

SUB-SURFACE ICHTHYOPLANKTONIC ASSEMBLAGES OFF THE BALEARIC ARCHIPELAGO DURING THE 2004 BLUEFIN (*THUNNUS THYNNUS*) SPAWNING SEASON

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Abstract

Key ichthyoplanktonic species associations are established on the basis of hydrographic and geographic distribution over the open sea waters surrounding the Balearic archipelago. Tuna species comprise a community linked to open sea waters of Atlántic origin. Another ichthyoplankton community is comprised by neritic species, which show different distributional tendencies based on their preferential water masses and their respective environmental characteristics.

Keywords : *Balear Sea, Ichthyoplankton.*

Introduction

The waters off the Balearic archipelago form part of the spawning habitat of larval top predator species, among which bluefin (*Thunnus thynnus*) and other tuna-like species represent an important fraction of the ichthyoplanktonic assemblages [1]. The hydrography of the area is characterized by the encounter of Atlantic and Mediterranean water masses causing an intense circulation pattern coupled to important mesoscale features such as gyres and fronts [2]. Consequently, contrasting environmental conditions occur that contribute to the high ichthyoplanktonic diversity in the area [3] and the distribution of the early life history stages of many fish species, among which bluefin and its associated species, are strongly influenced by the environmental features of water mass origin.

Material and Methods

The ichthyoplankton samples were collected in the TUNIBAL 06/04 survey on board the *R/V Cornide de Saavedra* from June 18-July 10, 2004. A total of 157 sub-surface plankton horizontal tows with a Bongo (500 microns) quadrangular net whose aperture measures 1 m diagonally were carried out over a regular 10x10 nautical mile station grid, mostly distributed over the southern part of the archipelago (Fig. 1). All tows were fixed at 10 minutes duration. In each station a CTD rosette (Seabird 25) was cast.

To define ichthyoplankton assemblages, a hierarchical cluster analysis of a Bray-Curtis similarity matrix calculated between species by ranked larval abundance was performed [4], considering only those species or groups that represented 1% of the total catch.

Mesopelagic species comprised the most important group of the ichthyoplankton (38%), with two species, *Ceratocopelus maderensis* (15%) and *Cyclothone spp.* (12%) representing the major part. While, *C. maderensis* was mainly distributed over the northern part of Ibiza and the Mallorca Channel in cooler waters of Mediterranean origin, *Cyclothone spp.* was more widely dispersed over the survey area but showing highest abundances in the area south of Menorca. Due to their oceanic distribution both species were grouped under species association A (Fig. 2b).

The B species association defined by the cluster analysis shows two sub-groups (B1, B2) differentiated by their spatial location and thereby, its hydrographic characteristics. Among the species of neritic character, the most abundant was *Chromis chromis* (11.3%), which showed more preference for water masses of Mediterranean characteristics (B1).

The main coastal pelagic species found was *Engraulis encrasicolus* (9.3%). It was mainly distributed north of Ibiza, most likely indicating its drifted origin from the northern coasts of Catalonia. The species was mostly found in Mediterranean waters, thus forming part of the B1 species association. In contrast, *Sardinella aurita* (2.6%), as key species of the B2 sub-group, was mainly found north of Menorca. In terms of abundance, the *Trachurus spp.* (3.5%) was important in terms of abundance, showing a distributional overlap with both of the previous species.

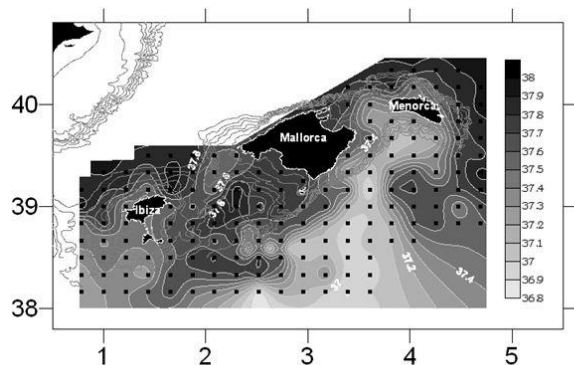


Fig. 1. TUNIBAL survey map: dots represent stations and shaded greys salinity at 10 m depth.

Results and Discussion

A total of 19,993 larvae and pre-juveniles were sorted from one cod-end of the net that were categorized under taxonomy levels of 21 species, 12 genera, 9 families and 1 order. Larvae of top predator species (tuna and swordfish) represented 29% of the total ichthyoplankton catch, among which bluefin (*T. thynnus*) and frigate tuna (*Auxis rochei*) were most abundant (Fig. 2a). The main bulk of the tuna species were distributed in the oceanic waters south of Menorca where transitional and warm water masses of Atlantic origin (23.5-25°C) forming a large anticyclonic gyre in the area (Fig. 1). The tuna species form part of the cluster association A whose distributional grounds is mainly centred south of Menorca.

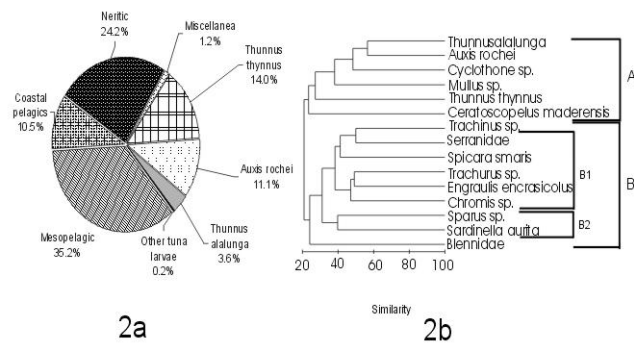


Fig. 2. (a) Ichthyoplankton composition, (b) Species cluster dendrogram.

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