Environment & Ecology 29 (1) : 113—117, 2011
 ISSN 0970-0420

Food and Feeding Habits of Soldierbream *Argyrops filamentosus* (Valenciennes, 1830) from the Arabian Sea Coast of Oman

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Abstract

Food and feeding habits of the soldierbream *Argyrops filamentosus* were studied from the Arabian Sea coast of Oman for two years during April 2005 — March 2007. The stomach contents consisted of substantial quantities of semidigested matter (46.4% during 2005-06 and 60.3% during 2006-07) and identifiable items like sardines, crab, squid, cuttlefish and other crustacean remains indicating the fish an active carnivore. There was not much variation in the food items encountered during various months. Active, moderate and poor feeding observed at various months, maturity stages and size groups of fish suggested no specific trend in feeding intensity. The information gathered would be useful for trophic modelling of marine fishes of Oman.

Key words : *Argyrops filamentosus*, Food, Feeding intensity, Arabian Sea, Oman.

The distribution and seasonal variation of the food organisms of a fish species might affect the shoaling behavior, migration, growth, condition and also the fishery (1). The recent developments to construct trophic models of marine ecosystems (2, 3) require information mainly on the diet composition and food consumption rates besides, biomass and mortality estimates of organisms. Hence, the study of stomach contents of fish becomes pertinent to understand the marine food chain and the predator-prey relationship. The soldierbream *A. filamentosus* (Family : Sparidae) is distributed in the western Indian Ocean region starting from South Africa including Mauritius, Madagascar and Reunion to the Red Sea and coasts of Oman including the Arabian Gulf. This species is one of the commercially important fishes of Oman occurring in shallow coastal waters to deeper offshore reefs (4). The estimated contribution of *A. filamentosus* from the Arabian Sea coast of Oman for 2005-2006 and 2006-2007 stood at 1,130 and 1,100 t respectively (5, 6). The fish has local preference and is marketed fresh or frozen. Except the brief information on the food of *A. filamentosus* from the western Indian Ocean region (7), no detailed study has been carried out on the seasonal variation of food items and feeding intensity of the species. Hence, with a view to develop database for trophic modeling of Arabian Sea fishes, an assessment of the general food composition, seasonal variation of food items and feeding intensity of *A. filamentosus* from the Arabian Sea coast of Oman was made for two years. The present paper deals with the results of the study.

(The authors thank H. E. Dr. Hamed Al-Oufi, the Under-secretary, Ministry of Fisheries Wealth, Government of Sultanate of Oman, for his interest, encouragement and valuable suggestions. The financial support from the Agriculture and Fisheries Development Fund, Government of Sultanate of Oman is gratefully acknowledged).

Methods

Sampling

A total of 1,085 specimens were collected at random every month from the fish caught by the artisanal fishing gears such as gillnets, traps, castnets and beach seines operated in the coastal waters of the Arabian Sea and landed at Lakbi and Salalah landing centres (Fig. 1) between April 2005 and March 2007. The fish were brought to the laboratory in ice box for

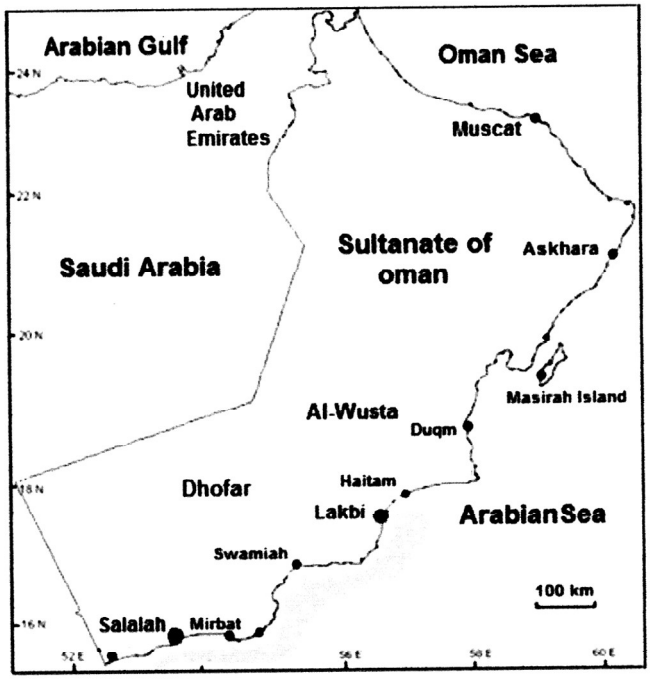

Figure 1. Map showing the sampling locations (Lakbi and Salalah).

qualitative and quantitative estimation of food. Each fish was measured (± 0.1 cm) to its total length (TL). Then the fish was cut open and the sex and maturity stage of the gonad were determined as I-Immature ; II-Maturing 1 ; III-Maturing 2 ; IV-Mature ; V-Ripe / Running and VI-Spent based on the macroscopic appearance and microscopic structure of ova in different stages of ovaries and on macroscopic appearance of testes (8). The stomachs were dissected out and preserved in 5% neutral formalin for subsequent analysis. The size of the fish utilized for the study ranged between 16 cm and 41 cm of TL.

Food Composition

For the general food composition and monthly variation in food items, 709 fish during 2005-06 and 376 fish during 2006-07 were studied. The contents of

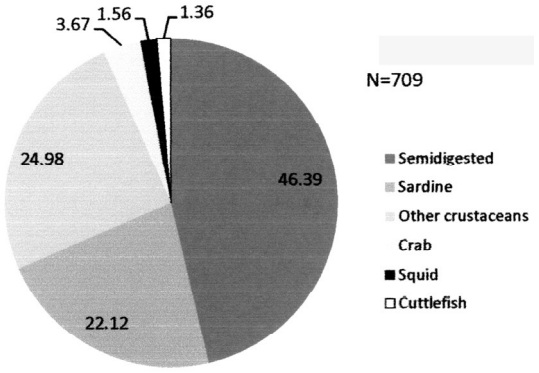

Figure 2. General percentage food composition of *A. filamentosus* during 2005-06.

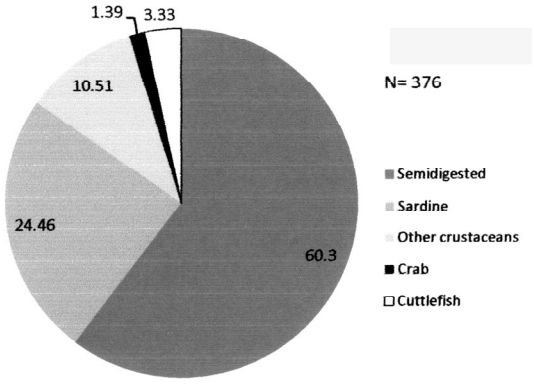

Figure 3. General percentage food composition of *A. filamentosus* during 2006-07.

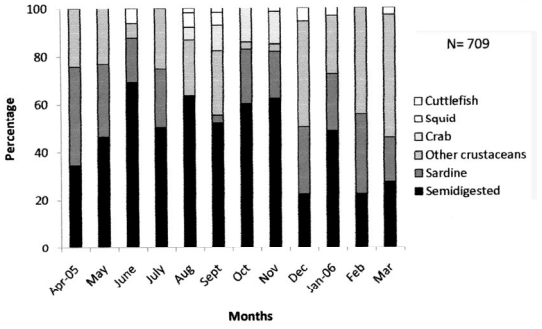

Figure 4. Monthly percentage occurrence of food items in *A. filamentosus* during 2005-06.

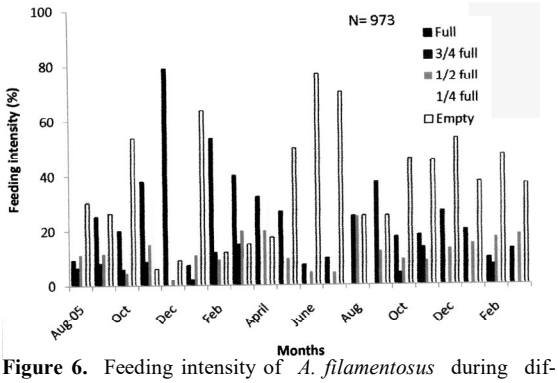

Figure 6. Feeding intensity of *A. filamentosus* during different months.

the stomach were emptied into a petridish and observed under a binocular microscope. For qualitative analysis, the food items were identified up to generic or group level. If the food items were in advanced stage of digestion, they were treated as 'semidigested matter'. For quantitative estimation of seasonal variation of food items, the points (volumetric) method was adopted (9).

Feeding Intensity

To study the feeding intensity in *A. filamentosus*, 973 specimens collected between August 2005 and March 2007 were utilized. Feeding intensity in fish during different months, maturity stages and size groups was estimated. The feeding intensity was recorded based on the state of distension of the stomach and the amount of food contained in it. The fullness of the stomach of fish was graded as full, 3/4 full, 1/2 full, 1/4 full and empty. Fish were considered as actively fed when they were found with full and 3/4 full stomachs and moderately fed when occurred with 1/2 full stomachs. Poor feeding was accounted for stomachs with 1/4 full of food contents.

Results and Discussion

General Food Composition

The food of *A. filamentosus* consisted of animal matter indicating the carnivorous nature of the fish. Among the identifiable food items, the important constituents were the sardines (*Sardinella* sp.), crab, squid (*Loligo* sp.), cuttlefish (*Sepiella* sp.) and other crustaceans (*Penaeus* spp. and other crustacean remains). The bulk of the stomach contents were mainly constituted by the sardine, crustaceans and cuttlefish. There was minor variation in the food components between 2005-06 (Fig. 2) and 2006-07 (Fig. 3). The squids were totally absent during 2006-07. The

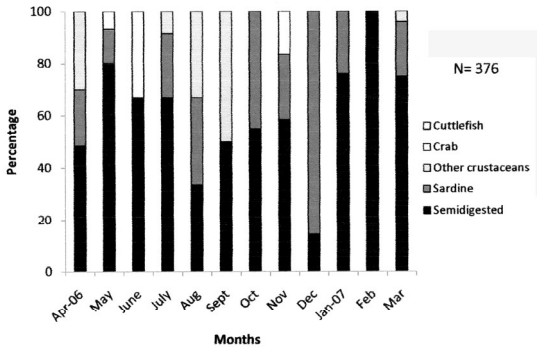

Figure 5. Monthly percentage occurrence of food items in *A. filamentosus* during 2006-07.

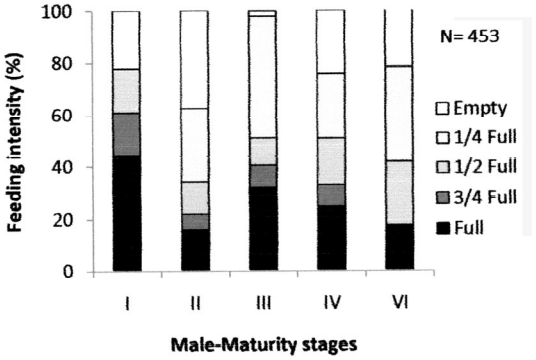

Figure 7. Feeding intensity in relation to different maturity stages of male *A. filamentosus.*

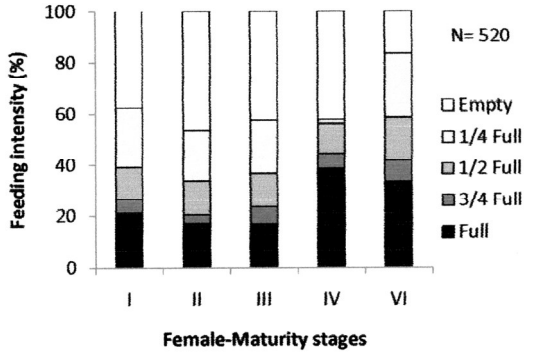

Figure 8. Feeding intensity in relation to different maturity stages of female *A. filamentosus.*

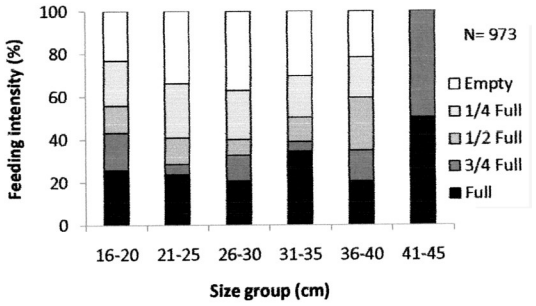

Figure 9. Feeding intensity in different size groups of *A. filamentosus*.

contribution of semidigested matter increased from 46.4% during 2005-06 to 60.3% during 2006-07. However, other crustaceans accounted for lower percentage during 2006-07 (10.5%) than during 2005-06 (25%). The contribution of sardines ranging from 22.1% to 24.5% indicated that this group was an important food item of the soldierbream. The range of food items showed that the fish hunts for the prey. The terminal mouth with four enlarged canine teeth located in the front of each jaw might help the fish for the capture of the actively moving prey. Though, the fish fed chiefly on the benthic invertebrates in the south western Indian Ocean region (7), in the present study, the food items included the sardines besides the invertebrates. The occurrence of semidigested matter in substantial quantities in tropical fishes is common (10, 11) as the metabolic rate is high.

Monthly Variation in the Composition of Diet

During 2005-06, semidigested matter was dominant during most of the months. The percentage of 'other crustaceans' was >20% during all the months except June, October and November (Fig. 4). The contribution of sardine as the food item found in the gut of *A. filamentosus* varied from 3.6% (September) to 41.4% (April). However, sardine was totally absent during August. Crabs occurred during August—November (5.5%—14.3%), squid and cuttlefish occurred in lesser percentages during certain months.

During 2006-07, while, semidigested matter was dominant (33.3% to 100%) occurring almost throughout the year excepting December (14.3%), sardines contributed to higher percentages during December (85.7%), October (45.2%) and August (33.3%) (Fig. 5). Although, other crustaceans were recorded in appreciable quantities during August (33.3%) and May (30.3%), crabs occurred only during November (16.6%) and cuttlefish during May and June (6.7%—33.3%).

Feeding Intensity in Relation to Months

Of the 973 specimens examined for feeding intensity during various months, 358 had empty stomachs. During the entire period of observation, active, moderate and poor feeding was recorded (Fig. 6). The occurrence of fish with active feeding ranged from 10% (July) to 38.2% (May). While, moderate feeding ranged between 6.3% (November) and 41.7% (January) ; higher number of individuals recorded poor feeding during November (75%). Fish with empty stomachs were encountered during all the months.

Feeding Intensity in Relation to Maturity Stages

While active feeding was observed in higher number of males in immature (61.1%) and maturing 2 (40.4%) stages (Fig. 7), in females more number of individuals in mature (44.3%) and spent (41.6%) stages fed actively (Fig. 8). Moderate feeding in males ranged between 10.6% (maturing 2) and 24.2% (spent) of individuals, while females recorded the minimum (11.5%) and maximum (16.7%) in mature and spent stages respectively. Except in immature

males and mature females, poor feeding was common in other stages of maturity in both the sexes. Fish with empty stomachs were more frequently occurring in females than in males. The incidence of empty stomachs is common among the tropical fishes (10, 12).

In some Arabian Sea fishes, empty stomachs or poor feeding condition occur during spawning season (8, 11). As the population of *A. filamentosus* spawned for about eight months (August—March) in a year along the Arabian Sea coast of Oman (8), it appears that there is no relation between the feeding intensity and maturity condition of fish (13).

Feeding Intensity in Relation to Size Group

The feeding intensity in various size groups indicated that there was no relation between the feeding and size of the fish (Fig. 9). Active, moderate and poor feeding including empty stomachs occurred in all the size groups except in the largest size group (41—45 cm), where all the fish had fed actively. Though, the female fish matures at the length of 22.2 cm TL and male matures at 27.5 cm TL (8), there appears to be no drastic change in the feeding intensity from smaller to larger sized fishes. The occurrence of empty stomachs would be due to regurgitation (14), calorific value of the diet of the fish (12, 15) and faster rate of digestion (16).

References

1. James P. S. B. R. 1967. *The ribbon-fishes of the family Trichiuridae of India.* Memoir I, Mar. Biol. Assoc. India. 226 pp.
2. Christensen V. and D. Pauly. 1993. Flow characteristics of aquatic ecosystems. Pp. 338—352. *In* V. Christensen and D. Pauly (eds). *Trophic models of aquatic ecosystems.* ICLARM Conf. Proc. No. 26.
3. Walters C. J., V. Christensen and D. Pauly. 1997. Structuring dynamic models of exploited ecosystems form trophic mass-balance assessments. *Rev. Fish Biol. Fish.* 7 : 139—172.
4. Randall J. E. 1995. *Coastal fishes of Oman.* Univ. Hawaii Press, Honolulu, HI. 439 pp.
5. GoSO (Government of Sultanate of Oman). 2005. *Fisheries statistics book 2005.* Sultanate of Oman.
6. GoSO (Government of Sultanate of Oman). 2006. *Fisheries statistics book 2006.* Sultanate of Oman.
7. Fischer W. and G. Bianchi (eds). 1984. *FAO species identification sheets for fishery purposes, Western Indian Ocean, fishery Area 51.* Food and Agric. Org. of the United Nations, Rome.
8. A1-Marzouqi A., N. Jayabalan, A. Al-Nahdi and S. Al-Habsi. 2009. *Biology, stock assessment and management of six species of demersal fishes from the Arabian Sea coast of Oman.* Demersal Fisheries Project II Final Rep. Min. Fish. Wlth, Oman. 240 pp.
9. Hynes H. B. N. 1950. The food of freshwater sticklebacks (*Gasterosteus aculeatus* and *Pygosteus pungitius*) with a review of methods used in the studies of food of fishes. *J. Anim. Ecol.* 19 : 36—58.
10. Kalita B. and N. Jayabalan. 2000. Food and feeding habits of the golden scad *Caranx kalla* (Cuv. & Val.) along the Mangalore coast. *Environ. Ecol.* 18 : 869—873.
11. Al-Marzouqi A., A. Al-Nahdi, N. Jayabalan and S. Al-Habsi. 2009. Stomach contents and length-weight relationship of the white-spotted rabbitfish *Siganus canaliculatus* (Park, 1797) from the Arabian Sea coast of Oman. *J. Mar. Biol. Ass. India* 51 : 211—216.
12. Sreenivasan P. V. 1974. Observations on the food and feeding habits of the torpedo trevally *Megalaspis cordyla* (Linnaeus) From Vizhinjam Bay. *Ind. J. Fish.* 21 : 76—81.
13. Jayabalan N. and K. Ramamoorthi. 1985. Food and feeding habits of the silverbelly, *Gazza minuta* (Bloch) from Porto Novo coast. *Ind. J. Mar. Sci.* 14 :110—112.
14. Job T. J. 1940. An investigation of the nutrition of the perches of the Madras coast. *Rec. Ind. Mus.* 42 : 289—364.
15. Longhurst A. R. 1957. The food of the demersal fish of a west African estuary. *J. Anim. Ecol.* 26 : 369—387.
16. Qasim S. Z. 1972. The dynamics of food and feeding habits of some marine fishes. *Ind. J. Fish.* 19 : 11—28.