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Distribution and abundance of fish larvae in an area of the central Mediterranean

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Abstract

This work investigates the composition and abundance of fish larvae, the spatial distribution of fish larvae in the area concemed, and the relationship fish larvae-oceanographic characteristics.

The study area is located in the southern Tyrrhenian Sea and extends from Capo Rasocolmo to Cefalù. Data were collected during two ichthyoplanktonic surveys carried out in June 2006 and April 2007. The sampling design was the same but, in June 2006 samples were collected from 39 stations and in April 2007 from 24 stations (using a 60 cm bongo net) due to bad weather and sea conditions.

The sorting of zooplanckton component was made in the laboratory, here only fish larvae were identified to species level following taxonomic and molecular criteria. The number of larvae collected was standardized to 10 m2 of surface.

The analysis of the spatial distribution of the index of the larvae was carried out using the method of interpolation to represent their distribution (ArcGIS Desktop 9.3). Multivariate Analysis (MDS, ANOSIM and SIMPER) was used to examine the association of larval forms.

The CCA (Canonical Correspondence Analysis) was made to correlate the distribution of the larvae to environmental parameters.

During ichthyoplanktonic survey carried out in June 2006, 2184 fish larvae belonging to 32 families have been identified. The most abundant species was *Cyclothone braueri* (Gonostomatidae).

The farnily of Myctophidae was numerically the most abundant with 14 species identified. Among them the most abundant are *Lampanyctus crocodilus, Lampanyctus pusillus* and *Myctophum punctatum*. Between pelagic species the most 'represented' was *Engraulis encrasicolus*.

During ichthyoplanktonic survey carried out in April 2007, 750 fish larvae have been identified and 219 not identified. The larvae of fish belonging to 23 families

identified, the family of Myctophidae is the most represented. *Myctophum punctatum* is the species most abundant followed by *Cyclothone braueri*.

The MDS Analysis detected station groups and larval associations well-defined mainly related to the distance from the coast showing a clear segregation between coastal and open sea stations.

Results of Canonical Correspondence Analysis of June 2006: the species *Trachinus draco, Diplodus annularis, Engraulis encrasicolus, Oblada melanura, Serranus cabrilla, Arnoglossus laterna* were present in most coastal stations and were in:fluenced by temperature. The species *Lampanyctus pusillus, L. crocodilus, Benthosema glacial, Notoscopelus elongatus, Stomias buoy, Cyclothone pygmaea, Myctophum punctatum, Lobianchia dofleini*, *Paralepis speciosa*, *Lestidiops jayakari*, *Trachurus mediterraneus* and *Nemichthys scolopaceus* were mainly present in the stations in the open sea and were influenced by salinity and fluorescence.

Results of Canonical Corrispondence Analysis of April 2007: the distribution of species *Nezumia aequalis, Spicara smaris, Glossanodon leioglossus, Ceratoscopelus maderensis, Paralepis speciosa, Arnoglossus thori, Synchiropus phaeton, Hygophum hygomii* is more influenced by salinity. The species *Carapus acus, Boops boops, Diaphus holti and Cyclothone braueri, Gobius niger, Trachurus trachurus and Actozenus risso* are more affected by temperature, and some Myctophidae as *Lampanyctus pusillus, Myctophum punctatum* and *Notoscopelus* are more affected by fluorescence, depth and oxygen.

The largest concentrations of fish larvae within the gulfs of the Sicilian coast may be related to flow from west to east, along the continental shelf, Atlantic Water Modified. This constant flow might allow the formation of vortices inside the gulfs favoring a good supply of nutrients and thus a greater abundance of larvae.

We have reached the following conclusions: the distribution of larvae is influenced by environmental parameters (temperature, salinity, fluorescence, oxygen); the species exhibit a gradient coast-wide, with a prevalence of Myctophidae in offshore station and species such as anchovies, fish dishes, Sparidae especially in coastal stations showed that both the MDS analysis by CCA; the presence of bays and gulfs, along with the currents and upwelling phenomena often lead to a flow of nutrients, which promote the distribution and abundance of zooplankton and ichthyoplankton.