Egyptian Journal of Aquatic Research (2016) **42**, 331–339

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National Institute of Oceanography and Fisheries

Egyptian Journal of Aquatic Research

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FULL LENGTH ARTICLE

Biometric indices and size at first sexual maturity of eight alien fish species from Bangladesh

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Received 12 April 2016; revised 8 August 2016; accepted 1 September 2016
Available online 12 October 2016

KEYWORDS

Biometric index;
Condition- and form- factor;
Sexual maturity;
Alien species;
Bangladesh

Abstract The biometric indices and size at first sexual maturity of eight alien fish species from several water bodies in Bangladesh were studied for the first time. A total of 273 individuals of eight alien fish species (*Barbonymus gonionotus*, *Clarias gariepinus*, *Ctenopharyngodon idella*, *Cyprinus carpio*, *Hypophthalmichthys molitrix*, *H. nobilis*, *Oreochromis niloticus* and *Pangasianodon hypophthalmus*) were collected using traditional fishing gears from June 2014 to May 2015. Among the four condition factors (Allometric condition factor, Fulton's condition factor, Relative condition factor, and Relative weight) studied, Fulton's condition factor was the best for assessing the well-being of these alien species in their natural habitat, based on the relationships of condition factors with body weight and total length. The calculated form factor was 0.0270 for *B. gonionotus*, 0.0077 for *C. gariepinus*, 0.0119 for *C. idella*, 0.0194 for *C. carpio*, 0.0101 for *H. molitrix*, 0.0092 for *H. nobilis*, 0.0158 for *O. niloticus* and 0.0105 for *P. hypophthalmus*. The size at first sexual maturity was estimated in TL as 12.30 cm for *B. gonionotus*, 25.53 cm for *C. gariepinus*, 32.80 cm for *C. idella*, 18.22 cm for *C. carpio*, 23.92 cm for *H. molitrix*, 30.18 cm for *H. nobilis*, 21.78 cm for *O. niloticus*, and 21.32 cm for *P. hypophthalmus*. The present study also calculates form factor and first sexual maturity of these alien species from different water-bodies world over. The findings of this study can be very helpful for sustainable management of these alien species in Bangladesh and similar ecosystems.

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Peer review under responsibility of National Institute of Oceanography and Fisheries.

http://dx.doi.org/10.1016/j.ejar.2016.09.001
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Introduction

About twelve alien species are documented in Bangladeshi waters (DOF, 2014). Among them, *Barbonymus gonionotus* (Bleeker, 1849), *Clarias gariepinus* (Burchell, 1822), *Ctenopharyngodon idella* (Valenciennes, 1844), *Cyprinus carpio* (Linnaeus, 1758), *Hypophthalmichthys molitrix* (Valenciennes, 1844), *H. nobilis* (Richardson, 1845), *Oreochromis niloticus* (Linnaeus, 1758), and catfish *Pangasianodon hypophthalmus* (Sauvage, 1878) provide a major part of fish production in Bangladesh (DOF, 2014). Although these species were intended for aquaculture only, recently they are also recorded in natural open waters of the country. Introduction of alien species can cause biodiversity loss, destruction of aquatic ecosystems in inland waters (Rosenthal, 1976, 1980, 1981) and may have biological impact on the recipient environment (Innal and Erk'akan, 2006; Gozlan, 2008; Hossain et al., 2008). Additionally, alien species may have impact on native fishes by predation, competition for food, interference with reproduction, or changes of habitat (Hanel et al., 2011; Piria et al., 2016).

Biometric index (conditions and form factor) is an important issue not only for providing invaluable information on the condition of fish population, but also for the proper management and conservation of the wild inhabitants (Muchlisin et al., 2010; Sarkar et al., 2009; Froese, 2006). In addition, the condition factor is a quantitative parameter that is very helpful to estimate present and future population success (Richter, 2007). The condition factor is also very important to know the spawning season of fishes (Hossain et al., 2012a, 2013a). The form factor can be handy to assess whether the body structure of a given species is considerably dissimilar from others (Froese, 2006). Moreover, the size at first maturity can be used to set minimum permissible capture size and for stock assessment (Lucifora et al., 1999).

Although a number of studies on biometric indices and size at first sexual maturity of different fish species have been conducted from Bangladeshi waters (Hossain, 2010; Hossain et al.,

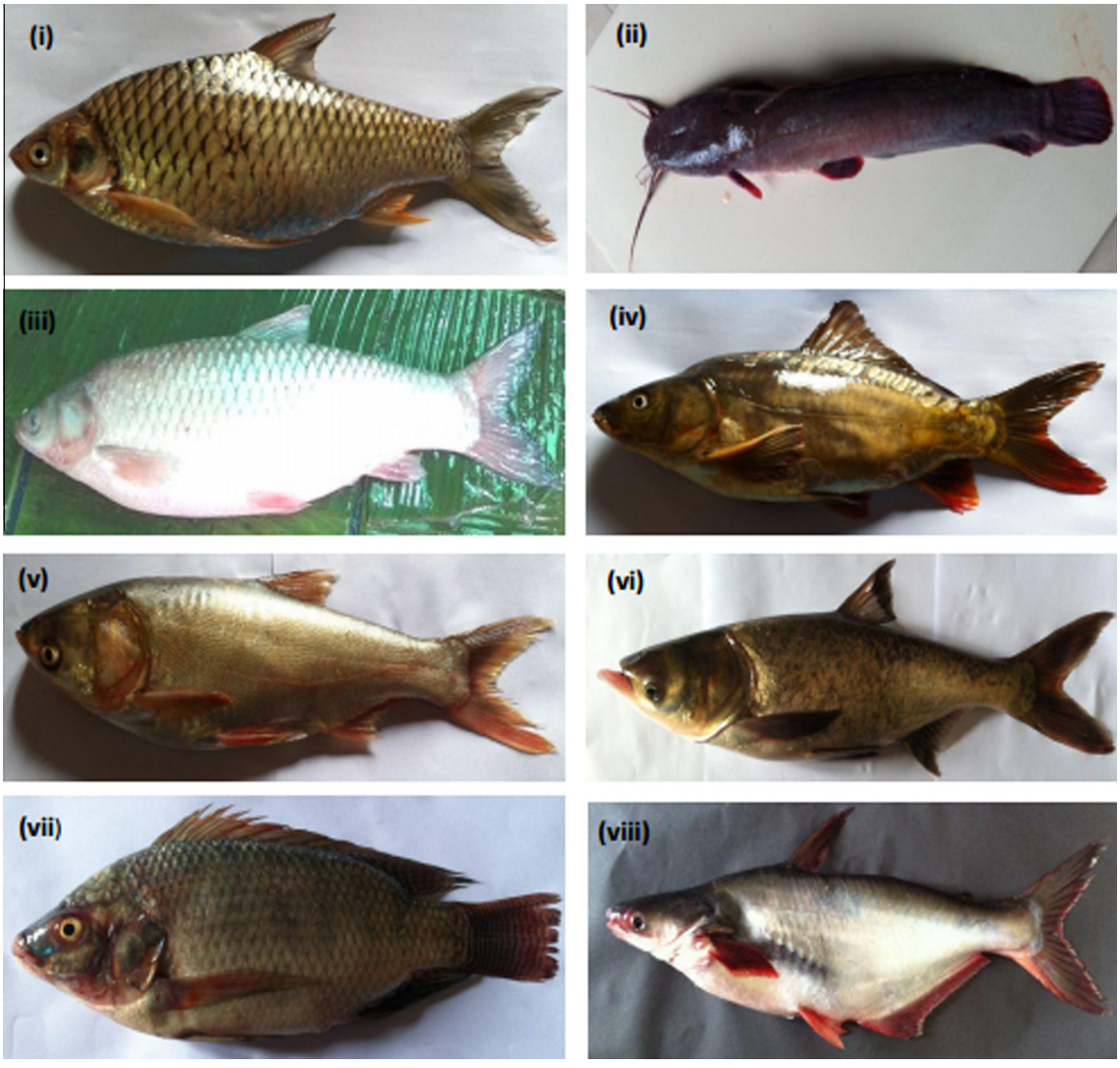

Figure 1 Photos show the eight alien fish species (i) *Barbonymus gonionotus*, (ii) *Clarias gariepinus*, (iii) *Ctenopharyngodon idella*, (iv) *Cyprinus carpio*, (v) *Hypophthalmichthys molitrix*, (v) *H. nobilis*, (vii) *Oreochrimis niloticus*, and (viii) *Pangasianodon hypophthalmus* from Bangladesh.