Detection of salinity and temperature effects on body shape of Sophiae toothed carp (*Aphanis sophiae*) using geometric morphometrics technique

Maryam Nasrollah Pourmoghadam[1]
Hadi Poorbagher[2]
Soheil Eagderi[3]

1. M.Sc Student of Fisheries, Faculty of Naturl Resources, University of Tehran, Karaj, Iran
2, 3. Department of Fisheries, Faculty of Natural Resources, University of Tehran, Karaj, Iran

[*]**Corresponding author:**
Soheil.eagderi@ut.ac.ir

Receive date:
Acceptant date:

Abstract

The present study aimed to investigate the effects of different levels of temperature and salinity on the body shape of Sophiae toothed carp (*Aphanius sophiae*) using geometric morphometrics technique. A total of 120 specimens were reared at four combined treatments with two levels of temperatures (16 and 25°C) and two levels of salinity (0 and 14 ppt) for one month. The left side of the specimens were photographed and 17 landmark-points were defined and digitized on 2D images using the tpsDig2 software to extract body shape data in geometric morphometrics technique. The obtained data superimposed using Generalized Procrustes Analysis to remove effects of size, position and orientation. The obtained data were analyzed using PCA, CVA and CA. The results revealed a significant difference between the body shape of treatments exposed to different combination of temperature and salinity ($P<0.05$). The results showed that changes in the body shape of 16°C and 0 ppt treatment includes the anteroventral shift of the snout, the elongation of the opercle, increasing the depth of the head and eye diameter. At 16°C and f 14 ppt treatment, decreasing in the height of opercle was observed. At 25°C and 0 ppt treatment, the height of the opercle was increased, and at 25°C and 14 ppt treatment, the observed changes were related to the tip of snout. The results of the present study indicated the effect of temperature and salinity on the body shape of the Sophiae toothed carp.

Keywords: Temperature, Salinity, Morphology, Geometric Morphometrics, *Aphanis sophiae*.