

SOME BIOLOGICAL FEATURES OF *Vimba vimba* POPULATION LIVING IN ASARTEPE DAM LAKE¹

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ABSTRACT

The knowledge of the bio-ecological features and constant monitoring of the distribution of *Vimba vimba* (L. 1758) are of great importance for its distribution and future. The knowledge of the parameters of length-weight relation, metric and meristic properties and condition factor of the species will enable us to compare the populations living in different habitats. *V. vimba* (L.,1758) shows distribution in the aqua lands of north western, mid Anatolia and Mediterranean regions. There is a lack of studies on *V. vimba* living in the Reservoir. The study was carried out on 32 *V. vimba* species caught in Asartepe Dam Lake between March 2015-February 2016. The length-weight relations and condition factors of the species were determined and the variation coefficients of morphometric and meristic features and the ratios of some diagnostic features with standard length were computed. The length-weight relation was found to be $W=0.0002xL^{2.5052}$. The correlation coefficient of length-weight relation was $R^2=0.9278$ (t test $p\leq 0.001$) and condition value was observed to be 1.652034 ± 0.2117 . The highest and the lowest variation were observed in eye diameter with 19.32% and total length with 14.79%. The highest and lowest ratios of some meristic features with the total length were found to be predorsal distance (with 55.16%) and nose length (with 4.30%). The average number of linea lateral scales was 58.33 ± 0.90 (57-60) numbers of vertebrae was 44.67 ± 0.58 (44-45). Concerning the meristic features, the highest and lowest variation was observed in number of pelvic fin unbranched rays with 22.78% and number of vertebrae with 1.30%.

Keywords: Asartepe Dam Lake, *Vimba vimba*, length-weight, condition, morphometric, meristic.

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INTRODUCTION

The physicochemical effects of the variations in environmental conditions naturally have a profound influence upon ichthyofauna. Therefore, the knowledge of bio-ecologic features and periodic investigation of the habitat are of paramount importance for the distribution and future of the species living different habitats.

Vimba vimba (L.,1758) have a large distribution in Europe and Asia (FishBase, 2018). This species known as Eğrez fish in Turkey is present in aqua lands of north-west, mid-Anatolia and Mediterranean regions.

The fish prefers benthic and pelagic regions in fresh water and lagoon system. It feeds on moluccas and insect larvae. They migrate to suitable lands for breeding. The interruption on the way of migration poses a very big danger for the species (Kottelat and Freyhof, 2007). The species has a very high level adaptation to river and lake ecosystems. They reach the sexual maturity at 3-5 years of age. They leave their eggs in rock and sandy regions immune to current effects between April-June. The reach maximum length of 50 cm and maximum weight of 1.4 kg. Although it has very little economic value it is locally consumed in some regions (Geldiay and Balık, 2009). In spite of the fact that it is in low risk LC category according to IUCN criteria, excessive hunting at forbidden periods pauses a danger for its populations.

The determination of the factors such as length-weight relation, metric and meristic properties and condition factor will enable us to compare the population of the species living in different habitats. The number of studies of the length-weight relation, condition factor and breeding and diagnostic features of *V. vimba* living in internal waters of Turkey are not sufficient. The biological features of *V. vimba* living in Sarıyar Dam lake were determined by Ekmekçi and Erk'akan (1992), in Sakarya River Kirmir stream by Becer and İkiz (2005), Karacaören-I Dam lake by Tutucu (2002), in Sapanca lake by Okgerman et al. (2011), in Büyükçekmece Reservoir lake by Saç and Okgerman (2016), in Marmara lake by İlhan and Sarı (2016) and in Eğirdir by Yağcı et al. (2017).

Although the area of Asartepe Dam lake is located in a very small area (1.7 km²) it is a habitat of 14 natural, invasive and economical fish such as *Alburnoides kosswigi*, *Alburnus escherichii*, *Capoeta baliki*, *Carassius gibelio*, *Chondrostoma angorense*, *Cyprinus carpio*, *Pseudorasbora parva*, *Squalius pursakensis*, *Tinca tinca*, *Vimba vimba*, *Cobitis simplicispinna*, *Esox lucius*, *Oxynoemacheilus angorae* and *Perca fluviatilis*. To the best of our knowledge there is no study related to the biological features of *V. vimba* in Asartepe Dam Lake. This study was carried out for the determination of length-weight relation, condition factor and some diagnostic features of *V. vimba* population and compare the results obtained with the literature data.

MATERIAL and METHODS

The study was carried out upon 32 *V. vimba* caught from Asartepe Dam Lake between the period of March 2015- February 2016. The dam lake constructed upon the İlhan Stream has a depth of 36 m and an area of 1.7 km² (Figure 1). The fish was caught with trammel nets with mesh sizes of 18x18, 20x20, 25x25, 30x30, 40x40 and 50x50 mm in the lake and with a 12 volt DC 5 amper Samus brand 725 MP and PWM2 model electro-shocker and hoops at the entrance of the rivers feeding the lake. The samples were caught in three different stations representing the whole lake. The morphological measurements were made by a ruler with an accuracy of ±1 mm and the weighs were determined with a scale with an accuracy of ±0.01g (Figure 2). The meristic properties were elucidated by the use of a lens mounted on the table and a stereomicroscope.

The relation between the length of and weight and the condition factor of the fish were determined by the use of $W=axL^b$ and $K=W/L^3 \times 100$ formula given in the literature (Richer, 1975). The basic statistical data of the morphometric (mm) and meristic features, variation coefficients ($VC=SS/$ Mean

x100) and the percentage values morphometric features of (SB%) in the standard length were determined (Avşar, 1998).



Figure 1. The map of Asartepe Dam Lake

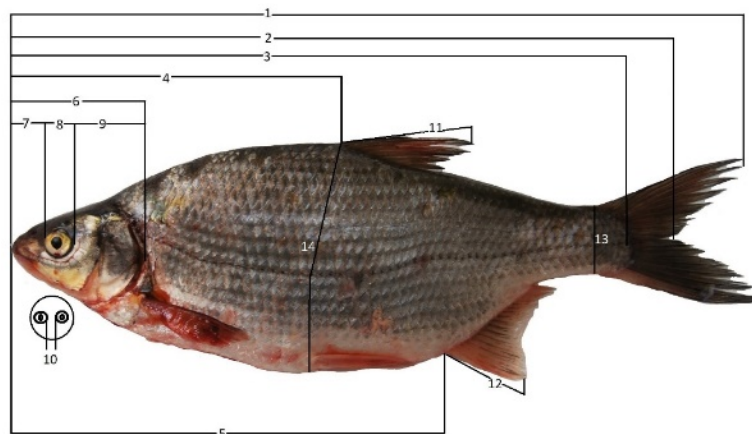


Figure 2. *Vimba vimba* (Original)

1. Total length 2. Fork length 3. Standard length 4. Predorsal length 5. Preanal length 6. Head length 7. Snout length 8. Eye diameter 9. Postorbital length 10. Interorbital distance 11. Dorsal fin height 12. Anal fin height 13. Caudal peduncle height 14. Body height

RESULTS and DISCUSSION

The mean length and weight of *V. vimba* species living in the lake were found to be 393.87 ± 139.38 g (143-724) and 318.31 ± 47.10 mm (227-398) respectively. The length-weight relation was $W=0.0002xL^{2.5052}$ (Figure 3). The b value of length-weight relation gives an information biotic and abiotic information about the physicochemical features of the fish and its body structure. If the value of this parameter equal to 3 it indicates isometric growth, if it is $b>3$ it shows positive allometric and finally if it is $b<3$ it points out a negative allometric growth (Avşar, 1998). According to these results it is observed that the *V. vimba* population was showing a negative allometric growth. The b values for *V. vimba* living in different habitats were reported as follows: Sapanca Lake 3.1552 (Okgerman et al., 2011), Büyükçekmece Reservoir 3.144 (Saç and Okgerman, 2016), Eğirdir Lake 3.2133 (Yağcı et al., 2017) and Marmara Lake 3.3118 (İlhan and Sarı, 2016). The b value of 2.5052 was seen to be

relatively lower compared with these results. In habitats where predators such as *Esox lucius* is present the body structure of this fish shows distinct differences due to defense mechanisms developed by the organisms they feed on. The lower b value of the *V. vimba* population living in Asartepe Dam Lake indicates the presence of such situation.

The correlation coefficient of length-weight relation of the *V. vimba* population living in Asartepe Dam Lake was computed as 0.9278. This coefficient is lower than the value of 0.993 in Sapanca (Okgerman et al., 2011), 0.991 in Büyükçekmece reservoir (Saç and Okgerman, 2016), 0.9950 in Eğirdir Lake (Yağcı et al., 2017) and 0.973 Marmara Lake (İlhan and Sarı, 2016). The condition factor was found to be 1.652034 ± 0.2117 . This value is higher than those of 0.99 in Büyükçekmece Reservoir (Saç and Okgerman, 2016) and 0.92-1.54 determine for Marmara Lake (İlhan and Sarı, 2016). This situation was attributed to the various factors such as effects of the biotic and abiotic properties of the environment, feeding regimes of the species present in the lake and predatory behavior of some species present in the lake.

The highest and the lowest variation in morphological features was observed in eye radius with 19.32% and total length with 14.79%. The ratio highest and lowest ratios of some body parts observed to the standard length were predorsal distance with 55.16% and snout length with 4.30%. The linea lateral scale number of 58.33 ± 0.90 (57-60) and the number of vertebrae was 44.67 ± 0.58 (44-45). The highest and lowest variation in meristic properties were observed pelvic fin unbranched rays with 22.78% and number of vertebrae with 1.30% respectively.

Küçük and İköz (2004) observed some of the diagnostic properties in the rivers pouring in to the Antalya Bay as flows D: III 9 (10) A: III 16-18 L.lat.: 53-59 L.trans.: 9-10/5-6, while Bostancı et al. (2015) found the same properties as D: III 8 A: III 18-19 P: I 15-16 Pelvic: II 9 L.lat.: 56-58 L.trans.: 9-10/5-6 in Turnasuyu (Ordu) stream. These values are in good accordance with our data obtained in Asartepe Dam Lake.

The periodic determination of the biological properties of the species forming the ichthyofauna, will be of great use for the sustainability of the species, their interaction with the other species and compare the behavior of species in different habitats.

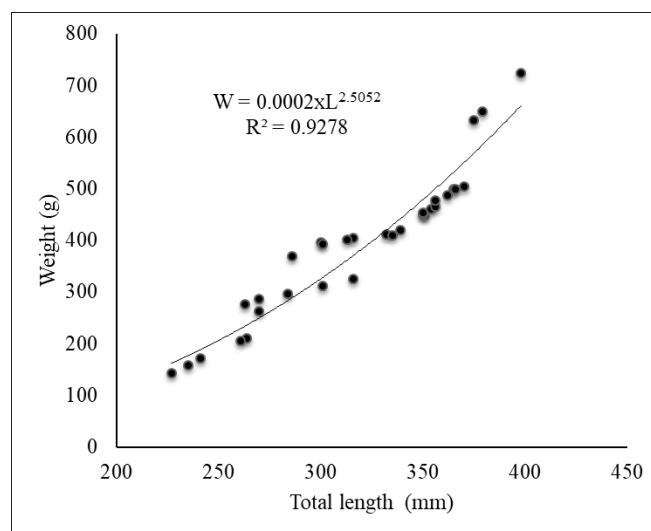


Figure 3. Length-weight relations of *V. vimba*

Table 1. *V. vimba* morphometric properties (mm)

Morphometric properties	Min-Max	Mean	Standard deviation	Variation coefficient (%)	Morphometric properties / Standard length (%)
Total length	227-398	318.31	47.10	14.79	-
Fork length	206-366	285.28	43.91	15.39	-
Standard length	192-338	266.50	42.25	15.85	-
Predorsal distance	104-180	147.00	24.08	16.38	55.16
Preanal distance	140-242	197.80	33.99	17.18	74.22
Head length	38-68	55.07	9.68	17.58	20.66
Snout length	8-15	11.47	2.07	18.05	4.30
Eye diameter	8-16	12.73	2.46	19.32	4.78
Postorbital length	22-37	30.08	5.31	17.65	11.29
Interorbital distance	18-35	28.2	4.71	16.70	10.58
Dorsal fin height	43-75	60.53	10.12	16.72	22.71
Anal fin height	25-48	37.93	6.67	17.59	14.23
Caudal peduncle height	26-48	39.13	7.23	18.48	14.68
Body height	75-130	107.13	18.22	17.01	40.20

Table 2. *V. vimba* meristic properties

Meristic Properties	Min-Max	Mean	Standard deviation	Variation Coefficient (%)
Linea lateral scale number	57-60	58.33	0.90	1.54
Linea transversal upper scale number	9-10	9.33	0.49	5.25
Linea transversal lower scale number	5-6	5.67	0.49	8.64
Dorsal fin unbranched rays number	2-3	2.73	0.46	16.85
Dorsal fin branched rays number	7-9	8.07	0.48	5.95
Anal fin unbranched rays number	2-3	2.8	0.41	14.64
Anal fin branched rays number	17-19	18.07	0.59	3.26
Pectoral fin unbranched rays number	-	1	-	-
Pectoral fin branched rays number	14-16	15.33	0.82	5.35
Pelvic fin unbranched rays number	1-2	1.8	0.41	22.78
Pelvic fin branched rays number	8-9	8.53	0.52	6.10
Number of vertebrae	44-45	44.67	0.58	1.30

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