# Differences in Sardine (*Sardina pilchardus* Walbaum) growth among the several areas in Mediterrannean Iberian Peninsula and Golfo de Leon Shelf

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Hydroacoustic surveys have been carried out yearly (except at 1986 and 1989) by the IEO in order to estimate the biomass of pelagic fish populations from Mediterranean Iberian Peninsula and Golfo de Leon shelf (1).

4142 pairs of sardine sagitta otoliths, belonging to specimens sampled at the different prospected areas during these cruises, have been readed using standard techniques (2). The age assigned to each specimen was its year class plus year fraction from 1st January to the sample day.

Data from the whole of surveys, including year classes range 0-5, were used jointly to estimate Von Bertalanffy growth parameters at each zone. Cataluña was not included in the study because of the scarcity of samples.

Number of analised specimens is detailed in table 1. Growth curves of the different zones can be seen in fig.1. Estimated growth parameters appear in table 2. As L and K values are correlated, Phi values (3) were calculated (table 4) to obtain the growing performance of the populations in the diverse areas.

In order to know the statistic significance of the differences, Hotelling's T2 test (alfa=0,001) was applied (4). Relative significance among parameters was estimated using Roy-Bose simultaneous confidence intervals (4).

The test results (table 5) showed that sardine growth in those areas differ significatively. However Alboran and Vera Gulf are closely related, as well as Alicante, Valencia and Leon Gulf areas are also related among them.

These data would indicate that there are not important migrations of sardine populations along Mediterranean Iberian Peninsula Shelf. The significative differences in sardine growth among so geographically proxime zones could be explained by several hypothesis, like variations in primary productivity, genetic characteristics or birthdate of recruits at each area. Further studies will be carried out to correlate sardine growth with those parameters.
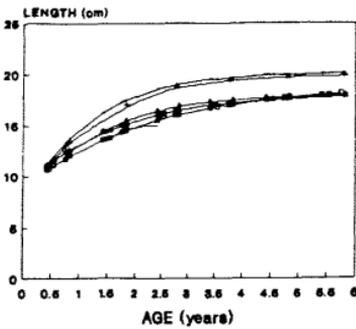


-Fig.1-GROWTH CURVES.

| | φ VALUES |
|---|---|
| ALBORAN | 5,86 |
| GOLF.VERA | 5,80 |
| ALICANTE | 5,30 |
| VALENCIA | 5,07 |
| GOLF.LEON | 5,51 |

TABLE 3-PHI VALUES.

T2 VALUES(To=17,7)

GOLF.VERA ALICANTE VALENCIA GOLF.LEON

| | | | | |
|---|---|---|---|---|
| ALBORAN | 4526 | 182101 | 189050 | 86993 |
| GOLF.VERA | | 57999 | 62053 | 24133 |
| ALICANTE | | | 7454 | 5234 |
| VALENCIA | | | | 10335 |

TABLE 4-HOTELLING'S T2 VALUES.

### ALBORAN — GOLF.VERA — ALICANTE — G.VALENCIA — GOLF.LEON

| | O | I | II | III | IV | V | VI+ | TOTAL |
|---|---|---|---|---|---|---|---|---|
| ALBORAN | 697 (7) | 173 (6) | 94 (5) | 25 (5) | 20 (5) | 3 (3) | 2 (2) | 1014 |
| G.VERA | 249 (6) | 31 (2) | 23 (3) | 21 (3) | 14 (3) | 6 (1) | 5 (3) | 349 |
| ALICANTE | 574 (7) | 316 (7) | 98 (7) | 17 (5) | 10 (5) | 2 (2) | 1 (1) | 1018 |
| VALENCIA | 438 (7) | 330 (7) | 149 (6) | 77 (6) | 25 (5) | 9 (3) | | 1028 |
| CATALUÑA | 314 (4) | 66 (3) | 12 (1) | 6 (1) | | | | 398 |
| G.LEON | 165 (2) | 60 (3) | 39 (3) | 31 (3) | 23 (3) | 16 (3) | 1 (1) | 335 |
| TOTAL | 2437 | 976 | 415 | 177 | 92 | 36 | 9 | 4142 |

TABLE 1-NUMBER OF ANALISED SPECIMENS BY AGE CLASS AND ZONE.

ESTIMATES OF GROWTH PARAMETERS

| | L | K | To |
|---|---|---|---|
| ALBORAN | 20,148 | 0,861 | -0,504 |
| GOLF.VERA | 19,921 | 0,836 | -0,506 |
| ALICANTE | 18,102 | 0,611 | -1,119 |
| VALENCIA | 18,932 | 0,446 | -1,409 |
| GOLF.LEON | 18,121 | 0,752 | -0,731 |

TABLE 2-ESTIMATED VON BERTALANFFY GROWTH PARAMETERS.

RELATIVE SIGNIFICANCE AMONG PARAMETERS

| | | (P1-P2) | CONF.INT. | CRITIC.Fo |
|---|---|---|---|---|
| ALB/G.VERA | L | 0,2271 | +/-0,2630 | 24,5 |
| | K | 0,0246 | | 4,5 |
| | To | 0,0025 | | 0,0 |
| ALB/ALC | L | 2,0458 | +/-0,1719 | 8869,8 |
| | K | 0,2599 | | 3549,9 |
| | To | 0,6149 | | 23514,0 |
| ALB/VAL | L | 1,2162 | +/-0,1866 | 769,2 |
| | K | 0,4153 | | 3037,6 |
| | To | 0,9048 | | 4433,7 |
| ALB/G.LEON | L | 2,0268 | +/-0,2659 | 2308,1 |
| | K | 0,1090 | | 98,7 |
| | To | 0,2271 | | 257,2 |
| G.VERA/ALC | L | 1,8188 | +/-0,2628 | 227,4 |
| | K | 0,2255 | | 163,3 |
| | To | 0,6125 | | 398,0 |
| G.VERA/VAL | L | 0,9891 | +/-0,2625 | 24,9 |
| | K | 0,3907 | | 715,5 |
| | To | 0,9023 | | 840,4 |
| G.VER/G.LEON | L | 1,7997 | +/-0,3239 | 861,4 |
| | K | 0,0844 | | 66,4 |
| | To | 0,2246 | | 231,1 |
| ALC/VAL | L | 0,8297 | +/-0,1863 | 312,5 |
| | K | 0,1652 | | 3,0 |
| | To | 0,2899 | | 570,3 |
| ALC/G.LEON | L | 0,0191 | +/-0,2857 | 0,2 |
| | K | 0,1611 | | 220,0 |
| | To | 0,3878 | | 426,0 |
| VAL/G.LEON | L | 1,8106 | +/-0,2654 | 256,4 |
| | K | 0,3063 | | 1716,3 |
| | To | 0,6777 | | 2096,8 |

TABLE 5-ROY-BOSE SIMOULTANEOUS CONFIDENCE INTERVALS.

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