

AGE, GROWTH AND FEEDING OF THE BLACK GOBY, *Gobijs niger*, IN CANDARLI BAY (AEGEAN SEA)

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Abstract

Age and growth of 681 black gobies (*Gobius niger* L., 1758) (6.2-15.9 cm TL) were studied based on samples collected monthly from the Candarli Bay (Aegean Sea). Age determined from direct reading on otoliths was comprised from zero to five years. The parameters of the fitted Von Bertalanffy growth equation were L_{∞} = 17.62 cm, k = 0.278 yr⁻¹, t_0 = -2.053 for males, and L_{∞} = 14.10 cm, k = 0.391 yr⁻¹, t_0 = -1.198 for females. Stomach contents were mainly Mollusca (%IRI=54.21), Crustacea (%IRI= 36.22), Polychaeta (%IRI= 7.72), Foreminifera (%IRI= 1.40) and Teleostei (%IRI= 0.45).

Keywords: Fishes, Aegean Sea, Teleostei, Population Dynamics

Introduction

The black goby is widely distributed in Eastern Atlantic and Mediterranean Sea (include Black Sea). Despite its abundance along Turkish coasts, only one study [1] concerning the population dynamics parameters of *G. niger* exists. The species is not consumed as food, yet due to its high proportion in the bottom trawl discard, which contributed to its habitat loss and pollution, the black goby population has evaluated as least concern in Turkey [2], thus making any biological data that we could possess of great importance. In this study, information on the age, growth and feeding habits of *G. niger* are presented based on material collected in Candarli Bay, Aegean Sea.

Material and Methods

A total of 681 specimens obtained. Total lengths (TL, cm) were measured to the nearest 0.01 cm and wet weights (W, g) to the nearest 0.01 gram. The mean lengths at age were analyzed separately per sex and were compared statistically using Student's *t* test ($p > 0.05$). Sagittal otoliths were removed, cleaned, dried and stored in labeled plastic tubes. Age was expressed in years, the birthday of the fish being considered to be 1st January. For the estimation of the individual growth rate, the von Bertalanffy growth equation (VBGE) was calculated. The growth performance index (Φ , phi-prime) was employed to compare growth rates. Stomachs were removed from 269 specimens, prey items were identified to group level, measured, counted and weighed on an electronic balance (precision 0.0001 g). Diet composition was evaluated using three measures: the numerical index (%N); the gravimetric index (%W), and frequency of occurrence (%F). The index of relative importance (IRI) was calculated and expressed as a percentage (% IRI).

Results and Discussion

The black goby specimens had total lengths ranging from 6.2 to 15.9 cm, with a mean value of 10.05 cm (S.D.= 1.90). Of the 269 black goby stomachs examined, 257 had food (95.5%) and 12 were empty (4.5%). Mollusca, Crustacea and Polychaeta constituted of 98.15% of the diet. Foraminifera and Teleostei comprised 1.40 and 0.45% of the diet, respectively. Age determination from direct observations on the otoliths resulted in the establishment of six age groups (0, I, II, III, IV and V) for the population sampled (Table 1).

Tab. 1. Comparison of maximum age and age at lengths records.

Area	Study	Locality	Sex	0+	I	II	III	IV	V
Mediterranean	[4]	Adriatic Sea	♂	7.7	9.4	11.9	13.5	14.5	15.5
			♀	6.2	7.8	9.5	10.4	11.8	-
			♂	-	8.8	9.6	12.0	-	-
			♀	-	9.6	12.0	13.2	13.6	-
	[5]	Mauguio Lagoon	♂	-	8.4	9.2	11.6	-	-
			♀	-	9.2	11.8	12.4	-	-
Candarli Bay	[1]	Izmir Bay	♂	8.18	10.34	11.93	13.29	14.14	14.78
			♀	6.67	8.10	9.90	11.33	12.26	-
	This study	Candarli Bay	♂	7.81	10.07	11.82	13.41	14.29	15.9
			♀	7.36	8.13	10.05	11.39	12.25	-
	[3]	Verse Meer Lake	♂	5.5	8.2	9.5	12.0	-	-
Atlantic	[8]	Norwegian coasts	♂+♀	-	4.4	7.1	8.6	9.6	9.3
	[9]	Stanswood Bay	♂+♀	-3	5.6	9.0	10.9	-	-
	[6]	Ria de Aveiro Lagoon	♂	7.6	10.8	11.8	-	-	-
			♀	7.2	10.5	11.5	-	-	-
	[7]	Obidos Lagoon	♂	7.8	10.5	12.2	13.5	-	-
		♀	8.0	10.3	11.9	12.0	-	-	

The maximum age reached by specimens of black goby (i.e. 5 years) from the Candarli Bay is within the longevity limits observed over the biogeographical distribution area (Table 1). In terms of mean length per age group (except age V being only males) significant differences were found

between the two sexes ($p < 0.05$). Males attain a bigger length than females. These differences between male and female in growth rates and life span have already been noticed by [1, 3-7]. In this study, growth rate of the population has been found relatively low. However, the growth coefficient is highly variable among different studies ($k = 0.19-0.91$) (Table 2).

Tab. 2. Comparisons of growth parameters.

Area	Study	Sex	L_{∞} (cm)	k (year ⁻¹)	t_0 (year)	L_{∞}^A	Φ^B	Locality
Mediterranean	[4]	♂	18.52	0.30	-1.689	10.1	2.01	Adriatic Sea
		♀	16.58	0.19	-2.571	15.7	1.72	
	[1]	♂	16.69	0.30	-2.205	10.0	1.92	Izmir Bay
		♀	14.84	0.32	-1.459	9.3	1.85	
	This study	♂	17.62	0.28	-2.053	10.4	1.94	Candarli Bay
	♀	14.10	0.39	-1.198	7.7	1.89		
Atlantic	[9]	♂	11.7	0.91	0.32	3.3	2.10	Stanswood Bay
		♀	15.1	0.91	0.32	3.3	2.32	
	[7]	♂+♀	16.66	0.34	-1.910	8.9	1.97	Obidos Lagoon

^A L_{∞} (life-span) = based on 3/k assumption
^B $\Phi = \log_{10} k + 2 \log L_{\infty}$

L_{∞} estimated in this study was within the observed total length of males and females. The diet of black goby is based on small benthic invertebrates, generally similar to that of other populations. Therefore, Foraminifera comprised 1.40% of the diet. I believed those foraminiferans are ingested accidentally, together with the animal constituents of the diet.

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