The Length-Weight Relationship and Condition Factor as Ageing Functions of Anchovy in the Middle Adriatic

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This paper is an account of the length-weight relationship and cubic condition factor variations as an ageing function as well as the conversion factor relationship between total and standard length of the juvenile and adult anchovy, Engraulis encrasicolus (L.) population from the coastal waters of the Middle Adriatic.

Anchovy specimens were randomly collected from commercial (purse-seining) pelagic catches during spawning season in Summer 1979. A total of 1,847 anchovy specimens were examined. Data on anchovy total and standard lengths are expressed in centimetres. The fishes were weighted to the nearest 0.01 g. Sex determination and state of gonads were by visual inspection. All of the adult anchovy specimens were at the most advanced state of maturity of gonads. The juvenile anchovy gonads were immature. The otoliths were used for aging the anchovy.

The length (L) weight (W) relationship for each age class was described by the equation: $W = a\ L^b$ (LE CREN, 1951). The cubic condition factor per each age class was estimated using equation proposed by HILE (1936) : $K = W \cdot 10^2 \cdot L^{-3}$.

The relationship between total length (L_t) and standard length (L_s) can be described by the following equation : $L_t = a + L_s b$.

The length-weight relationship

The mathematical relationship between the length and weight from all available data of anchovy can be described by the equation: $W = 0.018603\ L^{2.5801}$ Negative allometry is established. This is in agreement with the data of SINOVČIĆ (1978) who noted the negative allometry of anchovy in the Kaštela Bay in 1974.

The length weight relationship of each sex and age class is graphically presented in Fig.1. During the first and second years of life (0 and 1+) the growth of anchovy is isometric (b=3) or very nearly isometric (b=2.9). In the third (2+) and fourth (3+), negative allometry is established (b=2.61, b=2.40, respectively). The value of the length-weight coefficient decreased as the anchovy increased in age.

Condition

The cubic condition factor varied between 0.497 and 0.653. The value of the cubic condition factor decreased in function of increased age of the anchovy with aberrance of 0 age class which show the lowest value of cubic condition factor. The cubic condition factor for males is larger then that of females probably because female anchovy might become more exhausted during spawning.
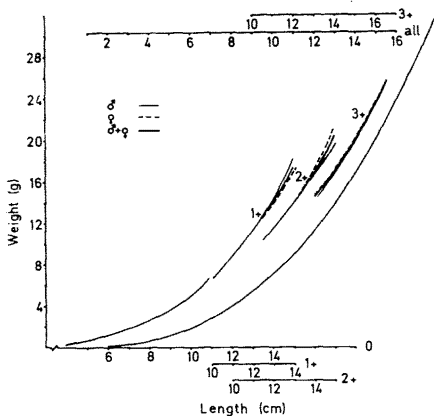

Fig.1. The length-weight relationship coefficient in relation to the anchovy age

Relationship between total length and standard length

Since many papers dealing with this fish species express the length measurements using total length (L_t) while others use standard length (L_s), a knowledge of the relationship between the two measurements is of practical value for comparative purposes. The relationship between total and standard length for small ($L_t < 8.5$ cm), medium ($L_t = 8.6-13.0$ cm), and large ($L_t > 13.1$ cm) anchovy can be described by the following equations respectively:

$$L_s = -\ 0.4024 + 0.9021\ L_t ; r^2 = 0.9988$$
$$L_s = -\ 0.5750 + 0.9019\ L_t ; r^2 = 0.9998$$
$$L_s = -\ 0.8127 + 0.9164\ L_t ; r^2 = 0.9998$$

For all available data the equation is:
$$L_t = 0.4179 + 1.1266\ L_s$$

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