OBSERVATIONS ON THE BIOLOGY OF *GYMNAMMODYTES CICERELLUS* (RAF. 1810) FROM THE LIGURIAN SEA (NORTH-WESTERN MEDITERRANEAN)

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Abstract

A total of 3133 specimens (larvae and adults) of *Gymnammodytes cicerellus*, collected between June 1995 and June 1996 with nets off the western coast of the Ligurian Sea (North-Western Mediterranean), were analyzed. Total length and weight were measured in order to obtain size-frequency distributions and the size-weight relationship. The reproductive period, evaluated by the annual trend of the Gonadosomatic Index, was observed from December to March with a peak in February, when larvae and recruits occurred too. The sex ratio showed a prevalence of females.

Key-words: fishes, reproduction, spawning, recruitment, Ligurian Sea

Introduction

In the Mediterranean Sea the Ammodytidae family is represented by two species both belonging to the same genus, Gymnammodytes. Since few years ago, only *Gymnammodytes cicerellus* was known to be present in the mediterranean basin. Nevertheless, Sabatés *et al.* (1) collected for the first time larvae and adult specimens of *Gymnammodytes semisquamatus* off the Catalan coast (NW Mediterranean). The differences between the two species are based on morphological, meristic and pigmentation characteristics of larvae and adults (1, 2). *G. cicerellus*, which is characterized by a gregarious behaviour, is mainly distributed in the Mediterranean and Black seas, and along the coasts of Portugal, Marocco and Senegal (3, 4). A detailed morphological description of the species can be found in Tortonese (3) and Sabatés *et al.* (1). This species, whose reproductive biology is poorly known, represents a resource for a small-scale fishery in various areas of the Western Mediterranean (Ligurian: present work; Sicilian: 5, 6, Catalan: 7, French coasts: 8).

In this study we report data on various aspects of the biology of *G. cicerellus* in the Ligurian Sea in order to provide information for a rational exploitation of this fishery resource.

Materials and methods

Samples of *G. cicerellus* were collected at Noli (SV, Ligurian Sea: 44°13' N, 08°25' E; Fig. 1). A total of 8 samplings were carried out between June 1995 and June 1996 using a trawler with a mesh size at the cod-end of 3 mm. The collected specimens were immediately frozen and then processed in laboratory. The identification of larvae and adults was based on Sabatés *et al.* (1). Overall 3133 specimens were measured for total length (TL) and total weight. Gonad weight was also measured for a representative subsample and the gonadosomatic index was calculated (G.I.=gonad weight/ total weight x 100). Sex identification was made macroscopically, while, when the macroscopical observation was not clear, a solution of 0.1 M Toluidine Blue was employed. Thus, sex ratio was determined for all samples.

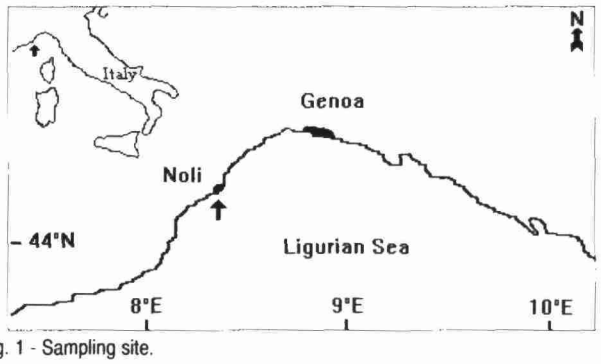

Fig. 1 - Sampling site.

Results

The length-frequency distribution is shown in Fig. 2. The different cohorts throughout the study period are easily identified. Total length ranged between 2 and 15 cm, although specimens longer than 12.5 cm were very scarce. In the catches of February and March 1996, two new cohorts occurred; probably, they must be considered as two subcohorts belonging to the same reproductive event. Young specimens appeared in February 1996 included larvae (mean length: 2.66 ± 0.31cm) and recruits (mean length: 4.95±0.20 cm). Compared to the successive year (Fig. 2), in the sample of June 1995, juveniles deriving from the reproductive season 1994-95 were not present.

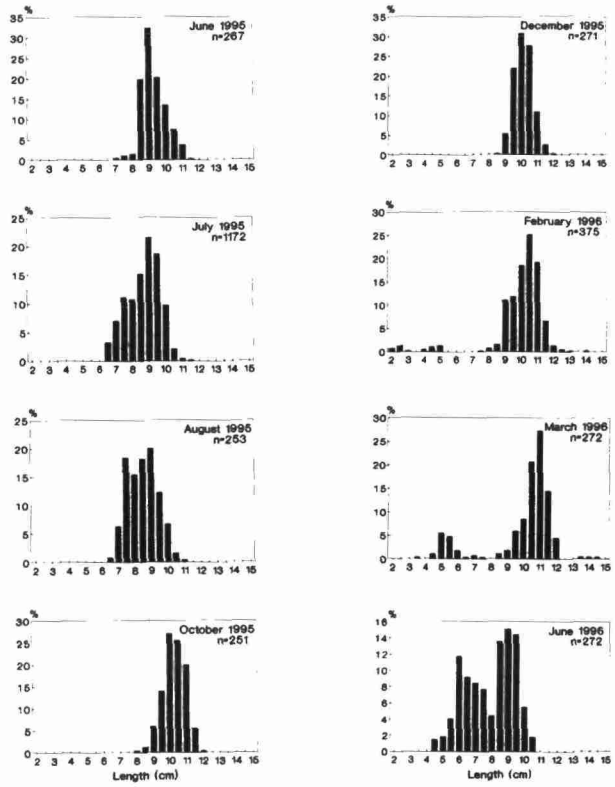

Fig. 2 - Length-frequency distributions of *Gymnammodytes cicerellus*.

Overall, 2211 specimens were used for the computation of the length-weight relationship. The resulting equation is: $W = 0.0022\ L^{3.075}$; $r = 0.97$, $P < 0.001$, where W = weight in grams, L = total length in cm, r = regression coefficient and P = significativity level (Fig. 3).

The cyclic trend of the G.I. (Fig. 4) showed that the reproductive period occurred approximately from December to March with a maximum spawning activity in February. Furthemore, females matured at a slightly smaller size (8.5 cm) than males (9 cm).

Based on the analyzed gonads, 46 males (6.8 %) and 111 females (16.4 %) were identified; this indicates that the bulk of specimens (522, 76.8 %) were undetermined (all individuals in the samples of June, July 1995 and June 1996). In any case, the overall sex ratio (males:females) was found to be 0.41, with a clear prevalence of females.

Five accessory species (*Pagrus pagrus, Pagellus acarne, Atherina sp., Mullus surmuletus, Sardina pilchardus*) were collected in July and August 1995 together with *G. cicerellus*, which represents the target species of this peculiar kind of fishery. All specimens resulted juveniles, but negligible in terms of number of individuals or percentage in weight, except for *Sardina pilchardus* in the sample of July.