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A Way Forward in Aquaculture/Ornamental Fish Farming

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ABSTRACT

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Aquaculture is the one among fast growing industries. There is huge demand for the endemic ornamental fishes in the international market. Due to unsustainable exploitation, valued native decorative fishes are in the state of endangered and extinction. Development of captive breeding technology could be possible way of conservation fishes without affecting the growth of aquaculture sector.

Introduction

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 (Sudha and Gokula, 2015). There is a great scope for Aquaculture (Ornamental fish culture) 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% (Vinayak, 2017). In

view of India's richness of fish biodiversity, geographic location and access through air connectivity to the international markets, it wouldn't be an understatement 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 (Dahanukar *et al.*, 2011).

Among the endemics, about 150 species of barbs are of ornamental value, comprising mostly of wild caught varieties. *Puntius conchonius* (Rosy barb) and *Puntius titteye* (cherry barb) *P. denisonii* (Kerala queen), *Dawkinsia filamentosa*, *D. rohani*, *P. sophore*, *Puntius manipurensis*, *P. pookodensis*, *P. melanostigma*, *P. melanampyx*, are the most common barbs in the aquarium industry (Mercy, 2009 and Jacob, 2013). Around 40 species of loaches (*Botia sp*), native of Thailand, India, Pakistan, China, Bangladesh and some Indonesian Islands has a tremendous market value. Small and lively zebra fish which are native to the Indian peninsular, Sri Lanka, Pakistan, Thailand, Myanmar, Malaysia and Indonesia also fetches a good trade in export market. *Danio malabaricus* (Pearl Danio), *Danio albolineata* and *Brachydanio rerio* (zebra fish) are most popular zebra varieties. *Brachydanio rerio* has high demand which is mainly found in Kerala and Karnataka (MPEDA, 2018). If judicious collection, transportation and marketing of these resources are adopted on a sustainable basis, and this could generate employment opportunities at different levels right from the upstream tribal belts to the urban fish exporting sector. Intense exploitation due to high export demands for most of the beautiful endemic fishes has put it in a state of vulnerable, endangered and even extinct levels. 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.

Materials and Methods

In order to propagate and enrich the indigenous ornamental fish resources in Western Ghat, the fish species namely, *Sahyadria denisonii* (Kerala queen) and *Dawkinsia filamentosa* (Filamentous barb) of Kerala origin were selected for the study. The induced breeding technology was developed for both species under the captivity using the synthetic hormones. 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 for farmers to generate elevated income by producing these valuable fishes.

Results and Discussion

The major constraint is lack of awareness regarding the sustainable culture practices, standard breeding protocol and advanced culture practices (Mercy, 2003). The Western Ghats are the gold mine of fish diversity which can be utilized for the improvement of the production. However, these resources have not been managed properly either for its conservation or for sustainable exploitation. The destruction of natural fish biodiversity is increasingly practised by overexploitation of endemic species which has high demand in the external market. Unlawful exploitation of fishes like *Sahyadria denisonii*, *Dawkinsia rohani*, *Puntius sophore*, *Puntius carnaticus* and many other fishes from southern-Western Ghats are listed under IUCN in vulnerable, endangered and critically endangered categories (Raghavan, 2010 and IUCN red list, 2018).

Development of captive breeding technology is the most possible way to conserve the natural population of commercially important endemic ornamental fishes without affecting the growth of aquaculture sector.

Advancement in breeding and aquarium technology has added new dimensions in the ornamental fish trade with species diversification. Induced spawning of *Puntius titteya* (Sundarabharathy *et al.*, 2004), *Puntius melanampyx*, *Garra mullya*, *Danio malabaricus*, *Chela fasciata*, *Nemacheilus triangularis*, *Nemacheilus semiarmatus* and *Pristolepis marginata* (Mercy *et al.*, 2009), *P. sophore* (Mahapatra *et al.*, 2010), *Puntius pookodensis* and *Pristolepis marginata* (Jacob, 2013) *Gonoproktopterus curmuca* (Padmakumar *et al.*, 2014), *Barbus gonionotus* (Siddhwartha Kumar *et al.*, 2014), *Puntius manipurensis* (Motilan *et al.*, 2014), *Puntius conchonius* (Sudha and Gokula, 2015) and *Dawkinsia rohani* (Pandi, 2018) has been developed. Similarly there is large scope for development of hatchery technology for the other commercially important endemic species.

In conclusion, India is blessed with the beautiful natural endemic decorative fishes. Development of captive breeding technology for an ornamental valued fishes could be way forward to increase our contribution to the world ornamental fish production. Captive breeding technology of endemic fishes also leads to the species diversification in the ornamental fish market, reduces the exploitation pressure on natural resources to a considerable level and contributes in the conservation of the natural resources.

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