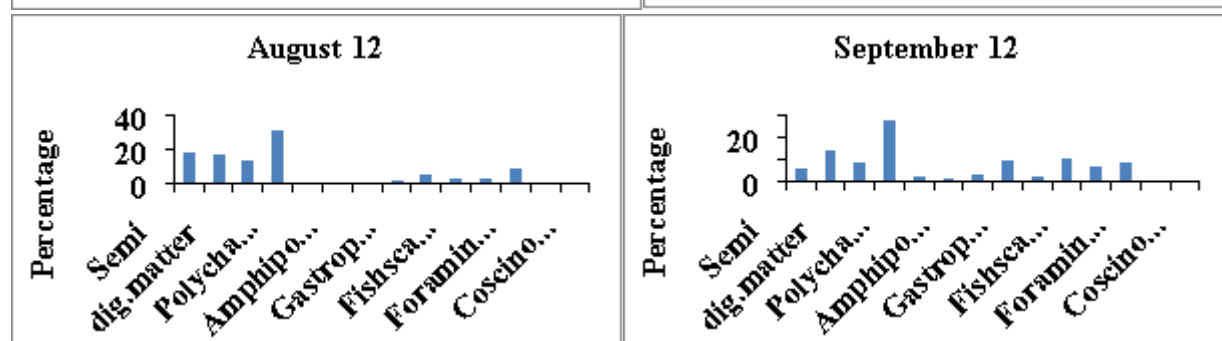
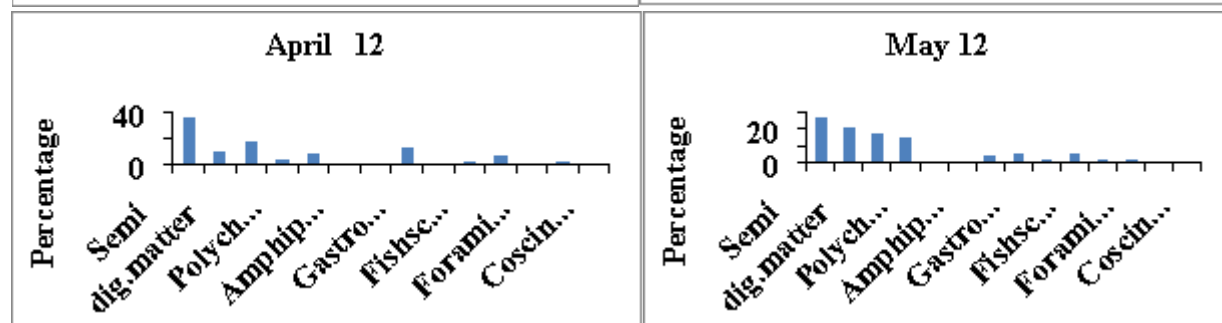
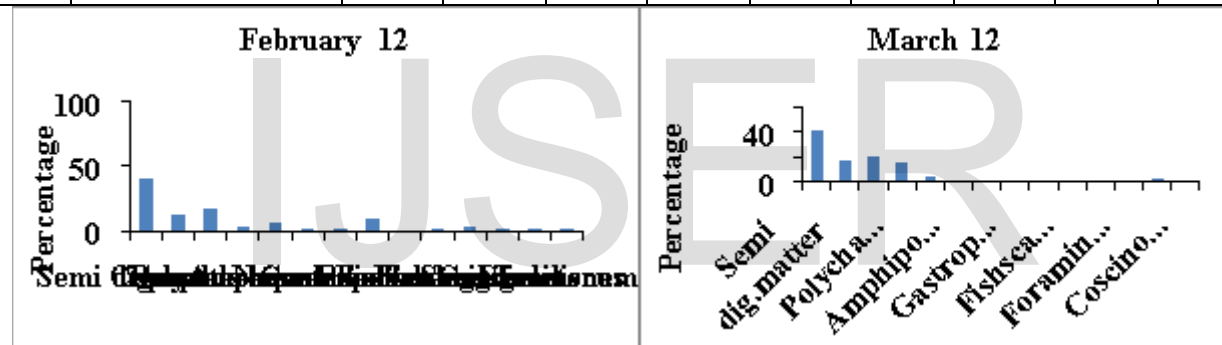
## RESULTS

### 1. QUALITATIVE ANALYSIS

In all 400 fish specimens at different stages were examined. Out of these 154 males and 206 females and 40 indeterminants. The analysis of stomach contents of *L. splendens* during different months is presented in ( Table 1) (Fig.1) and percentage composition of food items of *L. splendens* during different months from February 2012 to January 2013. The analysis of gut content showed that zooplankton, mollusca, phytoplankton and crustacean remains formed the main food. In all the months, nematodes, sand grains, semi-digested matter, fish scales also occurred forming a secondary diet. The average contribution of the gut contents for the whole period of study were approximately zooplankton 40.76%, mollusca 6.33%, phytoplankton 2%, crustacean remains 13.53%, nematodes 0.97, sand grains 3.43%, semidigested matter 30.46% fish scales 2.54%. Zooplankton formed a major constituent (40.76%) of the stomach contents throughout the year. Higher quantities of zooplankton appeared in the months of November (50.32%) and May (43.98%), whereas, the lower quantities were noticed in the months of August (35.63%) and January (36.36%). Among the zooplankton the Copepods (33.90%) were the most dominant item. The foraminiferans (14.15%) formed the major food content, maximum in the month of November (18.18%) and minimum in the month of May (1.38%). Phytoplankton (2%) formed an important food item next to zooplankton. Several genera of phytoplankton were identified. Of these, *Coscinodiscus* (69.96%), *Skeletonema* (16.38%) were dominant. Higher percentage of phytoplankton were recorded in November (6.86%), and lower percentage in the months of January (0.23%). Mollusca (6.33%) also formed an important food item. Considerable quantities were found in the months of September (12.56%). The lowest quantity was observed during the month of December (0.55%). Then Crustaceans remains matter (13.53%) formed important food item, Considerable quantities were found in the month of August (24.06%) while, the lowest quantity was observed during the month of February (1.94%). Semi digested matter (30.46%) in considerable quantities were found in the months of January (15.43%). The lowest quantity was observed during the month of September (1.87%). Miscellaneous matter formed the food items in the gut which, fish Scales (2.54%), Sand grains (3.43%), Nematodes (0.97%).

Table 1. Percentage composition of the food of *L. splendens* from Feb. 2012 to Jan. 2013

Sr. no.	Food items	Feb	Mar	Apr	May	Aug	Sep	Oct	Nov	Dec	Jan
1	Semi-digested matter	40.12	41.14	35.64	27.16	17.52	5.89	39.01	23.7	35.45	48.5
2	Copepods	12.41	16.58	9.33	20.24	17.14	14.01	7.07	10.07	11.17	21.7
3	Polychaetes	17.11	20.01	18.15	17.22	13.88	8.26	11.18	9.07	10.26	5.97
4	Crustacean remains	2.45	14.51	4.15	15.21	30.33	27.23	2.49	9.82	12.16	7.69
5	Amphipodes	6.14	3.32	8.65	0	0	2.13	8.13	5.06	6.54	3.23
6	Nematodes	1.25	0	1.04	0	0	1.1	3.01	0	0.73	1.88
7	Gastropods	1.34	0	0	4.32	0.99	3.44	1.1	0.32	0.11	1.31
8	Bivalves	9.12	0.85	12.47	5.37	1.98	9.12	5.12	1.23	0.44	0.75
9	Fishscales	0.85	0.24	1.07	1.4	4.92	2.23	0.32	7.23	5.33	3.55
10	Fish eggs	2.24	0.11	1.45	5.14	2.23	10.07	6.49	7.24	2.23	2.56
11	Foraminiferans	2.56	0	6.12	1.38	2.38	7.03	10.22	18.88	6.87	2.9
12	Sand grains	2.14	0.72	0.5	2.12	8.34	8.23	3.31	0.53	3.98	0.23
13	Coscinodiscus	0.89	2.44	1.36	0	0.47	0.53	2.35	6.53	3.5	0.12
14	Skeletonema	1.18	0.03	0.04	0.37	0.12	0.74	0.12	0.33	1.22	0.11



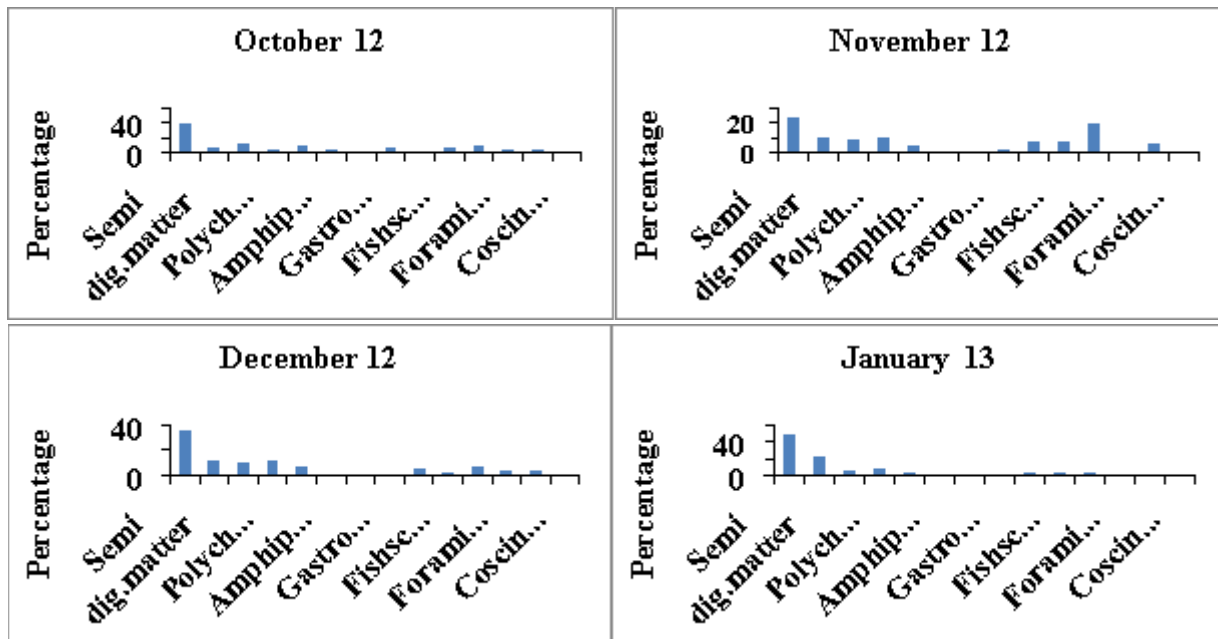


Fig.1 Percentage composition of food items in the stomach of *L. splendens*

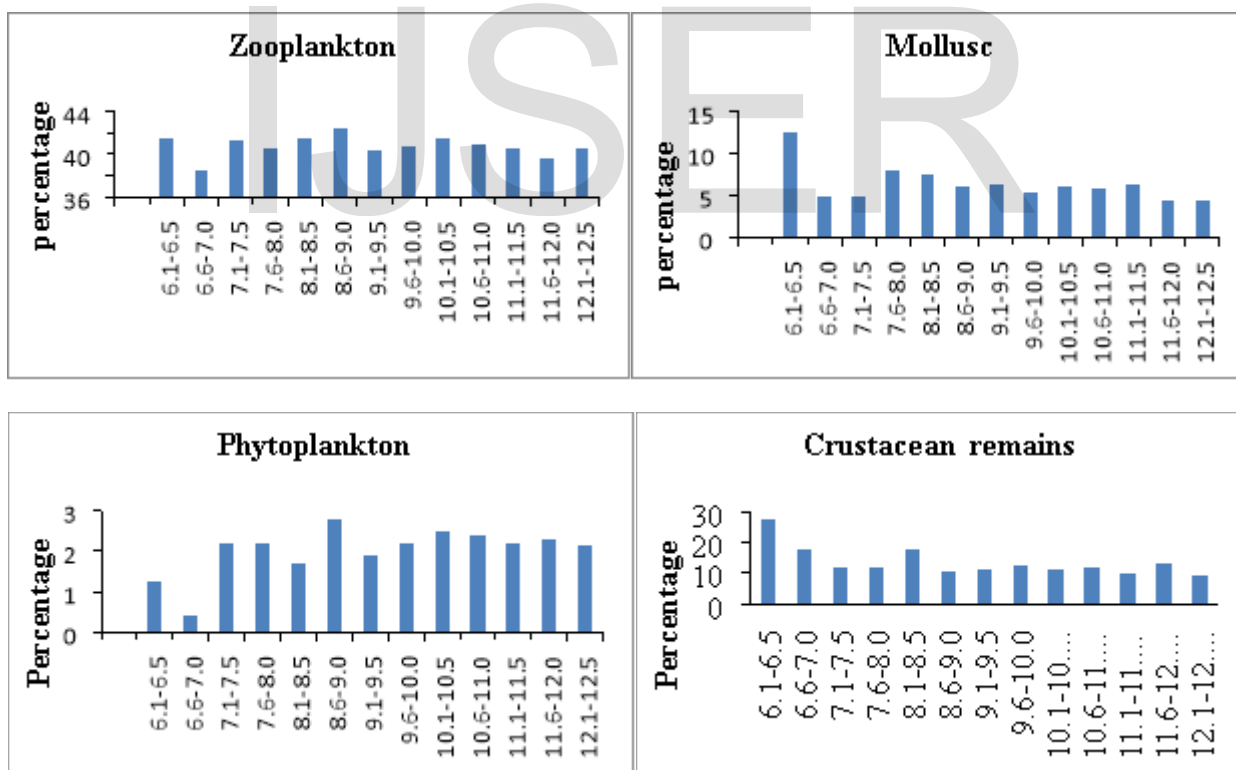
## 2. FOOD PERCENTAGE IN RELATION TO SIZE GROUP

The details of percentage composition of various food items in the stomach contents of *L. splendens* in various size groups are given in the (Table 2) (Fig.2). Analysis of data revealed that in all the size groups starting from 6.1 – 6.5 cm to 12.1 – 12.5 cm, food items zooplankton, mollusca, phytoplankton and crustacean remains, nematodes, were found in different proportions. Zooplankton were the most dominant food in all size groups ranging from 38.56% to 41.47% and no significant difference was noticed between size groups. Phytoplankton was dominant in the size groups 8.6-9.0 cm (2.76%) and 10.1-10.5 cm (2.48%) contrary to the lowest in 6.6-7.0 cm (0.4%) In the remaining size groups, no significant difference was noticed. Crustacean remains dominated the size groups 6.1-6.5 cm (27.23%), Semidigested matter was present in all the size groups in varied proportions. but higher percentage was observed in the size range 12.1-12.5 cm (38.36%).

Table 2. Percentage composition of *L. splendens* food of in various size groups from February 2012 to January 2013

Size group	No. of fish examined	zooplankton	mollusc	phytoplankton	crustacean remains	nematodes	sand grains	semi-digested matter	Fish scales
6.1-6.5	2	41.5	12.56	1.26	27.23	1.1	8.23	5.89	2.23
6.6-7.0	3	38.56	4.89	0.4	17.7	0.63	3.55	30.98	3.28
7.1-	12	41.22	4.85	2.21	11.92	0.66	2.12	34.8	2.23

7.5									
7.6-8.0	12	40.53	7.88	2.17	11.61	1.47	4.03	30.09	2.21
8.1-8.5	10	41.49	7.49	1.67	17.68	0.64	4.09	24.29	2.63
8.6-9.0	10	42.35	6	2.76	10.53	1.28	3.19	30.83	3.05
9.1-9.5	31	40.44	6.34	1.91	11.15	0.96	2.84	34.08	2.29
9.6-10.0	82	40.72	5.39	2.17	12.32	1.06	3.2	32.61	2.53
10.1-10.5	89	41.47	6	2.48	11.28	0.87	2.59	32.8	2.52
10.6-11.0	75	40.85	5.78	2.38	11.92	0.86	2.97	32.27	2.98
11.1-11.5	51	40.56	6.34	2.17	10.05	0.98	2.61	34.78	2.49
11.6-12.0	20	39.56	4.46	2.29	13.4	0.64	2.86	34.13	2.66
12.1-12.5	6	40.59	4.26	2.12	9.09	1.44	2.28	38.36	1.86
<b>Total</b>	<b>400</b>								



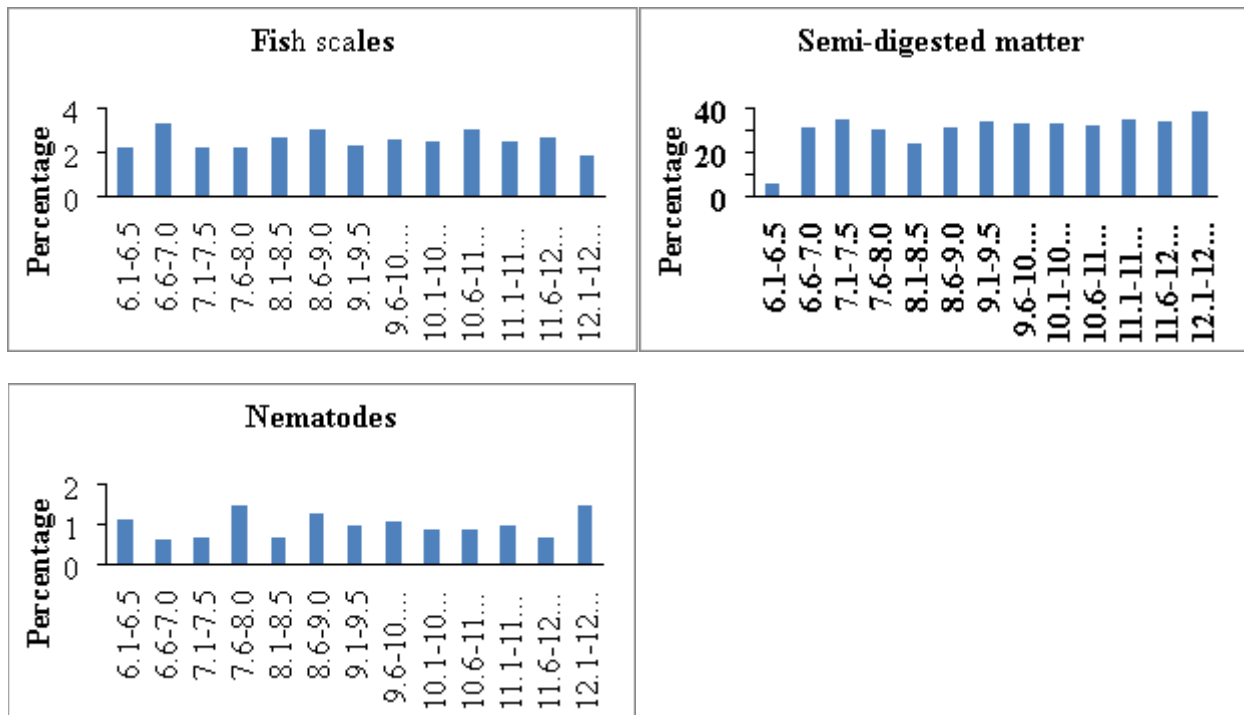


Fig 2. Percentage composition of food items of *L. splendens* in relation to size

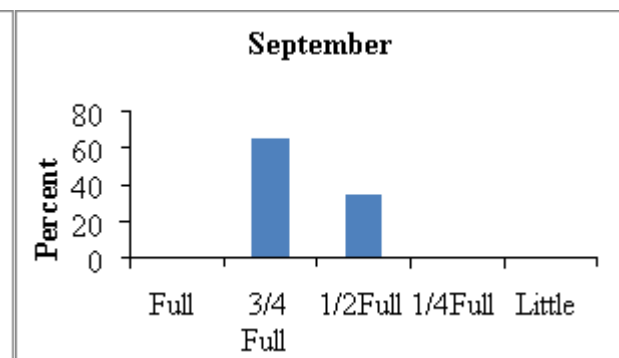
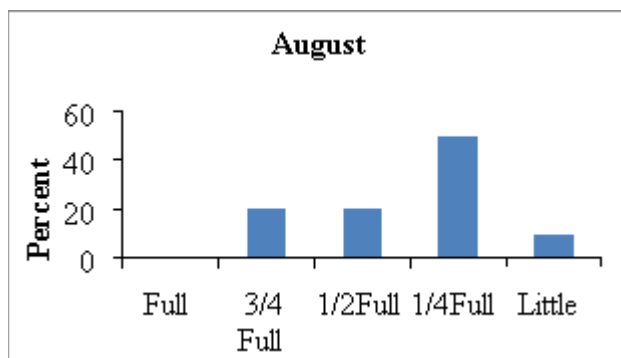
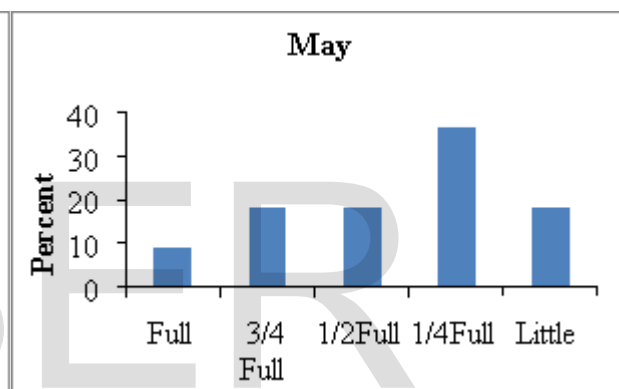
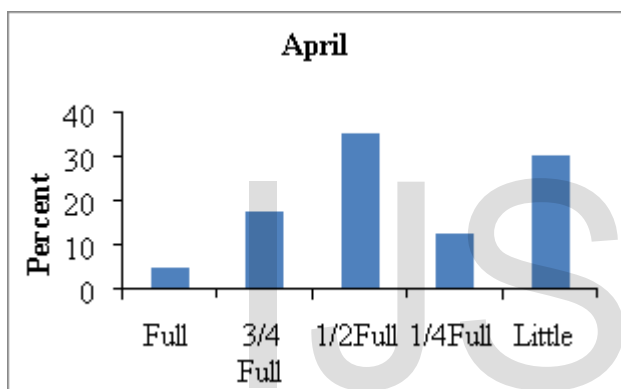
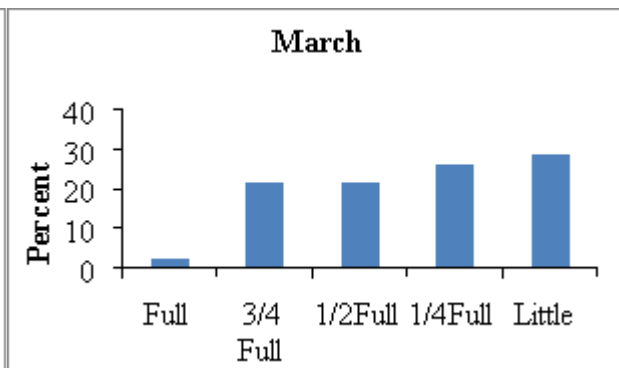
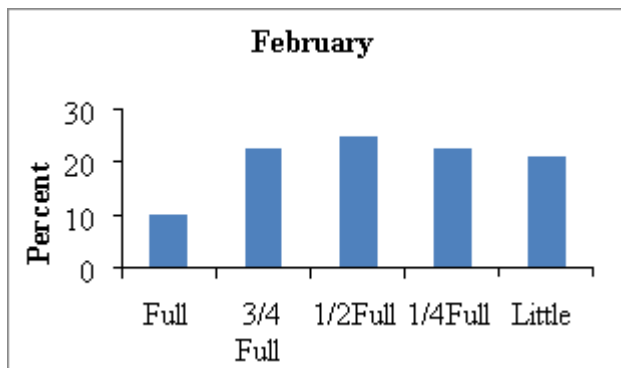
### 3. FEEDING INTENSITY

The percentage occurrence of stomach in various degrees of fullness during the study period is presented in (Table 3) (Fig.3). Greater percentage of fishes had stomach with considerable quantity of food indicating active feeding during month of February, March, November & December. Moderate feeding was noticed during May, August, September. Poor feeding was observed during September and October. There was no fish with empty stomach during the study period.

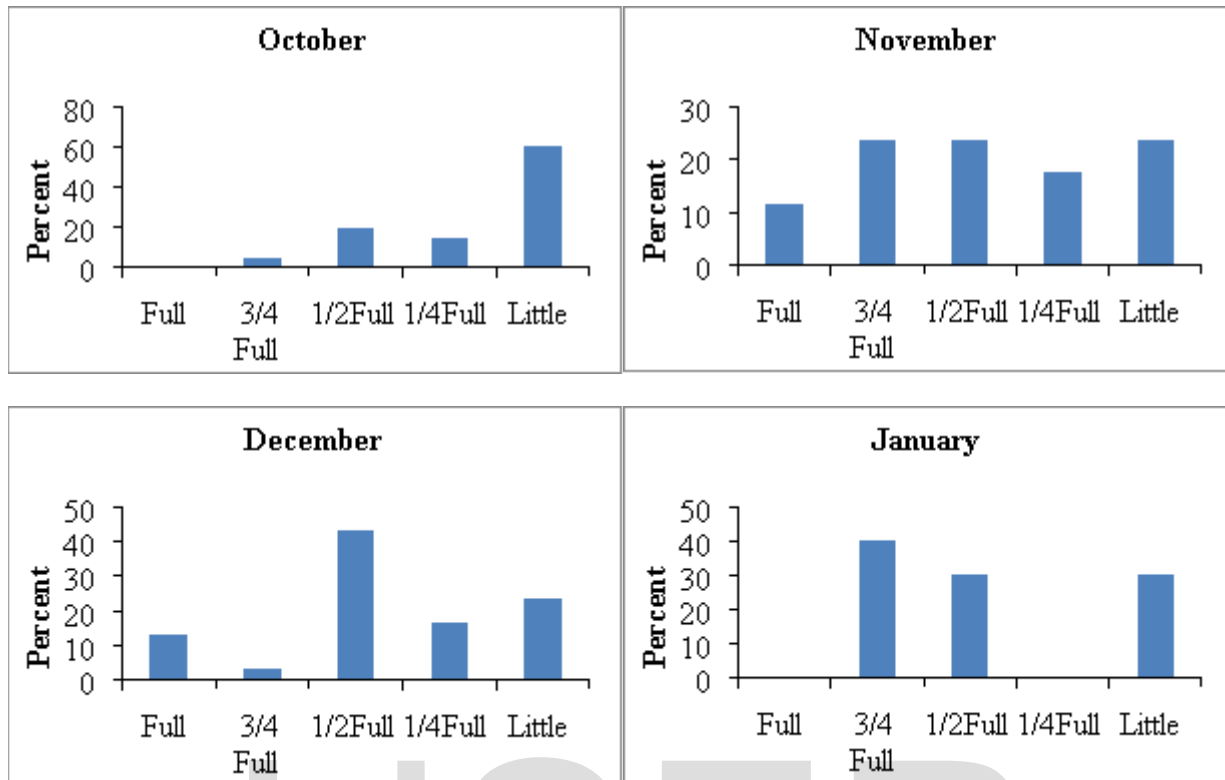
Table 3. Degree of fullness (percent) of *L. splendens* from February 2012 to January 2013

Months	Full	3/4 Full	1/2Full	1/4Full	Little
February	10	22.5	25	22.5	21
March	2.38	21.43	21.43	26.19	28.57
April	5	17.5	35	12.5	30.01
May	9.09	18.18	18.18	36.35	18.15
August	0	20.01	20.01	50.01	10.01
September	0	65	35	0	0
October	0	5	20.01	15	60.01

<b>November</b>	11.76	23.53	23.51	17.65	23.52
<b>December</b>	13.32	3.33	43.33	16.67	23.33
<b>January</b>	0	40.01	30.01	0	30.01







**Fig 3. Degree of fullness of *L. splendens***

## DISCUSSION

Reports of *L. splendens* from Thangachimadam on the East Coast, *L. bindus* from Calicut on the West Coast and *L. brevirostris* from Palk Bay and Gulf of Mannar in the vicinity of Mandapam are confined to biology of respective species done along the coast of India. As far as the Indian coast concern, most of the work on the silverbelly was done at southern coast of India, very merge information's was available on silverbelly along the west coast of India. Even though it contribute the major contribution in the commercial catches of west coast of India. In view of this, the present study was undertaken for Food & feeding habits of the *L. splendens* resources using a holistic approach integrating information on the studies on the Ratnagiri coast of Maharashtra, which will helps to understand the status of silverbelly fishery along the west coast of India.

The qualitative analysis of food and feeding habit in *L. splendens* indicated that, this species feeds mainly on zooplankton 40.76%, mollusca 6.33%, phytoplankton 2%. All species of *Leiognathus* feed on a great variety of zoo and phytoplankton species from the sea water. There is little variation between the stomach contents of the same species. This is an supporting evidence with the observation of earlier reports of research workers. Tiews *et*

*al.*, (1968) described that, all species of *Leiognathus* feed on a great variety of zoo and phytoplankton. But there is little variation between the stomach contents of the same species. Murty *et al.*, (2003) stated that, these fishes are mainly zooplankton feeders. Ayyappan *et al.*, (2011) stated that, no significant variations in the food of the fish from different place in different seasons. In the present study, it is reveal that all size groups ranges from 6.1 –12.5 cm. fish species showed food items in stomach such as zooplankton, mollusca, phytoplankton and crustacean remains, nematodes, sand grains, semi-digested matter, fish scales were found in different proportions. Further present that, zooplanktons were the most dominant of all size groups ranging from 6.1-12.5 (38.56% to 42.35%) and no significant difference was noticed between size groups. Phytoplankton were dominant in the size groups 8.6-9.0 cm and 10.1-10.5 cm & lowest between 6.6-7.0 cm. In the remaining size groups, no significant difference was noticed. The feeding intensity was highest during February, March, November & December. While poor feeding was observed during September and October. The poor feeding could be due to less availability of food or may be the due to spawning period of the fishes. The present study confined to studying the food items available in the guts at the time of analysis which revealed that there are seasonal variations in diet.

The food composition of *L. splendens* comprised with zooplankton 40.76%, mollusca 6.33%, phytoplankton 2%, crustacean remains 13.53%, nematodes 0.97, sand grains 3.43%, semi digested matter 30.46% fish scales 2.54%. The present study indicates that *L. splendens* is a zooplankton feeder. In all size groups of pony fishes ranging from (6.1– 12.5 cm) food items such as zooplankton, mollusca, phytoplankton and crustacean remains, nematodes, semi digested matter were found in different proportions. About the feeding intensity, greater percentage of fishes had stomach with considerable quantity of food indicating active feeding during month of February, March, November & December. While moderate feeding was noticed during May, August, September. And poor feeding was observed during the month of September and October.

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