

# DIET AND FEEDING HABITS OF *SIGANUS RIVULATUS* AND *S. LURIDUS* TWO RED SEA MIGRANTS IN THE SYRIAN COASTAL WATERS (EASTERN MEDITERRANEAN)

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## Abstract

Deux espèces de Siganidae : *Siganus luridus* et *S. rivulatus*, originaires de la mer Rouge, ont établi des populations importantes dans les eaux côtières de Syrie ; formant 55% du rendement de la pêche côtière. L'analyse du contenu stomacal de ces deux espèces montre des restes d'espèces d'algues vertes, rouges, brunes, confirmant leur régime alimentaire herbivore sélectif. L'adaptation éco-physiologique et alimentaire au milieu marin des côtes levantines, différent de celui de la mer Rouge, leur a permis d'installer des populations permanentes.

**Keywords :** Coastal Waters, Fish Behaviour, Algae, Levantine Basin, Fishes.

## Introduction

Being herbivorous, the *Siganus* species need a big quantity of algal food to assure their biological activities. The stomach of these fishes is an acid medium able to digest marine plants before entering in the digestive tract for complete digestion and thus excreting feces. In addition to algal food, they can feed accidentally on some non digestible substances such as mollusk shells and other invertebrates attached to algae [1, 2]. The diet and nature of food and feeding habits of siganids were the subject of many investigations in several geographical areas. The two considered species in our study *Siganus rivulatus* and *S. luridus*, which are of Indo-Pacific and Eritrean origin, have migrated and adapted to the Levantine sea environment, where they found different algal food from that of the Red Sea. They were obliged to change their diet and feeding habits in order to establish populations in the coastal waters. During the last decades, several investigations were conducted with regard to the feeding regime of some siganids in the Red Sea and in the Eastern Mediterranean [3-6]. In this paper we present data on the diet composition and the feeding regime of *S. rivulatus* and *S. luridus* in the Syrian coastal waters.

## Material and Methods

Samples were taken bimonthly during 2002 at three different areas along the Syrian coast: Lattakia, Tartous and Banias (34° 40'-35° 50' N; 35° 50'-36° 05' E). Soon after catching, the stomach and intestine were separated and preserved in 10% formaline for further content analysis. The percent of filled intestine was divided into six categories according to their filled volume; 1: completely empty intestine (0% filled), 2: almost empty intestine (1-25% filled), 3: half empty (26-50%), 4: almost filled (51-75%), 5: completely filled (76-100%), 6: over-filled (>100% filled). After measuring the length, the intestine was dissected longitudinally to extract the content, weighted and transferred into Petri dish for microscopic analysis. After the extraction of all the content, the empty intestine was weighted. The nature of the food content and composition were determined under dissecting and research microscopes. Four coefficients were used to describe the digestion efficiency in *Siganus* species [1, 4].

1-Coefficient of Vacuity of the intestine (CV). This coefficient is calculated by the formula:  $CV = EV / N \times 100$ , where EV is the number of examined individuals with empty stomach, N is the total number of intestines analyzed. This index reflects the richness or poverty of the environment in food.

2-General Nutrition Coefficient (EP). It is calculated by the equation  $EP = Es/Pt \times 100$ , where Es is the weight of filled intestine, and P is the body weight. It estimates the % exploitation of food resources available in the environment.

3-Environmental Coefficient Factor (RES). This coefficient is calculated by the formula  $RES = Pv/Pt \times 100$ , where Pv is the weight of digestive tube+liver+spleen, and Pt is the total body weight. It represents the ratio of internal viscera weight over the body's weight.

4-Frequency of Predation Coefficient (Fp). It is calculated by the formula  $Fp = N/M \times 100$ , where N is the number of intestine containing the food, and M is the number of filled intestines. It represents the percent of food prey (algae) available in the environment and the frequency of the surveyed fish to exploit it.

## Results and discussion

In *Siganus rivulatus* during April the CV was 0% when algal coverage was 65%; during September-October CV was 100%, coinciding with 10% coverage. In Tartous area, *S. luridus* showed CV=90% in October and in Lattakia 80% in February. The minimum EP of *S. rivulatus* was 5% in February and the maximum was 18% in April. The RES was 23% in *S. rivulatus* male and 10% in female during March, whereas during July RES was 10% in male *S. rivulatus* and 16% for females. The Fp was 40% for *Cladophora* and *Enteromorpha*, and 2% for *Gigartina*, *Padina* and *Sargassum*.

*S. rivulatus* and *S. luridus* feed all the time without discontinuity, even during the reproduction and spawning periods that take place in spring. Several varieties of algae were identified in the intestine contents, with prevalence of green algae such as *Ulva*, *Cladophora* and *Enteromorpha*. *S. luridus* seems to be less tolerant to food selection, although the frequency of grazing (Fp) was slightly higher than that in *S. rivulatus*. Some non digested substances were observed in the digestive tubes, such as mud, sand grains, and other debris of phanerogams, which are present in the area, namely *Zostera*, *Halophila* and *Cymodocea*.

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