

Foods and feeding of the rabbit fish *Siganus rivulatus* (Forsk.) in the Southeastern Mediterranean

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This paper deals with the quantitative and qualitative aspects of the feeding habits of both adolescent (< 20 cm TL) and adult stages of *S. rivulatus* in the SE Mediterranean waters off the Egyptian coast. Guts of 673 male and female specimens, ranging from 10 to 25 cm total length (TL), were analyzed. Monthly samples were obtained from the commercial fish catch landed at Alexandria fish market throughout a complete year. Fishes were measured, sexed and the stomach contents of each weighed. The food organisms in the examined stomachs were identified to the lowest possible taxon. Variations of the diet with size, sex and seasons were analyzed using the frequency of occurrence (WALKER, 1978) and percentage composition by point method (THOMPSON, 1959) together with the preponderance index (PI) (NATRAJAN & JHINGRAN, 1961). Monthly and seasonal variations in fullness coefficient (FC) and filling index (FI) were analyzed.

The present study showed that *S. rivulatus* feed on a wide variety of both plant and animal food. The plant food (green, brown, and red algae, and diatoms) was dominant and formed 70% of the stomach contents by composition and 92% by occurrence. While the total animal food (Bryozoa, Crustacea, Polychaeta, Mollusca) was less, forming 28% by composition and 42% by occurrence; Green algae, mainly *Ulva* spp. represents the preferable food item taken by the fish, PI, 57%, brown algae *Cystoseira* spp. ranked second, PI, 16% while red algae (*Corallina* spp.), Bryozoa and Amphipoda came third in order of importance, annelids, molluscs and sand appeared to be inadvertently consumed. It is worth to note that *Ulva* is the most abundant genus of the green algae in Alexandria region, followed by genus *Corallina* of the red algae (KHALIL *et al.*, 1988).

No significant differences were found between the diet of males and females. In both sexes, plant foods were dominant, (PI, 83% in females and 87.7% in males), and composed 68% and 72% of the diet and occurred in 89% and 96% of the stomachs of females and males, respectively. The food items of animal origin were less important (PI 16 in females and 11 in males). It constituted 30% and 25% and occurred in 45% and 39% of the analyzed females and males stomachs, respectively.

Food composition changes with fish growth, total plant food decreased with increase in size of the fish, while the amount of animal food increased. In juvenile fish (<15 cm TL) plant foods formed 81% of the diet and occurred in 100% of the fish examined *Ulva* was the major food item (65% by composition) followed by *Corallina* and diatoms. Brown algae were almost completely absent. Animal foods were less common and formed 18.5% by composition and 23% by occurrence. Bryozoa, amphipods and annelids were the major animal foods ingested (Figure 1). These food items (particularly *Ulva* and diatoms) are generally more common in the coastal waters where juvenile stages usually abound. These results corroborate with those reported by LA LAMI (1971). In adult fish (>25 cm TL) both plant and animal foods were quite important, they constituted 54% and 40% of the diet and occurred in 86% and 66% of the examined fish, respectively. Brown algae were the dominant items forming 32% by composition and 82% by occurrence with *Cystoseira*, *Sargassum*, and *Colpomenia* the most important. Red algae formed 14% by composition and 41% by occurrence. Green algae, and seaweed (*Posidonia oceanica*) constituted 6% by composition and 46% by occurrence. Of the animal food, Bryozoa and Amphipoda occurred in 41% and 36% and constituted 10% and 8% of the ingested food, respectively. Mollusca, Annelida, together with barnacle shells were of secondary importance. Such a change in the feeding habits is probably correlated with the behavior of the adult fish which, contrary to juvenile stages, move into deeper waters where these food items are more abundant (KHALIL *et al.*, loc. cit.).

The present results clarify that the fish exhibits substantial seasonal variation in feeding intensity; these variations are probably related to both the behavior of the fish as well as the relative abundance of suitable food. In all seasons, plant food exceeded that of animal origin.

Juvenile fish feed more intensively (maximum FC and FI) during spring and summer, while feeding intensity was minimum in winter.

These results seem to appertain with the relative abundance of preferable food items in the coastal waters in both spring and summer seasons (KHALIL *et al.*, 1988). On the other hand, adult fish feed heavily during autumn following the spawning season in summer (May-August). In summer and winter the feeding intensity was low.

The decrease in feeding intensity during summer is presumably because of the large space occupied by the developed gonads, while the low winter temperature and diminished stock of suitable food may be the cause of the low feeding activity in winter. The present results clearly demonstrates that *S. rivulatus* is a herbivorous-omnivorous fish with greater preference to macrophytes. GOLANI & BARANES (1990) reported that the Mediterranean population of the two rabbit fishes *S. rivulatus* and *S. luridus* show higher trophic selectivity than the source populations in the Red Sea probably indicating their adjustment to the new environment.

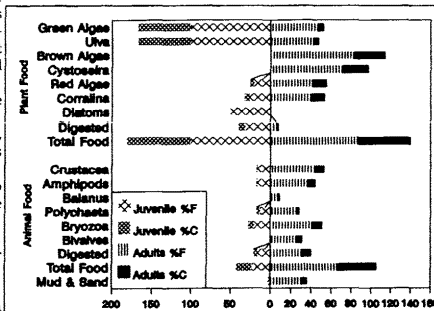


Figure 1. The percentage occurrence and percent composition in the forage categories of *Siganus rivulatus* in function of the size.

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