

Food and Feeding Habit of the Parrotfish *Scarus ghobban* Forsskal, 1775 (Family: Scaridae) from Nagapattinam, South East Coast of India

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Abstract: The food and feeding habit of the parrotfish *Scarus ghobban* was investigated in the present study from Nagapattinam, South East Coast of India for a period of one year (Sep. 2006 to Aug. 2007). The parrotfish are herbivorous and the food items were observed by varying proportions among preys. Plant materials are seaweeds, seagrass, red and green algae; diatoms contain (*Cosinodiscus* Sp. *Triceratium* sp.) Benthic organisms are crustacean larvae, Nematods and foraminifera's; calcareous deposition, sand particles and detritus (dead plant and animal matters) were observed in the stomachs of the Parrotfish. The percentage contribution of food items observed as 46 % of calcareous materials, 28 % of sand particles, 17 % of plant materials, 3 % of diatoms, 3 % of benthic organisms and 3 % of other materials. The percentage of feeding intensity were observed throughout the year as poorly feed 24%, heavy feed 23%, medium 23%, active 20% and empty 10%. The poorly feed were more recorded in the month of March (53 %), active feed were more found in the month of November (27.9%), heavy feed was highly recorded in the month of September (32.3 %), medium feed more in the month of March (32.3%), empty feed was found high in the month of June (15.2%).

Key words: Parrotfish • *S. ghobban* • Sea grass • Corals • Grazing • Scraping

INTRODUCTION

The Parrotfishes (family Scaridae) are easily recognized by the fusion of their teeth to form beak-like dental plates and by the bright coloration of most species, particularly the more colorful terminal males. Their sturdy dental plates and strong jaws enable them to scrape into algal-covered limestone and utilize algae no longer available to herbivores like surgeonfishes (Acanthuridae) and sea chubs (Kyphosidae) that can only graze directly on the thalli. They grind the limestone fragments and algae with their unique pharyngeal dentition, thus making the algae more digestible. Because of their more efficient use of algae when cropped to low levels by other herbivores, they occupy an otherwise unused niche on the coral reef. The abundance of parrotfishes on coral reefs is an indication of their success in exploiting this niche. As a result of the digestive process, these fishes void large quantities of sand and are therefore a major producer of calcareous sediment in coral-reef areas [1].

The parrotfishes are herbivorous to graze constantly on dead corals and hard substrate in order to file those [2]. The large part of the stomach contents found in 15 specimens studied by Sano *et al.* [3], was composed of calcareous powder which results from grazing on coral substrate. The most abundant vertebrate sea grass grazers are parrotfish from the genus *Scarus*. Like all of the parrotfish, they are diurnal feeders, showing high selectivity. These species have molariform teeth with powerful jaw muscles, highly adapted for browsing coral polyps, medusa and associated zooxanthellae, a special type of algae found in the tissues of living corals. While grazing on reefs, these fishes break pieces of corals. The polyps and medusa of corals are chewed into fine sand and passed through the digestive tract. By eating coral and coralline red algae, a single parrotfish may produce up to 90 kg of sand/year [4]. Thus, these parrotfishes ingest large amount of calcareous materials along with live coral polyps and this is ground into a fine powder with the help of powerful pharyngeal teeth and passed out as faeces. Thus, parrotfishes contribute substantially to the formation of bottom sediments.

Corals reefs are among the most biologically diverse ecosystems and many of the organisms contributing to the high species diversity of reefs normally weaken them and convert massive reef structure to rubbles, sand and silt. Numerous fish species erode reef substrata while grazing on algae and also fragment colonies while feeding on live coral tissues or when extracting invertebrates from coral colonies [5]. Parrotfishes (Scaridae) are the principal grazing groups with many fishes in the latter family capable of scraping and extensive excavation.

Parrotfishes are important agents of marine bioerosion that rework the substrate with their beaklike oral jaws [6-9]. As a dominant component of the herbivore assemblage on coral reefs, many parrotfish species have specialized in scraping algae off limestone; other species can excavate reef substrates and harvest substrate-bound algae [10]. The fused teeth in the oral jaws form beak-like dental plates and a highly modified pharyngeal apparatus bearing rows of broad ovoid teeth helps to triturate the ingested material [11-15]. In addition, scarids exhibit physiological adaptations to the exceptionally high carbonate content of the diet and have high carbonic anhydrase enzyme levels in the gut [16, 17].

In the present study, the parrotfishes (*S.ghobban*) landed at Nagapattinam are concentrated to examine their food and feeding habits besides length-weight relationships. The parrotfish, *Scarus ghobban* Forsskal, 1775, are landed in considerable quantities in Nagapattinam landing centre. There is no published information on the food and feeding habits, length-weight relationships etc. in this species from India and hence the present study is concentrated for the same.

MATERIAL AND METHODS

Study Area : Nagapattinam (Lat. $10^{\circ} 45' 31''$ N; Long: $79^{\circ} 51' 02''$ E) is one of the major fish landing centre in Tamil Nadu, Southeast coast of India. Exports of high value fishing products like shrimp, crabs, lobster, cuttlefishes, octopuses, molluscs and edible fishes are becoming increasingly important source of income. There are 400 mechanized country boats engaged in the fishing activity during the night hours.

Sampling: The samples were collected at monthly intervals of commercial catches with the size range of 15- 82 cm TL. The total length (cm) and weight (kg) of

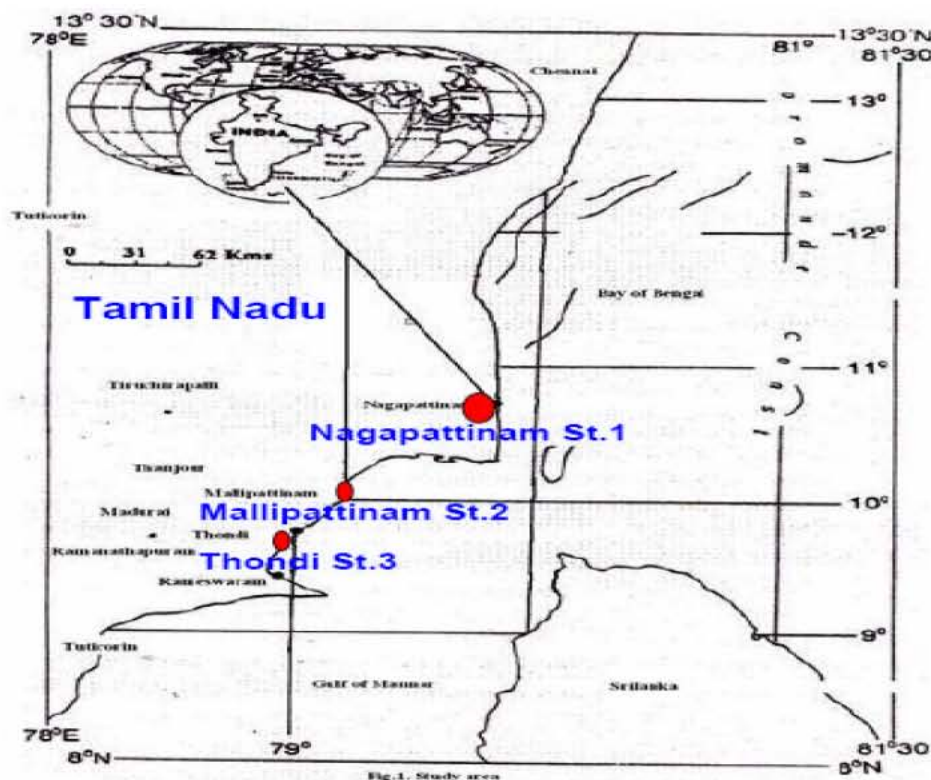


Fig. 1: Map Showing the Study Area

the fishes were measured. A total of 176 specimens of *S. ghabban* were examined. For the gut content analysis specimen was analyzed and examined in fresh condition. The alimentary tract was dissected out and preserved in 5% formaldehyde. The gut content was analyzed by following the methods of Hynes [18] and Odum [19].

The gut content were carefully emptied into a Petri dish and examined with the help of a binocular microscope. For evaluating the preference of food consumed, the different food items were assessed under the categories plenty, common, a few, little and rare and the points 16,8,4,2 and 1 were allotted according to the volume of the items were then summed up and scaled done to percentages to indicate the percentage composition of food items for various methods. Further, the stomach were classified into 'gorged' when they were filled of extent that the stomach wall appeared thin or semitransparent, the stomach was called "Full" when full with wall being thick and intake. They were classified as $\frac{3}{4}$ full, $\frac{1}{2}$ full, $\frac{1}{4}$ full, trace and empty depending upon their relative fullness. The stomach contents were examined separately with an aid of binocular microscope, sorted and classified in to the lowest possible taxon and enumerated.

RESULTS AND DISCUSSION

The parrotfish food items were observed by varying proportions among preys. Plant materials are seaweeds, seagrass, read and green algae; diatoms contain (*Cosinodiscus* Sp. *Triceratium* sp.,) ; Benthic organisms are crustacean larvae, Nematods and foraminifera's ; calcareous deposition, sand particles and detritus (dead plant and animal matters) were observed in the stomachs of the Parrotfish (*S. ghabban*) are shown in Table 1 and Fig 2.

Feeding Intensity: The feeding intensity were observed during September 2006 to August 2007 in parrotfish,

Table 1: Composition of Food Items in Parrotfish *S. ghabban*

Food categories	Name of the food items
Plant materials	Sea weeds , sea grass, read and green algae
Diatoms	Algae (<i>Cosinodiscus</i> sp, <i>Triceratium</i> sp)
Benthic organisms	Crustaceans, Nematods, foraminifera
Calcareous deposition	Coral deposition (Dead corals)
Soil particles	Decomposed and sand, clay materials
Others	Detritus (Dead plant and animal matters)

Table 2: Percentage of Feeding Intensity of Parrotfish *S. ghabban*

Month	Empty	Medium	Heavy	Actively feed	Poorly feed	Total
September	7.5	17.2	32.3	27	16	100
October	10	28	23.2	15.8	23	100
November	8.6	23.5	21.4	27.9	18.5	100
December	13.2	15.2	30.1	20.1	21.2	100
January	9.3	25.5	18	17.2	30	100
February	12.3	31.2	23.3	15.2	18	100
March	7.2	32.3	25.1	20.1	53	100
April	5.4	25	20.5	14.7	35.3	100
June	15.2	13.2	12	27.1	32.5	100
July	5.5	17	18.1	22	37.4	100
August	13.1	18.6	26.3	14	28	100

Table 3: Percentage Compositions of Various Food Items

Month	Plant materials	Diatoms	Benthic organisms	Calcareous material	Sand particles	Others	Total
September	12.3	0	4.5	35.2	45.3	2.7	100
October	6.4	3.2	0	40.1	47.3	3	100
November	15.2	0	5.3	46.1	28.4	5	100
December	27.5	5	0	55.3	12.2	0	100
January	20	4.2	3.6	58.2	9.8	4.2	100
February	10.3	0	0	46.4	31.3	12	100
March	24.3	3	6.3	43.2	23.2	0	100
April	8.2	4.2	7.4	60.2	17.2	2.8	100
June	17.5	0	0	50.1	30.4	2	100
July	28	6	2.3	30.5	27.2	6	100
August	21.1	5	4.5	39	30.4	0	100

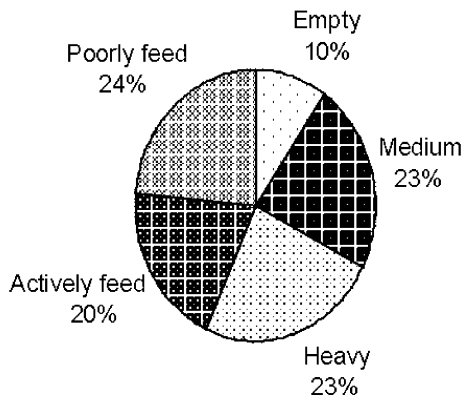


Fig. 2: Percentage of Feeding Intensity of *S. Ghobban*

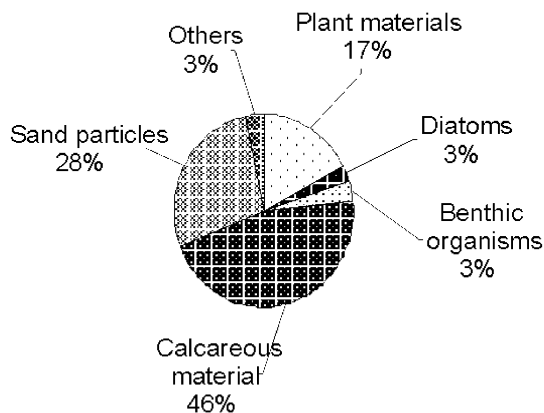


Fig. 3: Percentage Composition of Various Food Items of *S. Ghobban*

each specimens were examined by five categories are empty, medium, heavy, active feed and poorly feed. The feeding intensity in varied each month because to adaptation and availability of food items in the live spot. The percentages of feeding intensity were observed throughout the year. Poorly feed 24%, heavy feed 23%, medium 23%, active 20% and empty 10%. The poorly feed were more recorded in the month of March (23 %), active feed were more found in the month of November (27.9 %), heavy feed was highly recorded in the month of September (32.3 %), medium feed more in the month of March (32.3%), Empty feed was found high in the month of June (15.2%) showed in Table 2 and Fig. 3.

Food Categories: The calcareous depositions were observed in the month of April (60.2 %), sand particles rich in feed material observed the month of October (47.3%), the plant materials are richly recorded in the month of July (28 %), the diatoms were observed higher in July (6 %), Benthic organisms were higher in the month of April (7.4 %) and others of dead and decomposed

material were observed higher in the month of November (5 %). The result of food categories were observed throughout the year (September-2006 to August-2007). Calcareous material was very high and lower in benthic organisms in Table 3. The percentage of food categories are varied at throughout the year. The percentage contribution observed from 46 % of calcareous materials, 28 % of sand particles, 17 % of plant materials, 3 % of diatoms, 3 % of benthic organisms 3 % of other materials. Similar observation was noticed with the parrotfish food and feeding habits during the study period (September 2006 to August 2007). The parrotfish (*S. ghobban*) feed mainly dead corals (calcareous material), plant material (seagrass and seaweeds) and bottom materials are sand, diatoms, benthic organisms and particulate organic matters (Dead and decomposed plant and animal tissues). In the present study, the major feeding categories are dead corals (Calcareous material), plant material (Seagrass and seaweeds) and bottom materials are sand, diatoms, benthic organisms and particulate organic matters (Dead and decomposed plant and animal tissues) were record. The higher food categories 46 % of calcareous materials was observed and lower food categories 3% of diatoms and benthic organism was recorded during the study period at Nagapattinam coast.

The feeding intensity were observed in more percentage in poorly feed 24 %, heavy and medium feed 23 %, active feed 20 % and empty 10 % were recorded. Poorly, heavy, medium, actively fed and empty were found 53, 32.3, 32.3, 27.9 and 15.2 percentages was recorded in September, March, November and June, respectively. The month of May has no result about food and feeding intensity because banning of fishing activity for fish breeding season. The feeding intensity result is due to availability of food items and adaptation of the species.

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