

ON SHORE PEARL CULTURE - PERSPECTIVES

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Introduction

Marine pearl is the most important bioproduct of gem value. It is revered from ancient times mostly for sentimental/aesthetic importance, although it has no resale value like gold. When compared to the quality, value etc. the fresh water pearls now available plenty in India have no comparison with marine pearls. Since marine pearls are not actively traded in India, and most of the people cannot afford them, cheap fresh water pearls have invaded the Indian markets from China. The technology of marine pearl culture is very old and is in vogue for the past 100 years. At present Japan, China, Australia, Polynesian Islands and Indonesia are the leading commercial producers of pearls. The species that produce the valued pearls are *Pinctada fucata*, *P. margaretfiera* and *P. maxima* in the order of abundance. However, with regard to the value of the pearls produced, the order is *P. maxima*, *P. margaretfiera* and *P. fucata*. In all the countries pearl culture is conducted in the inter island areas or sheltered bays and is exclusively a sea based activity.

In the sea based pearl culture practiced at present, the pearl oyster collected from the sea or produced in the hatchery are grown in the sea by suspending, them from rafts or rens depending on the location, depth etc. The depth also varies from place to place, and

from season to season. As depth increases the fouling and boring problems become minimum. However the availability of food also decreases resulting in poor growth and mortality. In a farm, the cleaning activity is a daily affair, and the operation and maintenance of a suitable boat/vessel with labour force is a routine work consuming major part of recurring expenditure. Thus the operation cost is high compared to the capital expenditure.

At present pearl culture work is mostly confined to areas where there are natural beds. In India pearl oyster beds exist around Tuticorin area and research work is also largely confined to this region. The sea based technology of pearl culture was developed at Tuticorin about three decades back. However, till date there is no active commercial production of marine pearls in India. Both the coasts of peninsular India experience rough sea at frequent intervals making it difficult to float any rafts over a long period for commercial operations of any nature.

The On Shore Pearl Culture Technology

In the light of the above constraints, onshore pearl culture studies were initiated from Visakhapatnam in 1996. Experiments were conducted on several aspects and many related parameters were refined and standardized. A small demonstration cum research facility of onshore pearl culture

has been established in the premises of CMFRI, Visakhapatnam. The salient features of the technology developed and adopted are as follows.

The spat of *P. fucata* of 5 mm dorso ventral measurement (DVM) grows to 60 mm in about 8 months, suitable for implantation with 5 mm and above nuclear beads. The oysters are grown in suitable cement tanks specially designed for this purpose. The tanks are covered with dark covers and provided with ventilators on all sides to keep water temperature at optimum level throughout the day. They are then spread out at varying densities from spat to oysters of implantation stage depending on their size and are frequently thinned in tune with their growth.

The seawater for this purpose is drawn from the sea by a standard intake system of suitable capacity. The water system has a filter at the source permitting only semi-filtered water from the sea by avoiding sand particle but retaining micro algal cells. This sea water is directly pumped into the pearl oyster tanks. About 10% of the water is exchanged daily and 100% water exchange is effected at every 10 days interval.

Three species of micro algae viz. *Chaetoceros calcitrans*, *Isochrysis galbana* and *Nanochloropsis salina* were identified as best combination for good growth. They are grown separately and mixed in the ratio of 7:2:1 at the time of feeding. The ratio varies from spat to adult. The mixed micro algal feed is supplied to the pearl oyster tanks through a low energy drip flow system, the flow of which can be adjusted to the desired level of algal cell

concentration. The algal cell concentration varies from 10,000 cells/ml to 75,000 cells/ml for the size range of 5 mm to 60 mm DVM and also suitably adjusted to ambient seasonal changes in temperature.

The salinity ranges from a low of 16 ppt for about a few days during the north east monsoon period to the normal salinity of 35 ppt. It has been observed that this wide range did not affect the growth, survival or algal production. Chemicals or antibiotics are not used at any stage, even for cleaning the tanks, which make this technology eco friendly. Fouling, boring and predation was totally avoided in this system. With continuous food supply more than 80% survival from spat to the stage of adult was achieved. Even post-implantation mortalities were negligible, resulting in better pearl yield.

Maturation of the captive oysters and brood stock management technology have been developed. Brood stocks of pearl oysters were maintained in fully mature and ready to spawn condition, making it possible to conduct hatchery operation on a predetermined schedule. The brood stock development and spawning were tested successfully and spawning can be easily induced at any time of the year. In sea based activity one may have to wait for the oysters to attain natural maturity, which occurs only in certain seasons.

There are some misconceptions regarding onshore pearl culture, which need to be analysed in their proper perspective. One opinion often expressed is that in onshore pearl culture the quantity of algal requirement is huge and its

production is costly. In reality it is one of the easiest process involving cheap inputs. Due to lack of practical knowledge, some professionals feel that it is a costly input. In fact, once the algal culture facility is established, it becomes inexpensive and forms only one of the routine inputs. This is demonstrated by the large number of prawn hatcheries around Visakhapatnam, which carry out algal production on a large scale and efficiently using minimum inputs.

It is time for us to realise and accept the natural limitations of our open sea conditions, which restrict sustainable farming at sea. There is therefore a need to switch over to "seawater based activity" rather than sea based activity to overcome

this problem, instead of making improper comparisons with inter island, calm and protected areas as in Japan, Indonesia etc. A careful look at the recent success of commercial mussel culture along the west coast of India clearly indicates that the success is primarily due to shifting of the activity from the sea into the safe backwaters.

It is clear from the foregoing that onshore pearl culture technology has more advantages particularly in the context of Indian coasts as it can also be conducted quite far away from pearl oyster bed areas. An economic analysis made by NABARD predicts that the onshore pearl culture technology is economically viable.