

Preliminary studies on genetic structure of silver carp (*Hypophthalmichthys molitrix*) and bighead carp (*Aristichthys nobilis*) sampled from three hatcheries by allozyme marker

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Abstract. Genetic variability of three hatchery populations of silver carp, *Hypophthalmichthys molitrix* and big head carp, *Aristichthys nobilis* was assayed through allozyme polymorphism analysis. Five enzyme systems were assayed. Ten loci were recorded from these five enzyme systems of which one system, MDH was found polymorphic. Species from the three hatcheries could be separated with respect to variability obtained in MDH-1 and MDH-2 loci; the percentage heterozygosity recorded in silver carp populations of Maskanda and Parbatipur hatcheries were 0.061 and 0.063 respectively. Heterozygosity in the big head population of Brahmaputra hatchery was recorded at 0.041. Based on the variability recorded in these two loci the genetic distances between the six populations of the two species were determined with Nei's formula.

Research findings

- Genetic variability of silver carp and big head carp from three hatcheries, viz., Parbatipur, Maskanda and Brahmaputra was assayed through allozyme variation analysis.
- Based on enzyme systems assayed both the populations were found to be polymorphic at 20%.
- Among the 10 loci recorded from 5 enzyme systems, both silver carp and big head carp were polymorphic in MDH-1 and MDH-2 loci. The percentage heterozygosities of Maskanda and Parbatipur samples of silver carp were recorded at 0.061 and 0.063 respectively; the big head carp from only the Brahmaputra hatchery showed 4% heterozygosity.
- Based on Nei's formula for genetic identity and distance index, genetic distance was calculated and among the silver carp samples, Maskanda and Parbatipur formed a cluster and separated from the Brahmaputra hatchery by the $D=0.016$; among the big head samples Maskanda and Parbatipur formed a cluster and separated from Brahmaputra by $D = 0.05$.
- Both the two species have lost genetic diversity significantly because of improper genetic practice of breeding and or genetic drift.

Policy implications

- Both silver carp and big head carp have high growth potential in ponds. Both the species have lost genetic variability because of nonintegration of genetic principles in breeding of the species in the hatcheries.
- There is large-scale hybridization of the two species in the hatcheries.
- Genetic marking techniques through allozyme analysis can be applied in true identification of the status of the populations.
- True identification of the genetic status of the populations employed in the hatcheries, can foster greater scope for their culture and production through conserving genetic variation.

Livelihood implications

Being the promising species in the pond aquaculture systems of the country, information on the true genetic identity of both the species of silver and big head carp can be most demanding in the culture sector. Since a large majority of the pond farmers are poor and marginal, the culture potential of the species has got a tremendous value for sustainable livelihoods of rural farmers. The results of the present study is thus, expected to have a greater livelihood implications in Bangladesh.