MORPHOMETRIC AND MERISTIC CHARACTERISTICS OF THE SARDINE, *SARDINA PILCHARDUS* (WALB., 1792), IN THE MIDDLE EASTERN ADRIATIC SEA

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Abstract

A total of 1,219 specimens of sardine, *Sardina pilchardus* (Walbaum, 1792) were obtained from the Middle Eastern Adriatic Sea during the period from March, 2004 to February, 2005. Sardine specimens were caught by purse seine. Total length ranged from 13.0 to 19.0 cm, and weights ranged between 16.72 and 51.45 g. Negative allometry was established (b=2.5538) in the length-weight relationship.

Keywords : Adriatic Sea, Biometrics, Fishes.

Introduction

The aim of this paper is to present the morphometric and meristic characteristics of the sardine, *Sardina pilchardus* (Walbaum, 1792). Based on the differences in gill raker numbers and migratory patterns, it was supposed that two subpopulations of sardine exist in the Adriatic Sea [1]. Results of these studies give the basis for comparisons between sardine biometric characteristics from the Adriatic Sea with other regions. The length-weight relationship is essential in stock assessment models and in estimations of the weight from length observation, as well as in an estimate of fish population condition [2,3] and comparisons among populations of the same species from different habitats or regions [4].

Material and methods

Sardine specimens were caught with purse seine in the coastal and open Middle Eastern Adriatic Sea during the period from March 2004 to February 2005. Total length of analysed specimens ranged from 13.0 to 19.0 cm, and weights ranged between 16.72 and 51.45 g. A total of 1219 specimens were analysed for the length-weight relationship and for the morphometric characteristics, whereas 122 specimens were used for the analysis of merisitc characteristics. Eight morphometric (*LT, LS, LF, LH, LF, H, PE* and *Ed*) as well as two meristic parameters (*RD* and *Vert*.) were used for biometry. All lengths were measured to the nearest mm and weights to the nearest g.

The length-weight relationship was determined according to the equation: $W=aL^b$

where *W*=fish weight in g; *L*=total length in cm; *a*=proportionality constant and *b*=regression coefficient. In order to check for isometric growth, the *t* test was used.

Results

Overall morphometric and meristic characteristics are presented in Table 1. Mean total length was 16.03 ± 0.88 cm and mean weight was 31.49 ± 5.32 g. All length-length relationships were linear. The relationships *LT-LS, LT-LF* and *LF-LS* are: $LS = 14.019-0.0006\,LT$ ($R^2 =0.0817$); $LF = 14.017+0.0003\,LT$ ($R^2 = 0.0078$); $LS= 14.019-0.0006\,LF$ ($R^2=0.0817$).

Tab. 1. Morphometric and meristic characteristics of sardine caught in the Middle Eastern Adriatic Sea during the period March, 2004 to February, 2005.

Characteristics	Range (cm)	$\bar{x} \pm SD$
Morphometric:		
Total length (*LT*)	13.0 – 19.0	16.03 ± 0.88
Standard length (*LS*)	11.5 – 16.2	13.65 ± 0.76
Fork length (*LF*)	11.5 – 17.3	14.35 ± 0.77
Head length (*LH*)	2.3 – 3.9	3.08 ± 0.19
Length of dorsal fin base (*DF*)	1.2 – 2.9	1.81 ± 0.35
Maximum body height (*H*)	1.8 – 3.6	2.69 ± 0.24
Preorbital length (*PE*)	0.7 – 1.2	0.98 ± 0.07
Eye diameter (*ED*)	0.6 – 1.1	0.82 ± 0.07
Meristic:		
Number of rays in dorsal fin (*RD*)	17 – 19	18.11 ± 0.51
Number of vertebrae (*Vert.*)	48 – 52	50.02 ± 0.97

The length-weight relationship for sardine caught in the study area was: $W = LT^{2.5538}$; ($R^2 = 0.6976$; SE = 0.0009) and is shown in Figure 1.
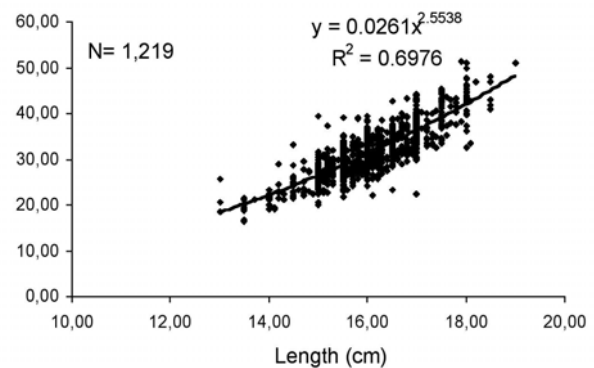

Fig. 1. Length-weight relationship of sardines from catches in the Middle Eastern Adriatic Sea during March, 2004-February, 2005.

Discussion

Vertebral numbers ranged from 48 to 52 ($\bar{X}$=50), whereas Mužinić [5] found that they ranged from 49 to 54 ($\bar{X}$=51) in the Middle Eastern Adriatic Sea. According to Sinovčić [6] the sardine from the coastal Middle and North Eastern Adriatic Sea has 50-53 vertebrae ($\bar{X}$=51). The length-weight relationship for the sardine from the Middle Adriatic Sea showed negative allometry (*b*=2.5538) (Fig.1). Alegria [7] reported negative allometry for the sardine length-weight relationship from the North (*b*=2.757) and the Middle Adriatic (*b*=2.851). The same results were also found in the length-weight relationship for sardines from the Ionian Sea in 1995 (*b*=2.75) [8] and 2003 (*b*=2.75) [9].

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