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.

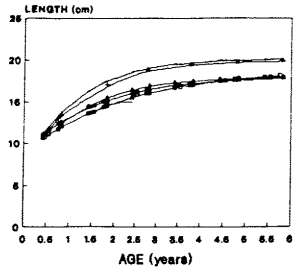
Data from the whole of surveys, including year classes range 0-5, were used jointly to estimate Von Bertalanffy growth parameters at each zone. Cataluña was not included in the study because of the scarcity of samples.

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 simoultaneous 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.

	0	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	185 (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.

	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.

RELATIVE SIGNIFICANCE AMONG PARAMETERS

		(P1-P2)	CONF.INT.	CRITIC.Fo
ALB/G.VERA	L	0,2271		24,5
	K	0,0246	+/-0,2630	4,5
	To	0,0025		0,0
ALB/ALC	L	2,0458		8869,8
	K	0,2599	+/-0,1719	3549,9
	To	0,6149		23514,0
ALB/VAL	L	1,2162		769,2
	K	0,4153	+/-0,1866	3037,6
	To	0,9048		4633,7
ALB/G.LEON	L	2,0268		2308,1
	K	0,1090	+/-0,2659	98,7
	To	0,2271		257,2
G.VERA/ALC	L	1,8188		227,4
	K	0,2255	+/-0,2628	163,3
	To	0,6125		398,0
G.VERA/VAL	L	0,9691		24,9
	K	0,3907	+/-0,2625	715,5
	To	0,9023		840,4
G.VER/G.LEON	L	1,7997		861,4
	K	0,0844	+/-0,3239	66,4
	To	0,2248		231,1
ALC/VAL	L	0,8297		312,5
	K	0,1652	+/-0,1863	3,0
	To	0,2899		570,3
ALC/G.LEON	L	0,0191		0,2
	K	0,1411	+/-0,2657	222,0
	To	0,3878		428,0
VAL/G.LEON	L	0,8106		256,4
	K	0,1063	+/-0,2654	1718,3
	To	0,6777		2096,8

TABLE 5-ROY-BOSE SIMOULTANEOUS CONFIDENCE INTERVALS.

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V

Contribution to the knowledge of growth of Greater Amberjack, *Seriola dumerili* (Cuv. , 1817) in the Sicilian Channel (Mediterranean Sea)

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Des études sur l'évaluation du stock et la biologie de la Sériole couronnée ont été effectuées en 1989, 1990 et 1991 dans le Canal de Sicile. L'étude de l'âge et de la croissance de l'espèce fait partie des objectifs de cette recherche. La corrélation taille-poids obtenue est la suivante : $W = 0.000049\ SL^{2,723}$. L'évaluation de l'âge, effectuée par la lecture des écailles a permis de séparer 8 classes d'âge ; on n'a pas considéré nécessaire de séparer les deux sexes pour ce qui concerne la croissance. Les paramètres de von Bertalanffy sont les suivants: L_{oo} (cm) = 167; t_o = -0.770; K = 0.1850.

In a research programme on the biology and the stock assessment of Greater Amberjack, the growth of this species has been studied. This species is interesting for Italian fishery because it is an important underexploited resource. It is very important for mariculture because it is possible to obtain high growth value in a short time. Greater Amberjack is a cosmopolitan fish with a large distribution in the world. This species is catched by fishermen using trammel net and purse seine but the sportive capture carried out mainly on the juvenile by trolling is not trascurable.

The investigation area was the South Tirrhenian Sea and the Sicilian Channel but the data used in the present work are coming only form south Lampedusa island fishing zone (fig. 1) because in relation with preliminary data it is possible to suppose that we have not one unit stock in the whole area.

According to LAZZARI (1988), this zone resulted the main spawning area in the Sicilian Channel.

In the three year investigations (1989, 90, 91) 4800 length and weight data were collected in landings and 1140 specimens ranging between 35 cm and 167 cm of standard length, were sampled, by rent professional fishing vessel using purse seine.

Standard length were preferred to total length because working on bif fishes in commercial catches the first one is more precise and easy to mesure, the tail beeing broken in many specimens.

The size frequency histograms are showed in fig. 2. In each sample, biometrical and weigth measurement have been recorded, sex and gonadic maturity determined and scales collected. In some specimens otoliths and vertebra have been collected too for comparative readings, the scales resulted more clear and easy to read.

The length-weight relationship has been calculated : $W=0.000049\ SL^{2,723}$.

Thus, we can identify 8 age-groups up to 142 cm because the bigger specimens were too rare to be employed for a correct age determination.

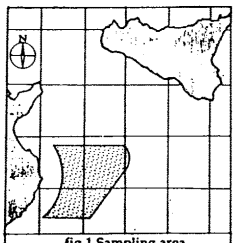

fig 1 Sampling area

The parameters of von Bertalanffy's growth equation have been calculated : L_{oo} = 167; T_o = -0.770; K = 0.1850.

Growth curves were calculated separately for the two sexes but there are not significative differences between males and females so, just one growth curve is proposed (fig. 4).

Since samplings have been always carried out during the spawning period, each agering correspond to a real fish year life.

In litterature there are not references for wild Greather Amberjack age determination but only for growth obtained in mariculture or for the other species of the genus.

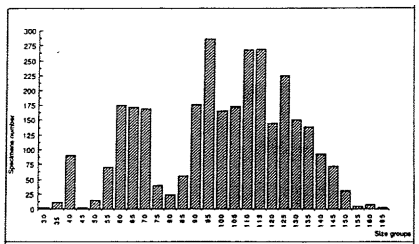

FIG. 2: SIZE FREQUENCY IN SAMPLING YEARS (1989/90/91)

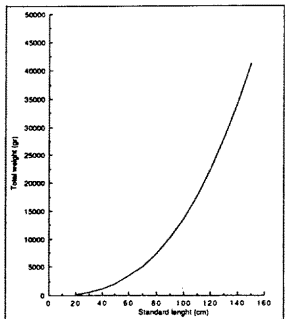

FIG 3 LENGHT - WEIGHT RELATIONSHIP

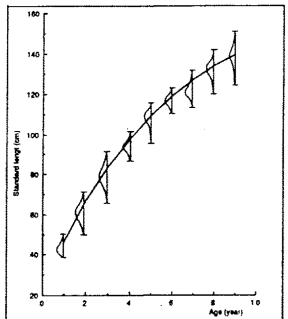

FIG 4 GROWTH CURVE

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