

A Way Forward in Ornamental Fish Farming

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The ornamental fish sector is a small but unique and vital part of an international fish trade. Fish keeping has emerged as the second most popular hobby in recent years, next to photography. There is a great scope for Aquaculture. By culturing imported exotic fishes locally, or tapping the resources of indigenous fishes, India not only earns foreign exchange but also enters into the world market of ornamental fishes. The contribution of India to the world ornamental fish trade is only at a tune of US\$ 1.7 million, which is rather sparse considering the vast US\$8 billion global market growing at an average annual rate of 9%. In view of India's richness of fish biodiversity, geographic location and access through air connectivity to international markets, it wouldn't be an understatement to say that India has not tapped these resources effectively. The demand for indigenous fishes is high in foreign countries. Our country is bestowed with climatic conditions ideal and conducive to growth, maturation and breeding of many indigenous as well as exotic ornamental fishes but India's share in the global export market is insignificant.

The Western Ghats of India is one among the biodiversity hotspots of the world and one of the richest regions in terms of its biological diversity. The Western Ghats holds rich freshwater fish diversity with about 290 species belonging to 106 genera, 33 families and 11 orders. The Western Ghats also portrays 189 species of endemic fish fauna, belonging to 69 genera, 23 families and 7 orders. About 110 species of fishes reported from the Western Ghats have value in the ornamental market. Exploitation due to high export demands for the beautiful endemic fishes has put at risk of

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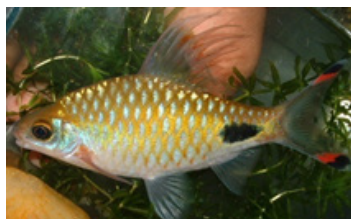
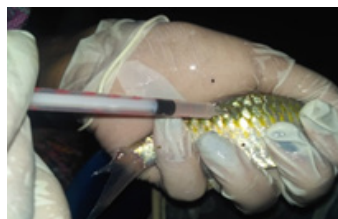
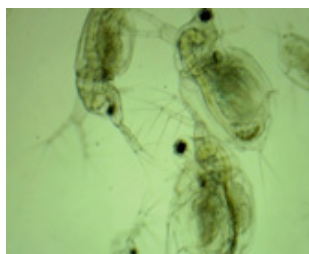
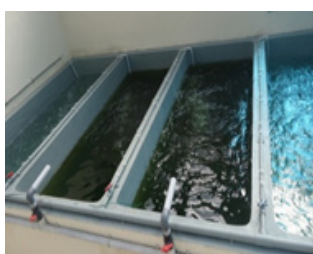
becoming endangered and even extinct. Hence, to serve market demand and save biodiversity the best solution is to develop seed production technologies for propagation and revival of valuable endemic fish species.

Advancement in breeding and aquarium technology has added new dimensions in the ornamental fish trade with more species and varieties being introduced to the aquarium trade. Though contribution of indigenous ornamental fishes is less in the total ornamental fish trade, possibilities for the development of indigenous ornamental fish trade is very high. Hence, in order to propagate and enrich the indigenous ornamental fish resources in Western Ghat, the fish species namely, *Sahyadria denisonii* (Kerala queen) and *Dawkinsiafilamentosa* (Filamentous barb) of Kerala origin were selected for research. *Sahyadriadenisonii* is the most popular and highly priced freshwater ornamental fish, it accounted for almost 60–65% of India's total ornamental fish exports. *Dawkinsiafilamentosa* is endemic to Kerala, Karnataka and Tamil Nadu river streams; it also has a very good demand in the ornamental fish trade. These vibrant colour barb are so popular that it has been requested in a majority of the trade enquiries and exported regularly from India. In order to ensure seed production year-round induced breeding techniques are necessary. The optimum dose of the hormone has been standardised by considering high potentiality at a low dose. Induced breeding technology developed by present research will lend a hand to farmers to generate elevated income by producing these valuable fishes.

Once after breeding larval, rearing is a risky task in farming practices. After yolk sac absorption, larvae prefer free drifting and tiny live animals as a feed, which is known as live food. Live foods are living nutrient capsules with rich nutrition and the larvae easily selects the live food which suits their mouth size. Most of the aquaculture industries are relying on artemia for larval rearing due to its commercial availability in cyst form. Even though several other live feeds culture techniques have been standardised, culture practices have not yet commercialized to a large scale. Cladocerans are the group of zooplankton rich in nutrients (fatty acids) which can replace artemia and could reduce the production cost. Hence, in order to support larval rearing practices in the present study mass culture technique for the Cladoceran (*Moina micrura*) was developed using microalgae (*Chlorella vulgaris*) as feed in system with recirculation and bottom line aeration facility. This simple farmer friendly technique will reduce the high production cost.

In ornamental fish culture, colour intensity is preferred more than the growth; carotenoid sources need to be supplemented in the fish diet to increase its enticing beauty. Several synthetic products are available in the market but the present study focused on the preparation of natural carotene ingredient (curry leaf, marigold petals, carrot peelings, and shrimp/crab shell extracts) incorporated diets to enhance colour. Natural carotenes work well compared to synthetic forms in captive culture conditions.

Using the conventional system such as smaller tanks and tubs for ornamental fish farming is becoming outdated. In order to produce more to make more profits (in a unit area), advanced culture systems are to be adopted in ornamental fish farming. Raceway farming would enable the sector to rise to a different level in our country. Raceways have various advantages like high stocking densities, zero water exchange system, suitability for mass culture and economical viability

*Sahyadriadenisonii**Dawkinsiafilamentosa**Hormonal inducement for breeding**Moinamicrura**Mass culture tanks of
Moinamicrura**Advanced raceway culture unit*

compared to traditional systems, accordingly in the present study the nursery and grow out rearing was carried out in advanced production system like Raceway with re-circulatory facility for mass production of selected indigenous ornamental fishes with feed interventions.

The study was designed to develop a complete package of commercial farming technology which includes the induced breeding for year-round seed production, mass culture technique for live feed production for larval rearing and colour enhancement in captivity using natural carotene source for selected indigenous Western Ghats origin ornamental fish species using advanced culture systems like Raceways with water recirculation facility. The study introduces advanced sustainable farming technologies for ornamental farmers, breeders and entrepreneurs to enhance their production using cost-effective technologies in a small area with less use of valuable water resources. The present study also helps to introduce hatchery-bred seeds of valuable indigenous *Sahyadriadenisonii* and *Dawkinsiafilamentosa* into the ornamental fish trade, thereby reducing the exploitation pressure on natural resources to a considerable level and contributing to the conservation of natural resources.