

DIFFERENTIAL EGG PRODUCTION OF SARDINE OFF THE CENTRAL HELLENIC COASTS IN DECEMBER 1999

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Abstract

An ichthyoplanktonic and an adult survey were conducted concurrently during December 1999 in the central Aegean and Ionian Seas. Spawning was much more intense in the Aegean than in the Ionian Sea. The overall pattern of the distribution and abundance of eggs was attributable to regional differences in the length/age structure and maturity state of the local adult populations. Higher egg abundance coincided with areas of increased productivity.

Keywords: Fishes, reproduction, ichthyoplankton, Ionian Sea, Aegean Sea

In the Hellenic seas, sardine (*Sardina pilchardus*, Walb.) forms the basis of commercially important fisheries comprising 11.4% of the mean total marine catch (1). As most members of the subtropic Hellenic ichthyofauna, sardine deploys the "bet hedging" spawning strategy producing multiple batches of eggs during a single spawning season. Reproductive traits of clupeoids are highly influenced by the fluctuating biological and physical oceanography of the upper water column which may result in substantial recruitment variability (2). The present paper presents preliminary results on the distribution of the spawning grounds of sardine in the coastal waters of central Greece in relation to reproductive traits of the adult populations and oceanographic characteristics of the area.

Materials and methods

In December 1999, sardine eggs were collected during an ichthyoplanktonic cruise onboard the R/V *Philia* (Fig. 1A). A total of 105 stations were sampled. At each station, a vertical profile of salinity, temperature and fluorescence was made using a Seabird 25 CTD. A standard oblique Bongo-net tow was performed (3). An adult survey was made concurrently onboard the purse-seine fleet and by means of a pelagic trawl operated from the R/V *Philia*. A total of 29 adult samples were collected covering the whole survey area. Fish were preserved in 10% neutral buffered formaldehyde and analyzed in the laboratory (n=1648). Females were measured (total length in mm) and ovary samples were subjected to histological analysis. Histological scoring included the reproductive state of the ovaries (yolk accumulation, presence of postovulatory follicles -POFs).

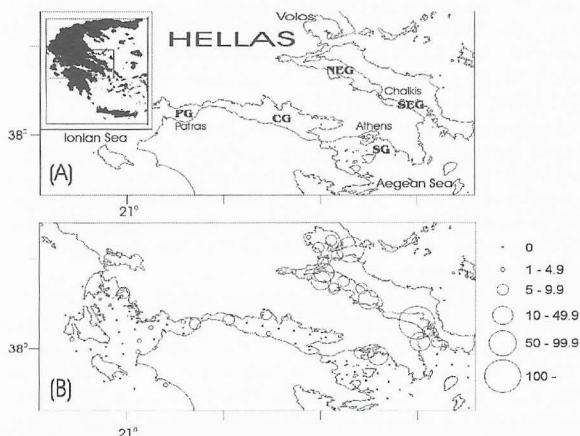


Fig. 1. (A) The study area: NEG=North Evoikos Gulf, SEG= South Evoikos Gulf, SG=Saronikos Gulf, CG=Corinthiakos Gulf, PG=Patraikos Gulf (B) distribution and abundance of sardine eggs (eggs/m²)

Results and discussion

Sardine eggs (Fig. 1B) were more abundant in the N. Evoikos Gulf, the central part of S. Evoikos Gulf and the inner Saronikos Gulf. On the contrary, egg production was very low in the Ionian Sea (Corinthiakos Gulf, Patraikos Gulf and outer Ionian Sea). This difference in spawning intensity might have been due to the under-representation of mature age/length classes in the Ionian Sea and/or the mismatch of spawning periods or spawning peaks between the two seas. Adult samples collected from the Aegean (N.Evoikos Gulf, S. Evoikos Gulf, Saronikos Gulf; Fig. 2) were dominated by individuals larger than 11.5 cm, which is the length at first maturity (4). On the contrary, most individuals were smaller than 11.5cm in the Ionian Sea. Histological analysis of the ovaries showed that in Saronikos and Evoikos Gulfs the bulk of females larger than 11.5cm were mature (presence of yolk in the oocytes) (Fig. 3A). In the Ionian Sea, the fraction of mature females was lower. This pattern was more pronounced when the comparison concerned the presence of POFs in the ovaries (Fig. 3B). Incidence of recent spawning was very low in the Ionian samples.

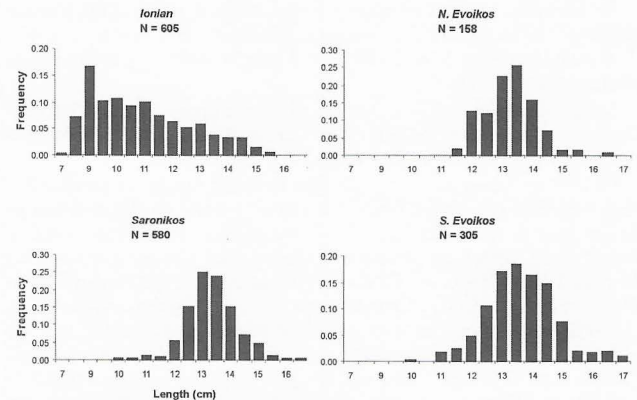


Fig. 2. Length frequency distributions of sardine

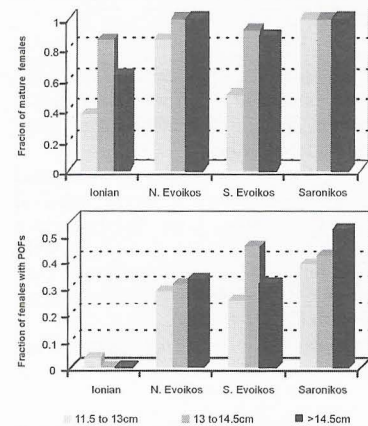


Fig. 3. Fraction of female sardines with (A) yolked oocytes, and (B) POFs, by length classes.

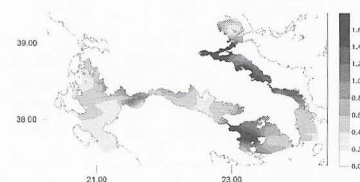


Fig. 4. Mean Chlorophyll-a values (µg/l)

The regional differences in egg production found in the present study seemed to be partially related to the specific productivity features of the two seas. The waters of the Aegean Sea were generally cooler and characterized by higher chlorophyll-a concentrations than the Ionian Sea (Fig. 4). As the energetic component of vitellogenesis in sardine is affected by the feeding capacity of the environment (5), differences in productivity might affect the reproductive output of sardine.

References

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