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Araştırma Notu / Short Note

Length-Weight Relationships of Five *Symphodus* Species (Pisces: Perciformes) from İzmir Bay, Aegean Sea

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Özet: ***İzmir Körfezi (Ege Denizi)'nden beş* Symphodus *türünün boy-ağırlık ilişkileri.*** Bu çalışmada, İzmir Körfezi (Ege Denizi)'nden beş Symphodus türünün (*Symphodus cinereus, Symphodus mediterraneus, Symphodus ocellatus, Symphodus rostratus, Symphodus tinca*) boy-ağırlık ilişkileri sunulmuştur. Örnekler, Ocak 2005-Mayıs 2006 tarihleri arasında dip trolü ile 15-20 m derinlikten yakalanmıştır. Eğim değerleri -b- 2.907 ile 3.292 arasında değişmiştir. *S. cinereus, S. ocellatus* ve *S. rostratus* türleri için pozitif allometrik büyüme gözlenirken, *S. mediterraneus* ve *S. tinca* türlerinde izometrik büyümenin olduğu belirlenmiştir.

Anahtar Kelimeler: Boy-ağırlık ilişkisi, *Symphodus*, Perciformes, İzmir Körfezi, Ege Denizi.

Abstract: In this study, length-weight relationships are presented for five *Symphodus* species (*Symphodus cinereus, Symphodus mediterraneus, Symphodus ocellatus, Symphodus rostratus, Symphodus tinca*) from İzmir Bay, Aegean Sea. Samples were caught in depths of 15-20 m by bottom trawls between January 2005 and May 2006. The value of the slope ‚-b-, ranged between 2.907 and 3.292. Isometric growth was determined for *S. mediterraneus* and *S. tinca,* while positive allometry was observed for *S. cinereus, S. ocellatus* and *S. rostratus.*

Key Words: Length-weight relationship, *Symphodus*, Perciformes, İzmir Bay, Aegean Sea.

Introduction

Length-weight relationships (LWR) are very useful for fisheries biology to estimate stock biomass from limited sample size (Petrakis and Stergiou 1995) and to calculate the weight at a certain age (Pauly 1993). In biological studies, L-W relationships enable seasonal variations in fish growth to be followed and the calculation of condition indexes (Richter et al. 2000). Consequently, they allow for comparing life history and morphological aspects of populations inhabiting different regions (Gonçalves et al. 1997).

Symphodus species distribute in the Mediterranean, Black Sea and Eastern Atlantic to a depth of 1-50 m, on near rocks and eel-grass beds. Sex reversal and also sexual dimorphism may observe in some species (Whitehead et al. 1986).

The length-weight relationships of the different Symphodus populations were described by a few studies both in Turkish seas (Karakulak et al. 2006; Özaydın et al. 2007) and in other localities (Petrakis and Stergiou 1995; Moutopoulos and Stergiou 2002; Vale et al. 2003).

In this study, L-W relationships have been calculated for five Symphodus species from İzmir Bay.

Material and Methods

Samples were collected on board RV EGESÜF (27 m LOA, 500 HP main engine) by bottom trawl in İzmir Bay, Aegean Sea from January 2005 to May 2006. The trawl samplings were performed monthly in the depth of 15-20 m by using the conventional demersal trawl net with 24 mm codend cover mesh size.

During the course of the study, 926 individuals of five Symphodus species representing the family Labridae were captured. All individuals were measured to the nearest ±1 mm in total length (TL) and weighed to the nearest ±0.01 g in total body weight (W).

Total length of all specimens was used in order to calculate the length-weight relationship (LWR), which was calculated by log transformed data; log W = log a + b log TL where, **W** is the total body weight (g), **TL** is the total length (cm), **a** is the intercept (initial growth coefficient), and **b** is the slope (regression coefficient).

The allometry coefficient is expressed by the exponent b of the linear regression equation.

The growth type was identified by the following equation (Sokal and Rohlf 1987): t_s=b-3/se(b), where t_s is the t-test value, b the slope and se(b) the standart error of the slope (b). To make a decision for the growth was isometric or allometric, we compared the obtained values of t-test with the respective tabled critical ones.

Results and Discussion

Sample sizes (n), minimum and maximum values of lengths and weights, as well as parameters a and b of the length weight relationships, the standard error of the slope (se(b)), the determination coefficient (r^2) and the growth types of five

Symphodus species are presented in Table 1. In the present study, the determination coefficient (r^2) values were greater than 0.86 in all species. They ranged from 0.867 (*S. cinereus)* to 0.984 (*S. tinca*).

The exponent b often has a value close to 3, but varies between 2 and 4 (Froese 2006). The b-values were varied between 2.907 (*S. tinca*) and 3.292 (*S. rostratus*) in this study. Concerning the type of growth, positive allometric growth was observed for *S. cinereus*, *S. ocellatus* and *S. rostratus* and isometric growth for *S. mediterraneus* and *S. tinca.*

Even though the change of b values depends primarily on the shape and fatness of the species, various factors may be responsible for the differences in parameters of the length-weight relationships among seasons and years, such as temperature, salinity, food (quantity, quality and size), sex and time of year and stage of maturity (Ricker 1973; Pauly 1984; Sparre 1992).

There are a few findings of length-weight relationships in Symphodus species in Turkish and other seas and only Karakulak et al. (2006) reported these growth types from Gökçeada Island (Northern Aegean Sea) as positive allometric growth for *S. tinca* and isometric growth for *S. mediterraneus* and *S. rostratus.*

Table 1. Length-weight relationships for five *Symphodus* species in İzmir Bay

Species	N	TL (cm)	Weight (g)	Length-weight relationship parameters				t-test
				a	b	se(b)	r^2	
S. cinereus	92	4.5-10.1	2.19-25.35	0.0229	3.031	0.0004	0.867	8.683[a]
S. mediterraneus	62	4.9-20.2	1.40-117.35	0.0147	3.005	0.0605	0.976	0.092[b]
S. ocellatus	328	4.7-9.2	1.10-10.56	0.0091	3.187	0.0303	0.971	6.176[c]
S. rostratus	167	7.0-11.4	4.17-17.85	0.0070	3.292	0.0423	0.973	6.897[d]
S. tinca	277	6.7-24.3	4.28-185.16	0.0184	2.907	0.0599	0.984	1.545[e]

[a] (t-test, $t > t_{0.05,\ 92} = 1.66$); [b] (t-test, $t > t_{0.05,\ 62} = 1.67$); [c] (t-test, $t > t_{0.05,\ 328} = 1.65$); [d] (t-test, $t > t_{0.05,\ 167} = 1.65$); [e] (t-test, $t > t_{0.05,\ 277} = 1.65$)

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