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Short Communication

Socio Economic Development through Fresh Water Pearl Production in Bundelkhand Region

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Fresh water pearls are always in demand among women from long era. According to our Indian gemology in nine maharatnas (Heera, Mukta, Manikya, Munga, Gomed, Neelam, Lehsuniya, Pukhraj, Panna) pearl is next to diamond [1]. Pearls are of three types Natural Pearl, Cultured Pearl, Artificial Pearl. Natural Pearl is produced when any foreign particle enters into the shell of mussels. In response to this mussel's secret nacre layer upon the foreign particle to reduce the itching. This secretion of nacre layer upon layer forms a shiny lustures pearl. The shining layer of pearl is as like as the inner layer of the shell. Pearl is made up of calcium carbonates 82-86%, conchiolin (H_2O + other elements) 2-4%, refractive index 1.530-1.685, hardness (on Mohs Scale) 3.5-4, specific gravity 2.65-2.85, density 2.85 [2].

Cultured pearls are produced in same fashion as natural pearl but the only difference is that the foreign particle forcibly inserted into the mussels and these mussels are reared under observation throughout the culture period. The cultured pearls can be made of desired shapes and sizes. Artificial pearls are made of plastic or nylon type material. Pearl culture activity is a millionaire business and constitutes an important part of aquaculture practice in the world [1]. Three species of fresh water pearl mussels' viz. *Lamellidens marginalis* and *Lamellidens corrianus* are available in water bodies of Bundelkhand region. The mussels of different size and age group are available along the river Betwa at different sites. These species can be cultured and employed at different hatcheries and fish farms/ponds of the region for pearl production.

For the present study fresh water mussel *Lamellidens marginalis* was selected for culture purpose as this species is easily available at different sites along Betwa River. Identification of mussel was done using standard keys [3]. The mussels were handpicked in early morning from local water bodies with the help of local fishermen and collected in plastic buckets for transfer to the culture pond located at the Botanical Garden of Bipin Bihari College Jhansi. Throughout the culture period the physico-chemical parameters of the pond water were analyzed periodically. Proceeding to surgery the mussels of 2-4 years old age were selected from the culture pond and were kept in surgical trays for one night in tap water. The Mantle Cavity Insertion method was used in the present study for insertion of nucleus in the mussel for producing designer pearls since it involves less risk [4]. During insertion mussels were carefully opened and nucleus of desired size and shape was inserted into the mantle cavity. The implanted mussels were carefully put in aquariums by treating the water with antibiotic neosporine, at the rate of 1-2 ppm as a prophylactic measure for a period of 10 days. After 10 days the implanted mussels were placed in nylon bags (1.0 cm mesh, 12 × 14 cm) with 3 mussels per bag and suspended at 0.2 m depth in the culture pond for rearing with the help of wire. For the nutrition requirement of the mussels the experimental pond contains naturally grown diatoms, green algae and blue-green algae. After the successful completion of the culturing period the mussels were taken out from the pond and opened one by one for getting the designer pearls. To maintain uniformity in colour and quality, pearls after harvest were subjected to value addition through surface cleaning or bleaching and dyeing [5].

Tools for operation

Designer moulds

Net bags

Final product

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Throughout the study period (2016-2018) many items and materials were procured from the local market to successfully carry out for the present study. A small rectangular culture pond of dimension 28*07*3 feet was used for the present study. The mussels collected from Betwa river were transported by personal vehicles and stocked in pond. During 10-12 month of culture period aquarium, mussels, steel wire, bamboo, ropes, nylon bags, surgical set and fertilizers were used time to time. The proposed activity carried out in present study during each culture period was summarized in (Table 1) while the quantity and cost of all the materials used for the present study were summarized in (Table 2).

Table 1 Scheduled activity followed during the Present study

Activity	Duration	Remarks
Selection of site along Betwa river for obtaining fresh water mussel *Lamellidens marginalis*	April-May	Knot-Ghat, Kolba-Ghat and Paricha Dam sites were selected as these sites have abundant availability of *Lamellidens marginalis*
Procurement of materials required for pearl culture	May-June	Surgical instrument, moulds, water analysis kit, net bags, steel/nylon wires, ropes, buckets, fertilizers, antibiotics
Preparation of culture pond	June-Aug	Periodic analysis of Physico-chemical parameter of pond and manuring pond for growth of planktons.
Collection of live mussels from site selected and transporting them to the culture pond	Aug-Sep	Mussels were collected during early morning hours with the help of local fishermen and transported to the culture pond.
Preparation of designer nucleus	Oct	Nucleus were made from the dead shell of mussels; surgical instruments were online purchase
Pre-operative condition and nucleus Implantation	Nov-Dec	Healthy mussels were selected for nucleus implantation in mussel and mental cavity insertion method was employed
Post-operative care and culture of mussel	Dec-Sep	Operated mussels were tagged and placed in net bag and suspended in culture pond for rearing and monitored periodically for checking mortality and health of mussels. Natural and artificial food along with suitable water quality are provided during the culture period
Harvesting	Oct	Designer pearls were harvested by sacrificing the mussel
Quality enhancement	Oct-Nov	Lusture of pearl is enhanced by bleaching process.

Designer pearl of different shapes and size were obtained successfully in 12 months at the selected culture pond in the local natural climate and suitable water quality after 60% mortality. The Market price of 'A' grade Fresh water pearl= 1400-1800/- and of 'B' grade Fresh water pearl= 800-1000/Rps [6].

Table 2 Total investment incurred in fresh water Pearl culture during the present study

Items	Quantity	Cost
Cultured area	28*07*3 feet	------
Cultured technique	Mantle cavity insertion	Single side
Timeframe of culture	10-12 months	------
Transportation	------	5000/-
Water analysis Kit	1 set	1500/-
Mussels	500	5000/-
Aquariums	2	1500/-
Steel wire/Bamboo/ropes	3/4kg	1000/-
Nylon net bags	100	700/-
Surgical set	2	5000/-
Designer moulds	07	700/-
Araldite for nuclei making	180gm	500/-
Chloromphenicol/Neosporin Powder (Antibiotic)	20gm	1500/-
Spirulina powder	500gm	1000/-
Liming /Fertilizer	5kg	3500/-
Harvesting /processing	-------	1000/-
Miscellaneous	-------	2000/-
	Total	29,900

The dead shells are used as raw material for the tools, ornaments and other decorative items. Mussel's meat is also a great source of protein and is used for edible purpose in some tribal belts. Dried Mussel meat also be used as fertilizer for

pond and feed for carps [7]. Mussels are also a filter feeder and through their filter feeding and respiratory mechanisms mussels filter water continuously. Due to their filter feeding nature they help in clearing the aquatic habitat [8]. Thus, there is great potential of pearl culture in Bundelkhand region as it has vast resource in the form of freshwater water bodies and the farmers and small entrepreneurs involved in fish farming business can harness its commercial potential and their by increasing their income which will lead towards their socio-economic development.

SUMMARY

The demand of pearls in market is rising day by day but their supplies from nature have reduced due to over exploitation and pollution. Fresh water Pearl production research techniques was first carried out in India in 1987 by Central Institute of Fresh water Aquaculture Bhuwneshwar, Orissa. They started it with identification of suitable local pearl mussel species, defining appropriate surgical implantation procedures, developing pre and post care procedure and captive pond culture of mussels. In recent years Bihar, Gujarat, Maharashtra, Madhya Pradesh and Uttar Pradesh have also initiated commercial production of fresh water pearls. Bundelkhand region has vast resource of fresh water with abundant distribution of qualitatively rich pearl mussel fauna. Bundelkhand fish-farmers and small entrepreneurs who are involved in fish farming business can also utilize these techniques of pearl production for increasing the income of the rural communities and their socio-economic development. In view of this the present study was carried out for popularizing the pearl production in *Lamellidens marginalis* in Bundelkhand region and making fish farming a profitable business. Governments can provide additional support by providing technical assistance or subsidies to make it a lucrative business.

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