



Amur Common Carp: A New Species in Indian Fishery

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Common carp (*Cyprinus carpio*, Linnaeus, 1758) belonging to the largest freshwater fish family Cyprinidae, is one of the earliest domesticated and most widely cultured fish species in the world (FIGIS, 2011). After farming for more than 4000 years in China and several hundred years in Europe, the wild ancestors of the domesticated common carp probably spread from Caspian and Aral Sea basins to the rest of the world and successfully adapted to wider range of environmental conditions (Balon, 1995; 2006). As a result, several strains of common carp (e.g. races, land races, strains, breeds and stocks) evolved due to geographical isolation, physiological adaptation, gene mutations and natural as well as human selection pressures and spread throughout the continent of Eurasia to China, Japan and South East Asia (Chistiakov and Voronova, 2009). Common carp has the maximum contribution to freshwater fishery than any other species worldwide. In 2016, out of the total 202.22 million tonnes world fish production, 110.20 million tonnes came from aquaculture production and the inland sector contributed 51.45 million tonnes with common carp contributing about 0.46 million tonnes which was about 9% (FAO, 2018). With total fish production of 11.41 million tonnes in 2016-17, the Indian fishery constituted about 5.64% of the global fish production. Its contribution was 1.1% of the GDP and 5.15% of the agricultural GDP of the country with nearly 65% contribution coming from the inland sector (NFDB, 2018) in which the Indian major and exotic carps including common carp, had the lion's share. Thus, the importance of common carp in aquaculture and enhancing fishery production in India's context is indisputable.

Background

The common carp presently cultured in India originated from the initial introduction of the "German strain" in 1939 and the "Bangkok strain" in 1957 (Jhingran, 1991). After many years of culturing, these stocks have drastically declined in performance in both monoculture and polyculture practices. Most likely inbreeding depression, negative selection and genetic drift have occurred during the extended period of domestication of these common carp stocks (Mahanta, 2010). Less growth and early sexual maturation of the currently cultured common carp is widely acknowledged across the country hence, there was an urgent need for a replacement of the existing stocks in order to improve its production potential under monoculture and/or polyculture systems. A collaborative comprehensive study financed by Department of International Development - Aquaculture and Fish Genetics Research Programme, was done by University of Stirling, University of Wales, UK and erstwhile University of Agricultural Sciences, Bengaluru and later in Karnataka Veterinary, Animal and Fisheries Sciences University (KVAFSU) for testing several strains of common carp from different geographical origins viz. Hungary (Wild Amur carp, P-3 (selected line)), Vietnam (selected Vietnamese, unselected Vietnamese), Indonesia (Rajadanu) and India

(local stocks; L-FRSH (Fisheries Research Station, Hesaraghatta) & L-BRP (BRP state hatchery)) over a period of 6 (six) years. Amur strain was found superior to all other stocks and cross-species including local existing stocks with an increase of 13.2% to 50.1% body weight (**Basavaraju et al., 2002**).

History

The existence of two sub-species of common carp was resolved with clear evidence of genetic differentiation between the European carp *Cyprinus carpio carpio* and Asian carp *Cyprinus carpio haematopterus* along with further presence of another sub-species *Cyprinus carpio varidivlaceus* in Asia (**Chistiakov and Voronova, 2009**). The erstwhile wild Amur-China type of wild carp, *Cyprinus carpio haematopterus*) carp spread to the water bodies of Western Asia after originating from the Asian Carp Centre. After flourishing and adapting to the local environmental conditions of the river Amur, it was brought from National Fisheries Research Institute, Russia to the gene bank of FCRI, Hungary in 1982. As reported from KVAFSU, Amur common carp has the following salient features - faster growth (~27% faster than the existing stock), late maturing, accepts artificial feed and feeding habit similar to common carp, lesser diseases susceptibility, slender body and smaller belly compared to existing common carp. For production of its nuclear brooder stock, seed of Amur common carp were supplied to different hatcheries in the country viz., Department of Fisheries, Govt. of Karnataka, Sikkim, Tamil Nadu, Pondicherry, Himachal Pradesh. Krishi Vigyan Kendra's (KVKs), North Eastern states-ICAR Research Complex for NEH Region, Meghalaya and National Brood Bank Centre of NFDB at Bhubaneswar etc (). Its seed was also procured by college of Fisheries, Pantnagar in 2011 from Fisheries Research and Information Centre, Hesaraghatta, Karnataka for developing its brood stock and seed production.

Taxonomic status

The taxonomic position of *Cyprinus carpio haematopterus* (see **Plate**) according to **Kuznetsov et al., (2011)** is given below:

Kingdom	: Animalia
Phylum	: Vertebrata
Sub-phylum	: Craniata
Series	: Pisces
Class	: Teleostei
Sub-class	: Actinopterygii
Super-order	: Ostariophysii
Order	: Cypriniformes
Sub-order	: Cyprinoidei
Family	: Cyprinidae
Sub-family	: Cyprininae
Genus	: <i>Cyprinus</i>
Species	: <i>carpio</i>
Sub-species	: <i>haematopterus</i>
Common name	: Amur common carp/Amur carp

It has an elongated torpedo-like body and possesses one long dorsal fin with 2–3 hard and 17–22 soft rays with sharp serration at the posterior margin of the first (largest) hard ray. Other additional characteristics also include 2–3 anal spines, 5–6 anal rays and 36–37 vertebrae. It has a large mouth opening with two pairs of barbels, one pair on the upper lip and the other pair at the corners of the mouth. Pharyngeal teeth with 5-5 molar-like teeth help in grinding the food. It occupies wide temperature range between 3–35⁰C with optimum of 20–25⁰C for growth and propagation (**Froese and Pauly, 2011**).



Plate: *Cyprinus carpio haematopterus*

Brief account of source and origin

(Source: <http://www.fao.org/docrep/005/Y2406E/y2406e04.htm#bm4.1>)

Country of Origin : Russia
 District : Siberia (River Amur)
 Developed : Originally wild form from river Amur
 Area of fish farm : River Amur in Asia region
 Maintenance : Fish Culture Research Institute (FCRI), Szarvas, Hungary
 Identification : Fin clipping, index Am, individual PIT tag
 Introduced into FCRI : 1982
 Breeding history : Nil
 Year of Propagation : 1982, 1989, 1993, 1994 and 1996

Morphological descriptions

a) Scaliness : Fully scaled & irregular (2-5%) homozygous (SSnn)
 b) Colour : Silvery-white
 c) Lateral line : Regular, irregular forms in 5%
 d) Fins : Regular
 e) Malformations : 0.7%
 f) Body shape, indexes
 Profile Index : 2.90
 Head Index : 3.90
 Width Index : 1.67
 Corpulence Index : 1.67
 g) Frequency of transferrin genotypes
 DD=0.132, EE=0.0943, FF=0.0377, GG=0.0755, DE=0.1509, DF=0.1132, DG=0.0943,
 EF=0.1321, EG=0.1132, FG=0.0566.

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