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Food and feeding habits of Sergeant major, *Abudefduf vaigiensis* (Quoy and Gaimard, 1825) from shallow waters off Visakhapatnam

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Abstract

Results of a qualitative and quantitative analyses of the food of the Sergeant major *Abudefduf vaigiensis* from littoral waters off Visakhapatnam during the period August 2004 to July 2005 are presented. The study was based on 474 fishes of total length ranging from 42-164 mm. The food items included macro-algae, benthic invertebrates, detritus and miscellaneous items. Among macro-algae *Spongomorpha* sp. (13.6%) and *Chaetomorpha* sp. (13.3%) were preferred food items. Copepods constituted 9.8%. A marked variation in the food contents between juveniles (40-69 mm) and adults (70-159 mm) was observed. During April to July macro-algae was the dominant food item.

Visakhapatnam coastal waters support a wide variety of biological resources. The rocky intertidal system attracts ecologically, economically, pharmaceutically and ornamentally important finfishes as this ecological habitat supports rich assemblages of benthic plants (algae) and animals (mainly invertebrates). Culture of these marine organisms would help utilize these resources on a commercial scale. Knowledge on the nutritional aspects of culturable finfishes is a prerequisite for successful aquaculture practices of finfishes. Marine ornamental finfish culture has steadily been gaining footing in aquaculture industry along coastal states. Earlier studies (Madan Mohan *et al.*, 1987; Pillai *et al.*, 1990; Pillai *et al.*, 1995; Gandhi, 2002; Pillai *et al.*, 2002) on the composition of food contents in marine ornamental fishes are limited. Hence, an attempt has been made to study the quality and quantity of natural food items of the dominant ornamental finfish *Abudefduf vaigiensis* from the shallow waters of Visakhapatnam Coast.

Materials and methods

This study was carried out in the intertidal rocky shore habitats of Visakhapatnam (Lat 17°43' N; Long 83° 22' E) during the period August 2004 to July 2005. Samples of *A. vaigiensis*, were collected twice a week by operating cast nets with the help of the local fishermen. Four hundred seventy four individuals (TL ranged from 42-164 mm) were collected for stomach-content analyses. The fish samples were brought to the laboratory. Each fish was measured, weighed and dissected for its stomach contents. The fishes were grouped into 5 categories based on the fullness of stomach viz. 'empty', '1/4 full', '1/2

full', '3/4 full' and 'full'. The stomach contents were quantified using the occurrence method and numerical method (Hynes, 1950). The index of preponderance (Natarajan and Jhingran, 1961) was calculated.

The stomach contents of each individual fish were sorted into major groups: algae, zooplankton, benthic polychaetes, crustaceans, molluscs and detritus. The food components were identified, wherever possible up to genus or species level depending on their state of digestion.

Results and discussion

The average feeding intensity of the sergeant major ranged from 44% (March) to 76% (April). The feeding intensity exhibited two peaks: one in summer (April) and the other in late post-monsoon period (January). The feeding intensity registered a steady decline during monsoon and early post-monsoon period (August to November). The feeding intensity between different length groups exhibited a steady increase. It was minimum in the length groups of 40-69 mm and maximum in 130-159 mm group fishes.

The stomach contents noticed were benthic algae, benthic invertebrates, detritus, semidigested food and miscellaneous items. The miscellaneous items included terrestrial insects and flower petals. The stomach contents were analysed both qualitatively and quantitatively in relation to size groups and season (summer, monsoon and post-monsoon). The degree of fullness (%) of stomachs of *A. vaigiensis* in different months is given in Table 1. The qualitative composition of food items recorded during

the study period included marine benthic macro algae (Chlorophyta: *Chaetomorpha* sp., *Spongomorpha* sp., *Ulva* sp., *Caulerpa taxifolia*, *C. racemosa*; Rodophyta: *Gracillaria* sp.), marine invertebrates (polychaetes, amphipods, copepods, shrimps, marine insects (*Halobates* sp.), molluscs, arrow worms (*Sagitta* sp.) and larvae (decapod larvae), detritus, semidigested food and miscellaneous items. Among plant food items *Spongomorpha* sp. (13.6%) and *Chaetomorpha* sp. (13.3%) were recorded more frequently. Among invertebrates, copepods (9.8%) were more frequently registered in the food items. Detritus constituted 10.5%. The occurrence of miscellaneous items (7.5%) indicated the omnivorous nature of the species. Eventhough six species of marine macro algae contributed to the food items, the preferred items were *Spongomorpha* sp. (31.2%) and *Chaetomorpha* sp. (27.6%). Of the eight groups of marine invertebrates

recorded in the food items, the group Copepoda (21.8%) was the most preferred.

Indices of preponderance of different food items in relation to life stage are presented in Table 2. It may be mentioned here that the juveniles (40-69 mm length group) specifically preferred the zooplanktonic food items (copepods) or benthic insects (*Halobates* sp.). Indices of preponderance in relation to season are presented in Table 3.

Pillai *et al.* (1990) during the investigations in Minicoy Island, reported the presence of encrusting and filamentous algae in the guts of *A. glaucus*. Pillai *et al.* (1995), based on their studies in Lakshadweep, concluded that pomacentrids were zooplanktivores, omnivores and herbivores. In their observations they found that copepods, decapod larvae, fish larvae, fish eggs, shrimp and megalopa larvae formed dominant prey groups. Based on the present

Table 1. Degree of fullness (%) of stomachs of *A.vaigiensis* in different months

2004-05	n	Empty	1/4 full	1/2 full	3/4 full	Full
Aug	19	--	--	36.8	63.1	--
Sep	39	--	15.4	48.7	35.8	--
Oct	32	--	25.0	37.5	31.2	6.2
Nov	18	--	22.2	66.6	11.1	--
Dec	79	1.2	56.9	10.1	6.3	25.3
Jan	42	--	35.7	4.7	4.7	54.7
Feb	57	--	52.6	17.5	14.0	15.7
Mar	43	--	55.8	23.2	13.9	6.9
Apr	15	--	--	26.6	40.0	33.3
May	40	--	10.0	35.0	52.5	2.5
Jun	66	12.1	--	15.1	63.6	9.1
Jul	24	4.1	25.0	20.8	50.0	--

Table 2. Index of Preponderance of different food item of *A.vaigiensis* in relation to size groups

Food items	Size groups (mm)											
	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150-159
<i>Chaetomorpha</i> sp.	--	--	--	10.5	0.16	31.6	29.3	20.3	23.9	32.9	20.0	38.8
<i>Spongomorpha</i> sp.	--	--	--	--	1.48	48.0	12.4	7.7	23.3	36.5	72.8	44.6
<i>Ulva</i> sp.	--	--	--	--	1.23	6.3	8.1	3.9	11.6	0.2	0.5	2.5
<i>C. taxifolia</i>	--	--	--	--	0.02	--	0.4	0	2.7	0.8	0	3.4
<i>C. racemosa</i>	--	--	--	4.9	0.07	0.1	3.2	1.7	4.9	3.7	0.9	2.5
<i>Gracillaria</i> sp.	--	--	--	--	0.07	0.4	0.3	42.3	12.7	16.3	3.1	0.7
Polycheates	--	--	--	6.3	--	--	0.1	0.4	0	--	--	--
Amphipods	5.0	3.	3.6	--	--	0.1	0.1	--	0	0	0.3	--
Copepods	63.7	20.2	22.5	73.8	95.3	12.7	40.1	10.6	14.5	8.5	1.9	4.7
Shrimps	--	--	--	--	--	0.1	0.1	--	--	--	--	0
<i>Halobates</i> sp.	31.3	76.8	73.9	--	0.2	--	2.5	8.9	4.2	0.3	--	--
Molluscs	--	--	--	--	0.02	0.1	0.06	0	--	0	--	--
<i>Sagitta</i> sp.	--	--	--	0.34	0.86	--	1.2	--	--	--	--	--
Decapod larvae	--	--	--	--	0.19	0.13	--	0.01	0.01	--	--	--
Miscellaneous	--	--	--	4.87	0.34	0.41	2.20	4.12	1.79	0.29	0.17	2.42

Table 3. Monthly Index of Preponderance of different food items of *A. vaigiensis*

Food item	2004					2005						
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
<i>Chaetomorpha</i> sp.	--	60.1	19.5	25.2	1.1	1.2	11.3	1.6	63.2	7.4	45.9	33.7
<i>Spongomorpha</i> sp.	1.1	0.7	0.6	4.4	0.4	0	71.0	65.8	26.5	89.5	50.5	65.1
<i>Ulva</i> sp.	--	23.8	1.1	0.4	0.5	0.1	0.1	2.2	0.4	2.4	1.2	0.4
<i>C. taxifolia</i>	1.4	0.8	0.7	0.6	--	3.0	0.0	1.3	0.4	0	0.5	0
<i>C. racemosa</i>	--	4.2	0.1	--	2.6	--	5.2	5.7	1.7	0.2	0	--
<i>Gracillaria</i> sp.	0.5	5.0	0.5	69.2	10.3	6.1	5.7	4.6	7.7	0.3	1.4	0.6
Polychaetes	--	--	0	--	0.8	--	0	--	--	--	--	--
Amphipods	1.3	--	--	--	1.0	--	--	--	--	--	--	--
Copepods	92.1	2.2	75.8	--	35.8	--	--	--	--	--	--	--
Shrimps	--	0.1	0	--	0.6	--	2.5	--	--	--	--	--
<i>Halobates</i> sp.	1.46	0.0	0	--	46.6	89.2	3.9	18.1	--	--	0	--
Molluscs	1.5	0.1	0	--	--	--	--	0.1	--	--	--	--
<i>Sagitta</i> sp.	0.2	0	0.3	--	--	--	--	--	--	--	--	--
Decapod larvae	0.1	0.1	0	--	--	0	0	0.1	--	--	--	--
Miscellaneous	--	2.3	1.0	--	--	--	--	0	--	--	0.1	--

observations it may be stated that *A. vaigiensis* exhibited variation in its feeding preferences both size wise (Table 2) and season wise (Table 3).

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<i>Spongomorpha</i> sp.	1.1	0.7	0.6	4.4	0.4	0	71.0	65.8	26.5	89.5	50.5	65.1
<i>Ulva</i> sp.	--	23.8	1.1	0.4	0.5	0.1	0.1	2.2	0.4	2.4	1.2	0.4
<i>C. taxifolia</i>	1.4	0.8	0.7	0.6	--	3.0	0.0	1.3	0.4	0	0.5	0
<i>C. racemosa</i>	--	4.2	0.1	--	2.6	--	5.2	5.7	1.7	0.2	0	--
<i>Gracillaria</i> sp.	0.5	5.0	0.5	69.2	10.3	6.1	5.7	4.6	7.7	0.3	1.4	0.6
Polycheates	--	--	0	--	0.8	--	0	--	--	--	--	--
Amphipods	1.3	--	--	--	1.0	--	--	--	--	--	--	--
Copepods	92.1	2.2	75.8	--	35.8	--	--	--	--	--	--	--
Shrimps	--	0.1	0	--	0.6	--	2.5	--	--	--	--	--
<i>Halobates</i> sp.	1.46	0.0	0	--	46.6	89.2	3.9	18.1	--	--	0	--
Molluscs	1.5	0.1	0	--	--	--	--	0.1	--	--	--	--
<i>Sagitta</i> sp.	0.2	0	0.3	--	--	--	--	--	--	--	--	--
Decapod larvae	0.1	0.1	0	--	--	0	0	0.1	--	--	--	--
Miscellaneous	--	2.3	1.0	--	--	--	--	0	--	--	0.1	--

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