SARDINE SPAWNING GROUNDS OFF THE BALEARIC ISLANDS OF MALLORCA AND MENORCA IN NOVEMBER, 1984, INCLUDING SOME OBSERVATIONS ON SURFACE TEMPERATURE AND ZOOPLANCTON BIOMASS DISTRIBUTION

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In the month of November, 1984, coinciding with the begginning of Sardina pilchardus' spawning period, an ichthyoplankton survey was carried out aboard the R/V Cornide de Saavedra, around the Balearic islands of Mallorca and Menorca.

A series of 42 sampling stations were realized circumnavigating both islands, in which 64% of the stations sampled were distributed close to the shore, while the resting 36% were more offshore. Bathymetric depths covered vary from 40 mts. to 200 mts..

Sampling gear consisted in a Bongo plankton net of 40 cm. mouth opening for the horizontal oblique tows, equipped with meshes of 250µ and 335µ, General Oceanics 2031 flowmeters and a scuba depth recorder that registered maximum depth attained in the tows.

Plankton samples proceeding from the 250µ mesh were used to evaluate zooplankton biomass expressed in terms of wet weight, dry weight and organic matter, whereas, the 335µ mesh sample was destinated to ichthyoplankton analysis.

Surface temperatures were also recorded in each of the stations sampled.

A total of 4,409 eggs and 3,854 larvae composed the totality of the catches. Although in the sardine's spawning commencement period, Sardina pilchardus represented 31.1% and 16.4% of the totality of eggs and larvae caught, respectively. It is next most important species in terms of abundance to Centracanthus cirrus eggs (50.3%) and Cyclothone braueri larvae (31.1%).

In general, sardine spawning areas have coincided with areas where maximum ichthyoplanktonic abundances have occurred. As in a preliminary survey carried out by Lago de Lanzós (1983), sardine spawning areas are mainly distributed along the southern part of the island of Mallorca, but in particular, maximum sardine egg and larval concentrations have occurred in a sector southeast to Mallorca where absolute maximums of 105.8 eggs/m2 and 22.9 larvae/m2 have been observed (Figs. 1 & 2). Lesser abundances are produced in the southwestern sector corresponding to the Bay of Palma and it's proximities, where relatively high abundances occur, such as, 25.6 eggs/m2 registered in the interior of the bay and 15.6 larvae/m2 in a station west to the bay.

Coincident with Oliver's (1955) first sardine egg surveys around both islands, the northwestern and northern coasts of the islands records no spawning activity.

With regards to the environmental parameters analized, that is, surface temperatures and zooplanktonic biomass, the following observations can be pointed out. Temperatures have ranged from a minimum of 17.6°C to a maximum of 20°C. Surface temperature distribution (Fig. 3), show an area of colder waters located in the southeastern coasts of Mallorca, in the same area where maximum sardine egg and larval abundances have been observed. The warmest waters were found in the northern coasts of Mallorca.

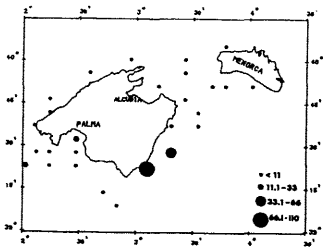

Fig. 1.- Sardine eggs/m^2. (November, 1984).

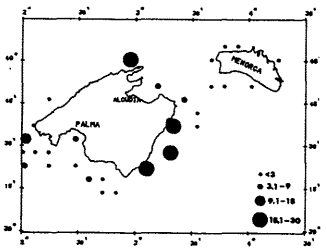

Fig. 2.- Sardine larvae/m^2. (November, 1984).

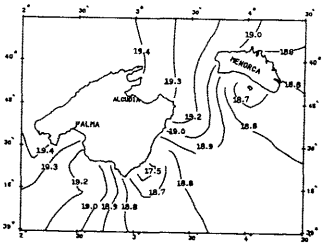

Fig. 3.- Surface temperature distribution (C°).

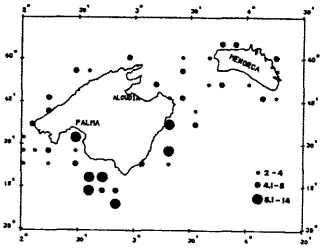

Fig. 4.- Zooplanktonic biomass (mg/m^3).

As to zooplankton biomass, expressed in terms of dry weight, these range from a minimum of 1.94 mg/m3 to a maximum of 13.58 mg/m3. Only seven sampling stations have recorded values over 8 mg/m3, as Fig. 5 shows. These relatively higher values found are distributed in the eastern and southern coasts of Mallorca, principally around the island of Cabrera.

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Oliver, M., 1955. La ponte de la sardine (Sardina pilchardus Walb.) dans le detroit de Gibraltar, la mer de Alboran, les eaux de Levant espagnol et des Iles Baléares. CGPM Debáts Doc. Tech., (3): 103-129.

THE ICHTHYOPLANKTON CAPTURED IN NINE FIXED STATIONS LOCATED AT THE BAY OF MALAGA, FROM MAY TO DECEMBER OF 1977

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The following preliminary data proceed from planktonic surveys carried out during 1977, from the months of May on to December with a two day period of sampling. Unafortunately, the data corresponding to September is lacking, while the sampling in June is overlapped with July (30 th and 1st, respectively). In the remaining months, 9 stations of fixed situations were undercarried, obtaining 54 zooplanktonic samples.

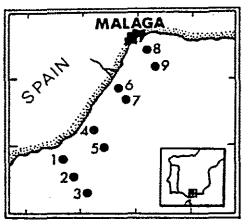

Fig.1.- Stations chart.

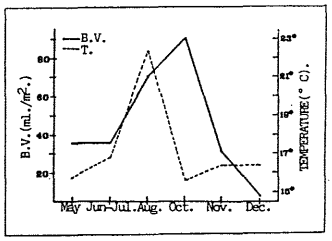

Fig. 2.- Mean monthly values of sedimented plankton (ml/m^2.) and mean surface temperature (C °).

The stations are distributed in the sampling area in four transect. Close to shore stations have been realized in bathymetric depths of 20-25 mts., whereas off shore stations vary from 85-100 mts. depth.(Fig.1).

A Hensen plankton net was used, which was equipped with a 250 µ mesh. All the tows were vertical and the water column sampled varied in function of each station's particular depth, these ranging from 15 to 50 mts..

Temperature and salinity values were taken at different levels of the water column, but for the purpose of tis paper, only surface temperature data shall be considered. Sedimented plankton volumes were also taken.

Fig.2 represents the mean month values of sedimented plankton (ml/m2) contrasted with mean surface temperatures of the sampling area. Highest zooplankton values occur during the months of August and October.

A total of 1,051 larvae were collected, comprising 26 species and 22 taxonomic groups (wich include the genus and family levels). From a total of 2,547 eggs that were caught, only the two important commercial species were classified, that is, Sardina pilchardus and Engraulis encrasicolus. Due to their commercial importance, their particular study will be examined in detail in our following paper.

Monthly egg and larval abundances, considering the totality of species appearing are shown in Fig.3. Highest abundances appear during the month of November. This peak is influenced from October on to December by the importance of the sardine's planktonic elements, that is in it's peak spawning period. Not regarding this species in the compute, greater abundances of eggs occur during June-July, whereas in August for the larvae, possibly caused by an increased spawning activity in the typical neritic species of our coasts.

With regards to the spatial distribution considering as a whole all species collected, greatest abundances of fish eggs have been registered at st.4, with an accumulated density for the whole sampling period of 848 eggs/m2. Highest values of fish larvae appeared in stations 9 & 5, with 235.6 larvae/m2 and 234.3 larvae/m2, respectively.

The ichthyoplankton of this area during the studied time period is characterized by the preponderance of Sardina pilchardus (principally from October to December), in wich their eggs and larvae represent the 52.7% and 39.9%, respectively. This species with the genus Callionymus and the family Myctophidae have represented aproximately 70% of the totality of larvae collected.

Although all sampling stations are litoral, the mesopelagic gonostomatid larvae are quite important in the catches, representing 4.8% of the total catch. These are mainly represented by Maurolicus muelleri (2,9%) wich appears regularly throughout the whole sampling period and Cyclotone braueri (1,9%), wich only appears from May to October. In any case, higher abundances of larvae belonging to the mesopelagic groups (myctophids and gonostomatids) have appeared in deeper waters located in the most western stations.

Along sampling period analyzed, the following succession of the dominant groups of larvae are presented:

MAY: major abundances correspond to the myctophids, wich represent 36,4% of the total, mainly represented by the species; Lampanyctus crocodilus, Myctophum punctatum and Benthosema glaciale, wich among them ammount 27,3%.

JUNE-JULY: newly, the myctophids are the dominant group, with the 54,4% of the total larvae. In order of importance, the most representative species were Benthosema glaciale, Ceratoscopelus maderensis and Lampanyctus crocodilus, wich among them represents 37,2% of total larvae.

AUGUST: the most representative larvae collected corresponds to the genus Callionymus, representing 46,5% of the totality of larvae captured.

OCTOBER: this month registers lowest abundances of larvae and no dominance in the composition of species is observed.

NOVEMBER: Sardina pilchardus is the dominant species appearing, representing 86,5% of the larvae collected.

DECEMBER: the species Sardina pilchardus represents 40,2%. Myctophid larvae have also been important, representing 41% of all the larvae caught, but being Myctophum punctatum (33,6%) the most dominant species in this group.

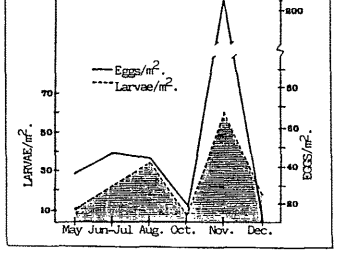

Fig. 3.- Monthly eggs and larvae abundances.