Early Life History of Anchovy in Catalan Coast (NW Mediterranean)

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Twelve ichthyoplankton cruises were made over the continental shelf of the catalan coast of Spain between 1983 and 1985 in order to determine the distribution and abundance of anchovy (Engraulis encrasicolus) eggs and larvae and other aspects of its early life history.

The results of this study have shown that there are two main spawning subareas in the sampling area: one at the north, influenced by the Golfe de Lion hydrographic conditions, and the other at the south, associated with the River Ebro delta. The maximum densities were found on the shelf break associated with a shelf-slope hydrographic front (Font et al., 1988). Related to the temperature cycle, the duration of the spawning period shows differences in both areas, being shorter in the north than in the south, with peak in both subareas occurring in June. The spawning starts approximately at 13.5 °C but it gets intensified between 18-22 °C; finally when the water temperature decreases the spawning gradually stops. On the north spawning subarea this decrease is faster than on the south one determining shorter reproductive periods.

In spite of a large reproductive period on the south area the total egg production, in 1983, was higher on the north with a value of 44669.7 x 10^9 against 35077.5 x 10^9 on the south.

The vertical distribution analysis denotes that the maximum egg and larvae abundance were located above the thermocline specially in very stratified water conditions. Spawning occurs at depths between surface and 10 m. Small larvae (2-4 mm SL) were founded over the same depth range than eggs, while bigger ones were scarcely located with a marked concentration between 10 and 30 m depths. Diel vertical migrations were observed on larger larvae (from 10 mm SL) which were situated near surface during the night but migrate to deeper waters (30 m) during day time.

Related with larval feeding it seems to be a contradiction between the levels of maximum productivity (high chlorophyl) and the distribution of larvae, mainly in zones where anchovy larvae are most abundant. Nevertheless, the main components of the food of other clupeoid larvae (Blaxter & Hunter, 1982) such as dinoflagellates and copepod eggs and nauplii are distributed in western Mediterranean between surface and 50 m (Margalef, 1985) as shown for anchovy larvae.

A growth model for larval anchovy in their natural environment was established, based on the analysis of daily growth increments in the otoliths (Palomera et al., 1988). The Gompertz growth equation suitably describes the growth of this species in a length range of 3 to 23 mm. A instantaneous growth rate of 0.9 mm d^{-1} was calculated for 8 mm larvae at a temperature of 20 °C; that means that the larva ateint a 10 mm length in eight days from first feeding.

Mortality rates were calculated from the decline in abundance of anchovy larvae through succesive age-classes within the peak spawning months of the three years, and egg production and mortality rates compared between the two spawning subareas and among years (Palomera and Lleonart, 1989). Mortality rates ranged from 0.17 to 0.58. Mortality was higher in 1983 than in 1984 and 1985, coinciding with a high production of anchovy eggs in that year. In general, mortality at the northern spawning area was lower than at the southern one. It seems that the profits of exploiting the production over a narrower time period assures higher larvae survival on a more unstable area.

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