



INDUCED DESIGNER PEARL PRODUCTION IN FRESH WATER MUSSEL LAMELLIDENS CORRIANUS

Vijiyata Singh Rathor*

Department of Zoology, Abhinav Pragya Degree College Rath, UP, INDIA

* Corresponding Author Email: vijiyatarathour20@gmail.com



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ABSTRACT

Natural pearl formation is instigated when a foreign particle such as a piece of sand, shell piece or parasite make its way into particular region of mollusc and cannot be expelled. The animal secretes a calcium carbonate material known as nacre to coat the foreign body, resulting in a shimmering and iridescent creation of a pearl. Cultured pearls are formed essentially by the same process. In the present investigation artificial pearl cultured in *Lamellidens corrianus*. After nine months the result were rounded pearls (3 mm to 4 mm) and designed pearls like lord Gnes, Om, Tajmahal, 786 and Saraswati etc. (10 cm to 15 cm). This investigation first time attempt in Bhopal (M.P.). This study indicated to the artificial production of designed pearls will be great achievement for economic point of view

Keywords: Freshwater mussel, designed pearls, *Lamellidens corrianus*

INTRODUCTION

Pearls one of the most prehistoric gems, are esteemed around the globe because of their cool and soft emergence, pastel hue and recognition to diverse disposition as compared to the other jewels. Previously Japan, China, Australia and French Polynesia have had exclusive authority on pearl culture techniques. During the early period of the last century Japan dominated in the frontier of pearl cultivation, later joined by the Australians in 1950's and French Polynesians a decade later, both through technical exchange from Japan, which gradually lost its monopoly on technical grafting skills. The marine pearl culture in India by CMFRI 1973 and the theory of natural and culture pearl formation in marine oysters is now fairly established. In India the first report occurrence is from in a pond of Vindayasagar colony of Jadavpur in West Bengal in 1988 in species of *Lamellidens marginalis*. During the same year they got an initial success in producing spherical pearls. After this initial success CIFA (Central Institute of Fresh Water Aquaculture) Bhubaneswar, Orissa also took up an extensive research work in 1989.

Pearl culture is a billion dollar business and one of the world's largest aquaculture activities in terms of value. In recent times, opportunity for investing in this specific area have been narrow.. India is in the

process of establishing its own 'niche market' employing indigenous mussel fauna.

The Indian subcontinent is bestowed with a rich and diverse group of mussel fauna. The genus *Lamellidens* is represented by nine species and two sub-species(Rao 1989). Every mussel has the ability to produce a pearl of some sort, however only those possessing a lustrous mother of pearl layer can form a gem quality pearl (Alagarswami 1977 and Misra *et. al* 2005, 2009).

Natural pearl formation is instigated when a foreign particle such as a piece of sand, shell piece or parasite make its way into particular region of mollusc and cannot be expelled. As a defense device, the animal secretes a calcium carbonate material known as nacre to coat the foreign body. So many layer of this coating is deposited on the irritant, resulting in a shimmering and iridescent creation of a pearl. Cultured pearls are formed essentially by the same process, except that the irritant, otherwise called a nucleus, of desired shape and size is surgically implanted into the body of bivalve mollusc where it is difficult to be expelled (Chellam 1988). Thus, the nature's hand has not been completely eliminated; in fact it is the animal that determines the

*Author for correspondence

character of the pearl produced. According to the size and colour of pearl desired the appropriate mussel species is selected. *Lamellidens corrianus* produce a maximum of 6mm sized pearl with a pinkish hue in former and silvery in latter.

MATERIAL AND METHOD

Mussels are handpicked and collected from the wild bodies in baskets or crates with water for short distance transportation. The collected mussels are preferably transported during the cooler early morning hours, where possible.

Pre-operative conditioning

The indigenous pearl mussel species are collected from freshwater bodies and are subjected to pre-operative conditioning for two days. They are kept in ferro-cement tanks (200 liter capacity) with aged tap water at a stocking density of one mussel per liter of water. Pre-operative conditioning ensures proper rest of adductor muscles in preparation for surgery.

Surgical implantation

The mantle cavity insertion method is a simple procedure. Prior to surgery, mussels of required shell length and weight are collected. They are carefully opened by means of a speculum, 0.5 cm wide, without causing injury to the adductor muscle and soft parts of the mussels. A small area of the mantle from the anterior side is carefully detached from the upper shell valve and a nucleus of the desired size and shape up to 2 – 4 beads (mussel shell powder and araldite) is inserted slowly into the both side mantle cavity and is further pressed in deep to avoid rejection. Both the valves of a single mussel can be implanted with the chosen beads.

Post-operative care

Post-operative care is an important step in freshwater pearl culture operation that is required for the implanted mussels to recover. The implanted mussels are placed at the rate of two mussels per bag in a ventral side up position for a period of 10 days. Necessary care is taken to allow free opening and closing of the shell valves for respiration. The units are daily examined; dead mussels and those that reject the nucleus are removed.

The food supplies of most of the bivalves are still poorly unstated. Most of the commercially important species of bivalves are plankton feeders. However the examination of the gut content does not give any precise idea of their feeding habit. It contains organic materials, colloidal substances, particles of organic detritus and living organic particles (bacteria, planktons, eukaryotic cells). The size of the particles plays an important role as well as their concentration on the rate of retention. Chlorella, Chlorococcum, Kirchenirella and Spirulina are considered to be their preferred (Misra *et. al* 1998).

Pond culture of implanted mussels

Ponds are generally 2.5 meters deep with a clayey soil base and slightly alkaline waters. A pond with proper inlets and outlets is ideal for implanted pearl mussel rearing. Ponds without aquatic macrophytes and algal blooms such as Microcystis and Euglena are suitable for pearl culture. The ponds are provided with P.V.C tubing (5 cm diameter) platforms (16 x 8 m) as rafts for hanging the pearl mussel culture units. The implanted mussels are placed in nylon bags (1.0 cm mesh, 12 x 14 cm) at two mussels per bag and reared. The physico-chemical parameters and water level of the ponds are monitored throughout the culture period (APHA 1995).

Table 1: Physical and chemical parameters of ponds

Water parameters	Temperature °c	pH	Free CO ₂ ml/l	Dissolve Oxygen ml/l	Alkalinity mg/l	Hardness mg/l	Nitrates mg/l	Phosphates mg/l
Range	23 - 27	6 – 6.7	0.5 - 0.9	5.4 – 5.9	21.9 - 22.8	24.1 – 24.6	1.00-1020	0.200-0.220
Mean ±SD	25.3±1.55	6.4±0.21	0.8±0.15	5.63±0.17	22.44±0.34	24.32±0.19	1.09±0.07	0.21±0.0078

Harvest of pearls

The pond culture of operated mussels varies from twelve months or more depending upon the size and number of nuclei implanted, the health of the mussels and the condition of the pond environment. In the case of mantle tissue implantation methods the colour of the pearls varies from silvery white to golden yellow, green and deep pink depending upon the mother mussel and the nature of the donor mantle grafts employed (Ram *et. al* 1994). At the end of the culture period (September to may month or more), harvesting is done.

RESULT

The mussels are individually sacrificed and pearls are taken out from the pearl sac of the mussels. Some freshwater mussels are capable of producing gem quality pearls. As the pearls are produced through a natural process they show a wide range of variation such as rounded pearls (3mm to 4 mm) and designed pearls like lord Ganesha, Om, Saraswati, 786, Tajmahal and fish etc. in their appearance and quality. This investigation first time attempt in Bhopal (M.P). To maintain uniformity in coloration and quality, pearls after harvest are subjected to value addition through

surface cleaning and bleaching which may enhance their value.

Concerns

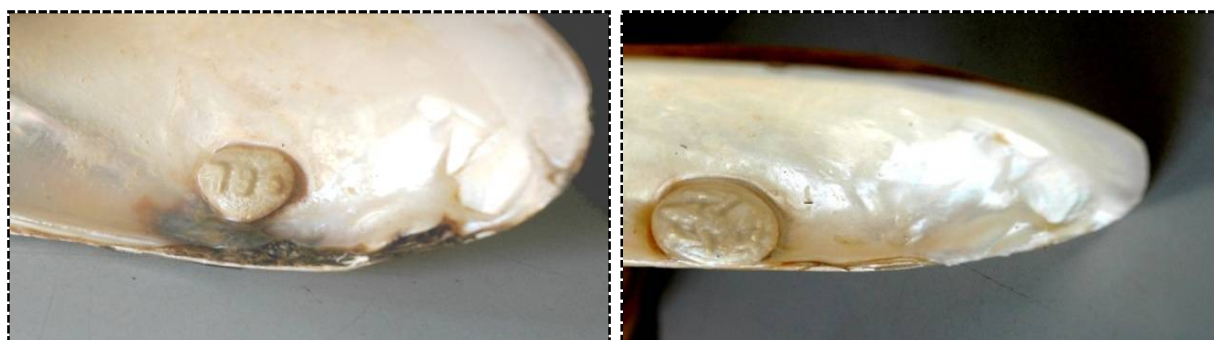
The biological parameters that need to be checked before initiation of pearl culture include water quality, water source, water depth, , nutrient load, temperature and superior quality of recipient as well as donor mussels. Site selection has to be convenient for operational activities. Mussels collected from the wild are ideal; however pathological parameters of the indoor produced animals need attention prior to selection. Pearl culture demands various ancillary activities that require appropriate attentions viz. mussel collection, implantation, nucleus preparation, culture unit fabrication, farm management and harvesting. The product should have a steady market avenue for better remuneration.

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Table 2: The operation & observation of operated mussels are explain by the table.

	Range	Mean $\pm$ SD	Percentage %
No. of mussels (experiment)	40 – 100 pcs 575pcs	63.89 $\pm$ 21.47	100
No. of mussels (moratality) after two weeks	9 – 58 pcs 257 pcs	28.55 $\pm$ 13.72	44.69
No. of mussels (alive)	23 – 42 pcs 318 pcs	35.33 $\pm$ 3.28	55.31



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