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A preliminary assessment of the impact of COVID-19 pandemic on freshwater pearl farming in India

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Abstract

The ill-fated outbreak of COVID-19 pandemic that grasped the entire world had not only restricted the movement of people worldwide, but also altered the human behaviour and consumption pattern by cause of the imposed restrictions. The human catastrophe left no stone unturned in toppling the world's financial system by affecting all the sectors with aquaculture being no exception. The aftermath of this crisis urges the necessity to explore pathways that will not only enhance the sustainability of the aquaculture business but also help the stakeholders to rise above the hammering effects of the pandemic. Here we discuss how the freshwater pearl farming has been affected by the pandemic and if this can be considered as wake-up call to make it a feasible component of aquaculture commerce.

Keywords: COVID-19 pandemic, aquaculture, freshwater, pearl culture

Introduction

With the onset of the COVID-19 pandemic, attributable to the severe acute respiratory syndrome coronavirus 2(SARS-CoV-2), in the late 2019 and the havoc it caused worldwide, the comprehensive economy of the world was appallingly ruined leaving a greater percentage of people with fewer superfluous earnings^[1-4]. The pandemic compelled the complete realm to be contained in their shelters in an attempt to evade the further multiplication of the virus. The period when restriction on public gatherings and social distancing norms were becoming the new normal, all aspects of commerce and business were facing a disastrous downfall. As per the reports of International Labour Organization, around millions people have lost their jobs augmenting hunger and poverty^[5, 6]. Landless labourers, wage earners, and small-scale farmers are the most helpless groups who have been hit the worst as an upshot of being thwarted from their day-to-day work^[7]. The enforcement of pandemic-induced restrictions has largely altered the consumer behaviour and purchase pattern that adversely affected the supply chain and preference of goods and services^[8]. Thus various sectors have faced a major repercussion, with aquaculture and fisheries sector being no exception to it. Hence, a critical study was carried out to assess the widespread consequence of COVID-19 pandemic on freshwater pearl farming in India.

Freshwater pearl culture technology

Pearl, also called the queen of gems, is a high-priced ornamental commodity obtained from molluscan bivalves and since ancestral times it has been praised for its finesse and virtuosity. The collection of pearls accounts to the archaic times when pearl was procured from the wild by chance and was rare. Nearly all species of molluscs own the ability to produce pearl-like object that is technically called "Calcereous Concentration". But the shiny pearl will be produced in the mussels that have the nacre called mother-of-pearl (MOP)^[9]. Nacre is also referred to as 'mother-of-pearl shell', a composite of organic and inorganic material that is formed in some molluscs by the mantle layer. It is strong, flexible and iridescent. The mother-of-pearl layer is found in the pearl mussels of freshwater origin categorized under the Unionidae and Margaretiferidae families and these families are more likely to produce pearls with superior quality among the mussel species. Among all the pearl producing freshwater mussel species available in India, 3 species namely, *Lamellidens marginalis*, *Lamellidens corrianus* and *Parreysia corrugata* belonging to Unionidae family are utilised for pearl production in freshwater environments.

Enhanced pearl production usually includes five stages: Collection of mussels, preparation and implantation of the nucleus, culture in the pond, harvesting of pearls and value addition, among which the making and implantation of the nucleus are the important steps ^[10]. Implantation can be carried out round the year except during the summer months to reduce post-implantation mortality. In comparison to other aquaculture technology, pearl production technology requires additional skill and the culture duration is relatively long.

Mussels of appropriate size are collected from freshwater bodies prior to the surgical implantation and are subjected to pre-operative conditioning to ensure proper relaxation of adductor mussels. There are three types surgical implantation methods i.e. mantle cavity insertion method, mantle tissue method and gonadal method of implantation. Out of the three methods, mantle cavity method of implanting the nucleus is the simplest one where a nucleus is inserted into the mantle cavity (cavity is made by detaching the mantle tissue layer from the shell valve). In the mantle tissue procedure of implantation a graft tissue obtained from the donor mussel is implanted, alone or alongside a small nucleus, into the mantle tissue. Lastly, in the gonadal method of implantation an incision is carefully made in the gonad of the receiver mussel and a round nucleus sandwiched between two grafts is placed into the incision site. Nucleus implantation is followed by post-operative care for a phase of 10 days with an aim of reducing mortality of implanted mussels and minimizing rejection of nucleus. During the post-operative care, the implanted mussels are treated with antibiotics and fed with green algae. The mussels are then relocated to ponds and reared for 12-18 months that is determined by the method of implantation followed. After the completion of the rearing period, implanted mussels are harvested to obtain pearl which is then value added to enhance the marketability ^[11].

Pathways to impact of COVID-19 on freshwater pearl farming: The reduced availability of labour and raw materials required for production and post-harvest processing of aquatic species, decline in demand, disruption in supply chain, etc. during the COVID-19 crisis has unconstructively affected the fisheries and aquaculture sectors worldwide ^[1, 5, 8, 12]. A drop in demand of aquaculture products has also marked a hold on the fish, prawn, shrimp and molluscan stock, increased operational cost and risk of loss from disease outbreak, if any ^[13-15]. The extensive disruption of supply chain has negatively affected the accessibility to various aquacultural inputs like feed, seed, chemicals and medicines ^[8]. Due to the restrictions imposed on travel and global trade there has also been a drastic decline in the fishing activity and reduction in exports

^[8, 16, 17]. Aquaculture production is governed by the health of the farmed species which owes to the management and husbandry practices that further rely on the labour, investment and capital making them vulnerable to the effects of COVID-19 ^[18]. Hence, it won't be erroneous in saying that all the facets of fisheries and aquaculture have faced the consequences of the catastrophe with the fishing community and aqua culturists being the major loss bearers. Fortunately, the COVID-19 crisis has observed a positive shift in freshwater pearl farming, as an outsized number of individuals have shown the desire to take up the farming practice to obtain a robust profit. ICAR-CIFA being the pilot institute of India in conducting studies on freshwater pearl farming has witnessed that not only aquaculturists/fisheries stake holders but also people with agriculture background and people with a job are willing to invest in this sector. Further, freshwater pearl culture also holds the credibility of being taken up as an ancillary lucrative aquaculture business along with fish/shell fish culture post the pandemic to overcome the losses stumbled upon and perk up the living standard of the farmers.

Owing to an escalating interest in freshwater pearl farming among the folks, ICAR-CIFA has been flooded with a profusely large number of applications to undertake the training programme dedicated to the farming. The prevalence of the COVID-19 pandemic has pushed the entire world to opt and familiarize itself with the virtual mode of learning. Going with the current trend of virtual learning, the entire training program during the closure period was carried out online. In this context, a 3-day training program on entrepreneurship development has been given by the institute on freshwater pearl farming. This training program was commenced on 17.09.2020 as the first edition in the series. The module of the course includes lecture classes and step-by-step practical demonstrations and protocols for freshwater pearl farming. A total of 16 e-learning videos on several facets of freshwater pearl cultivation were created and presented to selected participants and admirable feedback was received from the participants. The advantage of this virtual learning program was that more number of people could be trained in a single batch when compared to indoor hands-on training.

Besides, freshwater pearl culture is also granting a new source of revenue option to quite a lot of migrants who have come back to Odisha by reason of obligation to the nationwide lockdown norm. Many farmers have met with success in freshwater pearl farming in their own backyard ^[19]. In addition to this, the other impacts of the pandemic, including both the constructive and deleterious effects, and the routes that led to the impacts are summarized in Fig 1.

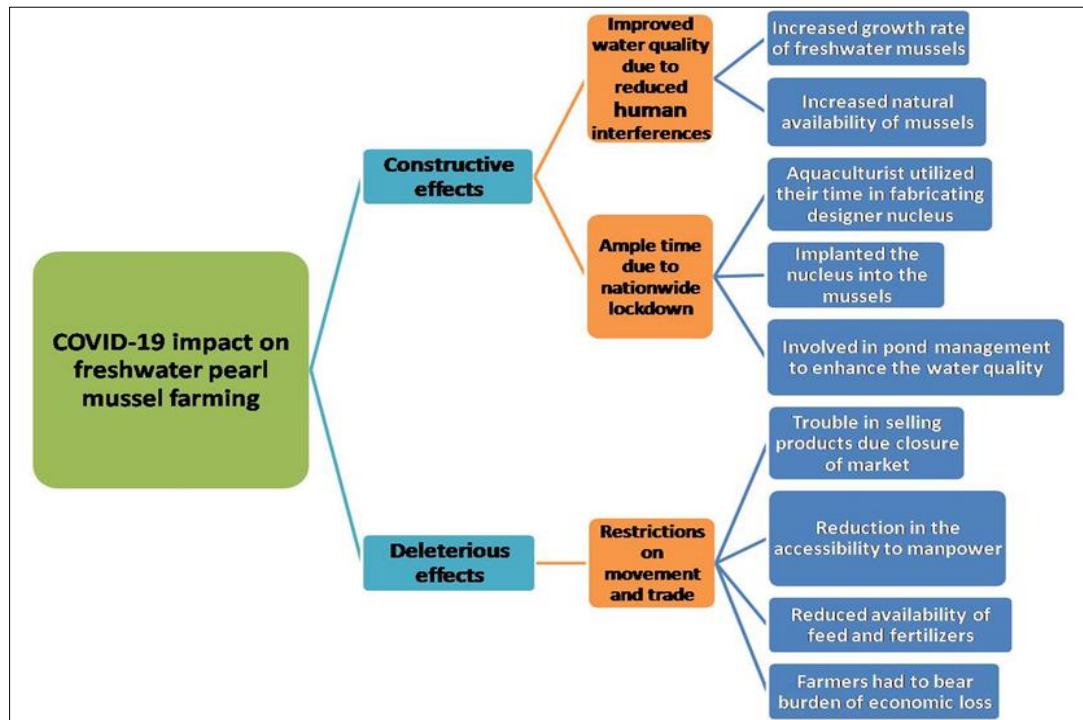


Fig 1: A schematic representation of the impact of COVID-19 on freshwater pearl farming, including both the constructive and deleterious effects

Conclusion

The unfortunate prevalence of the coronavirus is a call to reflect upon and refine the existing aquaculture practices to cope with the loss encountered as a consequence of the pandemic, along with sustainable use of aquatic resources. Thus, to counteract the bleak outcomes of the pandemic on the aquaculture commerce, it is crucial to devise possible ways and strategies to minimize economic losses at national level. The growing interest among the folks to opt freshwater pearl farming validates its ability as an alternative aquaculture practice to muddle through the consequences of the COVID-19 emergency. In the new normal situation, a set of standard operation procedure for pearl cultivation in freshwater systems has been established, resulting in the adoption of the technology by a greater mass of people. At present the main focus is to develop technical expertise in new normal situation in order to spread the technical know-how of freshwater pearl farming. Amidst COVID-19 pandemic, scientists of ICAR-CIFA have developed e-learning materials and organized a virtual training program on freshwater pearl culture which has become popular among the farmers, entrepreneurs and all the stakeholders of the farming communities in a very short span of time. Several people have put across their keen interest to participate in training program on freshwater pearl farming for which the institute has taken concrete steps to train the interested persons in individual batches, which would help to rejuvenate the aquaculture sector including pearl farming. During COVID-19 pandemic the institute has trained more than 1000 farmers/entrepreneurs on virtual platform belonging to the different states of the country. It can be concluded that the crisis has played an important role to boost the freshwater pearl farming sector and we hope to surmount the fallouts of the pandemic on the aqua farmers of the nation. Nevertheless, it is an uphill battle for the people, but with time this pandemic can be conquered and the farming fraternity can take their old lives forward with new experiences.

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