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Size and age at first maturity in Horse Mackerel (*Trachurus trachurus* L.) from the Adriatic Sea

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Size and age at first maturity are important characteristics for the assessment of a species under exploitation. The knowledge of these parameters makes possible a rather real evaluation of spawning biomass since they directly affect its reproductive potential, defining the reproductive life span of individuals.

This paper presents the result of studies of variations in mean length and mean age at first maturity in horse mackerel from the Adriatic Sea. This species makes up a considerable part of the trawl catch at the eastern Adriatic coast.

The data used cover the 1986-1988 period. Total length (L , cm), weight and sex were recorded. Gonad maturity was determined by macroscopic examination using Macer scale of specific maturation (MACER, 1974). Age was estimated by otoliths reading. Mean age (A_0) and mean length (L_0) at onset of maturity and the reproductive life span (RLS) were calculated by the Lysack formula (TRIPPEL and HARVEY, 1987). Length (L_{50}) and age (A_{50}) for 50 % maturity as well as length (L_{95}) and age (A_{95}) at 95 % maturity were taken directly from the maturation curves.

Variation in mean length and mean age (years) at first maturity of horse mackerel for the period 1986-1988 are as follows:

Year	Sex	N	L_0	L_{50}	L_{95}	N	A_0	A_{95}	A_{catch}	RSL
1986	Males	150	19.70	20.84	26.34	61	2.56	5.70	3.44	0.88
	Females	154	19.28	20.22	25.88	72	2.13	5.10	3.23	1.10
1987	Males	155	19.57	21.65	26.50	98	2.82	6.08	4.11	1.29
	Females	134	19.41	21.60	27.15	85	2.68	6.15	3.57	1.08
1988	Males	180	20.60	23.15	27.12	103	2.70	5.88	4.00	1.30
	Females	201	20.66	22.42	26.90	111	2.54	5.05	3.98	1.44

Onset of maturity in males tended to occur at larger sizes and older ages than in females. However, it may be stated that both males and females mature during the third year of age. The complete population reaches maturity not earlier than at five years of age. The transition from all immature to 100 % mature condition occurred over a 10 cm interval of length and 3 to 4 years of age, for both males and females. The intervals tended also to increase.

When mean length at onset of maturity in males and females is compared to asymptotic length of this species, which was estimated to be 37.55 cm, for 1980-1981 period (ALEGRIA, 1984), it may be concluded that in both sexes the onset of maturity takes place when the specimens attain 52 % of the total length. This suggests that the reproduction strategy is rather late, probably due to the fact that most of energy is expended on the process of fast growth of adolescents.

The values obtained for each separate year of our study show a tendency to slight increase of mean length at first maturity, particularly in females. In relation to the age, however, the variations show no defined trend. The changes observed are probably related to changes of sea water temperature and favourable environmental conditions, which affect genetically defined length and age at onset of maturity. It is known that the increase in length and age at first maturity normally corresponds to years classes hatched at higher population biomass, since under those conditions reaching first maturity takes more time. This can mean that the horse mackerel stock is subexploited in the Adriatic Sea. However, it is uncertain if these were actual trends or due to sampling variability.

In the catch of horse mackerel in the eastern Adriatic, the adolescents up to 2.5 years of age make up 38 %, 41 % are individuals of 3-5 years and the rest are older individuals. On this basis the mean age of catches was estimated. If first maturity occurs when females attain, on average for 1986-1988 period, 2.45 years of age their reproductive life span lasts 1.25 spawning periods. Similar may be stated for males.

In summary, this study has indicated that there has been a trend of slight increase in mean length and age at first maturity of horse mackerel of the Adriatic Sea, resulting in a shorter reproductive life span. However, further data are necessary to determine if this will be continued.

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