

AUTUMN OVERLAPPING OF *SARDINA PILCHARDUS* AND *MERLUCCIUS MERLUCCIUS* EARLY STAGES IN THE NW MEDITERRANEAN: DISTRIBUTION AND DIET

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Abstract

This study analyses the distribution and diet overlap of the early stages of sardine and hake off the Catalan coast during the autumn spawning period. Data on horizontal and vertical distributions of eggs and larvae, the larval size structure in the overlapping zones and the diet composition are examined. Information derived from the study of larval diet was used to discuss the consequences of the overlapping distributions.

Keywords: *Ichthyoplankton, Diet, Western Mediterranean*

In this study we analyse whether there is overlap in horizontal and vertical distribution of eggs and larvae of sardine and hake, as well as on their larval feeding preferences. Samples were collected in November 2005 off the Catalan coast, by means oblique Bongo (300 µm) hauls in a grid of stations from coastal to slope regions. Stratified samples differentiating water column at 10 m intervals, from surface to 150 m, were also obtained by means oblique hauls using a Longhurst Hardy Plankton Recorder (LHPR) (280 µm) performed in a transect carried out following the 200 m isobath. Sardine larvae were the most common and abundant species during the cruise, 97% of occurrence; while hake larvae occur in 67% of the stations. Although the sampling was performed during the spawning period for both species (1, 2), the abundance of sardine eggs and larvae was an order of magnitude higher than that observed for hake. Horizontal egg and larval distributions of both species showed a conspicuous overlap in the shelf-break region. Sardine eggs and larvae were found along all the study region, with higher abundance of earlier stages (eggs and <5 mm larvae) on the shelf region. Hake larval distribution was restricted to the shelf break, while eggs showed a slightly widespread pattern, but with higher abundance also at the shelf-break.

The vertical structure of the water column shows the initiation of the autumn mixing processes, with slight stratification (Fig. 1), under this situation, an important overlap in vertical distributions of eggs and larvae of sardine and hake was evident, both species appearing along the 150 m of the water column, although sardine showed higher concentrations in the first 100 m.

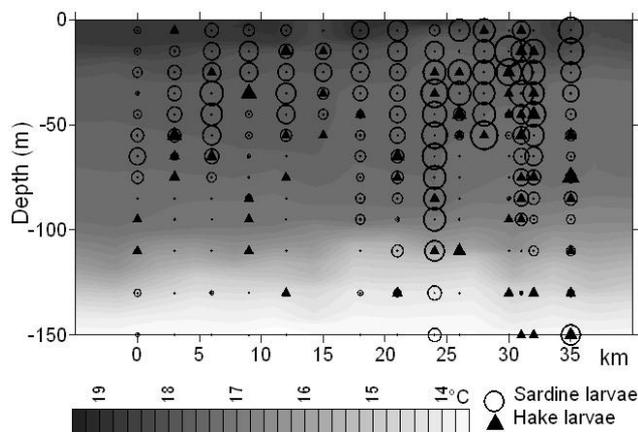


Fig. 1. Vertical distribution of temperature along the 200 m isobath transect, with overlaying sardine and hake larval abundance (log scale). Highest sardine symbol denote 5416 larvae/1000 m³, and highest hake symbol denotes 108 larvae/1000 m³

The comparison of the diet composition of the larvae of the two species along their development (sardine larvae from 5.5 to 15.8 mm SL and hake from 2.5 to 10 mm) showed that there is no overlap in the prey items they feed on (Horn index=0.37). While preflexion sardine larvae (<10 mm) mainly fed copepod nauplii and small preys as tintinnids, small hake larvae (<4 mm) have a diet already based on adult copepods. Larger sardine larvae (from 10-16 mm) showed a shift in their diet to the postnaupliar stages of calanoid copepods like *Clausocalanus* sp. Hake larvae from 3-10 mm continue with a diet based on adult copepods, being *Clausocalanus* sp., by far, the dominant prey, followed

by *Paracalanus* sp.

Trophic ecology of hake larvae are influenced by its big mouth and large looped-guts, which allows them to eat and digest a relatively high number of big preys. The feeding incidence in these larvae was significantly higher than in sardine (90>30%). Although there is an important overlap in the distribution of the larvae of both species and sardine larvae are more abundant than hake, we think that there is no competition among larvae of both species because there is no overlapping between their diets (Fig.2, Costello's graphic).

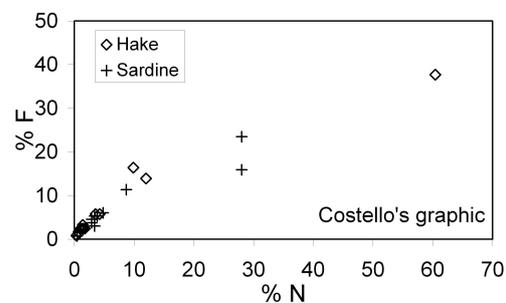


Fig. 2. Diet composition according to Costello's graphic method for *Merluccius merluccius* and *Sardina pilchardus* larvae. N%: Percentage of abundance and F%: Percentage of occurrence of each prey item in the larvae

References

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