Marine pearl culture

Scope for Group Farming

The bivalve culture of prawn farming is gaining importance and popularity throughout the world. The worldwide popularity of mussel as an edible bivalve is no surprise that over 203,000 tonnes of mussels are harvested from the wild and a million tonnes of farmed mussels were landed in 1999 (FAO).

In India, bivalve culture started in early seventies. The Indian production has not created much impact on the world scenario when compared to that of China, which ranks top in the bivalve production. The reason is the wide spread culture of bivalves in China without any socio-economic problems.

Bivalve culture in Kerala, Tamil Nadu, Karnataka, Maharashtra, Gujarat and Andamans has shown encouraging results. Culture of bivalves is an effective way of enhancing seafood production, among them mussels has the highest production rate and the most valued is the marine pearl oyster and pearl (Queen of gems).

India is endowed with rich resources of pearl oysters, both in the Gulf of Mannar, Andaman and Nicobar Islands, Gulf of Kutch along the northwestern Gujarat coast and Vizhinjam in the Southwest coast of India. The pearls are produced from the marine pearl oyster and freshwater mussels. The pearl oyster Pinctada fucata (Gould) belongs to the Phylum Mollusca, class pelecypoda, order pseudolamellibranchiae, family Pteriidae and genus Pinctada. In the Andaman and Nicobar group of Islands, the black-lip pearls oyster Pinctada margaritifera is available in stray numbers. There are four more species of pearl oysters Pinctada sugilata, P. chemnitzi, P. atropurpurea and P. anomimides in Indian waters. Along the Gujarat coast pearl oysters are found in the intertidal zones ("Khaddas" of Jam Nagar District). In the Gulf of Mannar the oysters are found under water on submerged reefs or rocky areas at a depth of 10-20 m and at a distance of 11-16 km from the coast. The oyster beds are locally known as "paars" and the total numbers of such pairs are more than 65 in number.
the Gulf of Mannar.

**Food and Feeding**

Like other free-living bivalve molluscs, pearl oysters are filter feeders. They use their gills for sorting and then lead to mouth. The major food of pearl oysters consists of diatoms, flagellate, larvae of lamellibrachs, gastropods, heteropods, crustacean nauplii, appendages, frustules of copepods, spicules of sponges and unidentified spores, algal filaments, detritus and are found in the stomach and intestine of freshly collected pearl (P. fucata) oysters from the farm and natural beds.

**Reproduction**

Sexes are separate. The males and females cannot be distinguished from their external morphological characters. Sex reversal and hermaphrodites was also noticed in a few animals. The animal attains sexual maturity at the size of 15.5 mm. The farm-reared pearl oysters reach this size with in 3-4 months. In the Gulf of Mannar the pearl oyster spawn twice in a year. The male and female oysters release their spermatozoa and ova in the surrounding seawater and the eggs get fertilized as soon as they come in contact with the sperms. The larvae reach spat in 20 days time period. A spat of 0.3mm reaches operatable size (45–50 mm) in a period of one year in the east coast, the same takes 9 months in the west coast.

The pearl oysters have been observed to live upto 7 years (farm reared). The spat produced in Central Marine Fisheries Research Institute hatchery are sea ranched in pearl oyster beds to repopulate the barren 'PAARS'.

A natural pearl is formed when the pearl – secreting cells of the mantle migrate into the mantle of the oyster under the stimulus of a foreign body (undischarged eggs of the oyster; sand grains got into the shells and formed pearls; and that parasites or other eggs or other organic matter formed the core of the pearls). The pearl - sac secretes nacre on the foreign body and in due course a pearl is formed according to the shape of the foreign body.

**Culture pearl production technique**

The term “cultured pearl” was used for the first time in 1920 for the pearls produced in Japanese pearl oyster “akoya gai” and marketed in Europe. The renowned name Mikimoto is the first man to produce cultured pearls are mentioned, the Australian Saville-Kent deserves full credit for the original development of the technique. His technique involved taking a piece of mantle tissue from one oyster and implanting it in another. The term ‘artificial pearl’ does not denote a cultured pearl, but would refer to cheap imitations made of plastics, glass etc; by using the extract “guanine” from fish scales for artificial shine. The tissue culture techniques in pearl production are maintained as a trade secret by the larger pearl producing nations. For the production of a cultured pearl, a shell bead nucleus is implanted along with a mantle graft tissue into the gonad of the recipient oyster by a skilful surgery. The operated oysters are put in iron cages with lid netted with synthetic threads /plastic baskets/ netlon bags and suspended from the raft, rack, long line or kept on the under water platforms and (land based culture tanks with sufficient water air and feed etc; according to the area in an air conditioned room without contamination) for pearl formation.

The core material called shell bead nucleus is produced from the fresh water mussel shells from Mississippi River, America. This is imported to Japan, China, Thailand and Australia where they produce nucleus beads of 2 – 22 mm diameter. Necessary surgical tools designed and developed by CMFRI are available in Tamil Nadu based companies. “Mabe” pearls are produced by implanting the images of required object in between the mantle and shell cavity without affecting the mantle. This technique was developed by CMFRI, in 2002. The tissue culture of pearl is under...
perfection in CMFRI, tissue culture laboratory at Tuticorin.

In Indian pearl oyster a nucleus of 2-8 mm can be used and the duration for sufficient coating of nacre on the implanted nucleus varies from 4-22 months. The oysters should be checked after 3 months to assess the retention of the nucleus by narcotizing the animal or by X-ray screening. The X-ray screening is an expensive procedure and is not viable for small P. fucata pearls. It is viable in the case of P. margaritifera and P. maxima pearls, which are priced higher.

**Harvesting, grading, processing and marketing**

The pearls are harvested by cutting and separating the two valves and squeezing out the pearl from the gonad of the oyster. In order to use the same animal for remiplantation, the animal before taking out the pearl is anesthetized as done during implantation and the pearl is extracted carefully. Another nucleus is implanted in the same spot. If the site is not ideal, implantation could be done in other three sites of the same oyster if the animal is healthy. The animal is released back to the farm for healing of wound and rejuvenation for a fortnight or a month. The same animal can be re-implanted; seas ranced and used for graft preparation or leave the animal to live after birthing a good pearl. This practice is prevalent in the case of P. maxima and P. margaritifera wherein an oyster may value 80-100 $.

The pearls are graded into “A”, “B” & “C” depending on the size and shape. “A” grade pearls will be spherical with good luster, “B” grade will have small pimple like projection with good luster. “C” grade pearls will have 2 or more teats. Rice pearls and seedless pearls are produced by implanting several pieces of mantle graft in the gonad. Baroque pearls are shining and odd shaped pearls used for jewellery purposes. The quality of the pearl can be verified by an acid test. Good quality pearls produced by oyster’s forms bubbles when treated with HCl. Imitation pearls do not form bubbles.

Pearl care is very essential for retaining the quality for years. The pearls should not be rubbed, heated. Pearl has to be washed in freshwater and dried in a soft cloth or dried in shade; olive or coconut oil may be applied to retain the luster.

In the international market pearls of larger size are highly valued. India is importing pearls worth Rs.29 crores every year. The major countries involved are Bahrain, Hong Kong, Japan, UAE and U.K. In India, few private entrepreneurs are involved in pearl production. CMFRI is offering regular training on hatchery production, farming methods and pearl production to the officials of State Government, Universities, and Research Institutes, Krishi Vigyan Kendras, industry and progressive farmers.

An NATP Project on Breeding, Culture of pearl oysters and production of pearls (1.3 crores) in *Pinctada fucata* is underway at Central Marine Fisheries Research Institute. A project worth 1.6 crores and funded by DOD (Department of Ocean Development) is proposed to start in Andaman and Nicobar Islands shortly. This will be a pioneering work on the production of black pearls in the country and will bring an additional income by way of export. For competing in the world market, India has to commercialize the pearl programmes and produce bigger sized pearls.

CMFRI held the First Indian Pearl Congress and Exposition at Cochin during the month of February 2003. All the pearl workers in the country were invited to discuss and sort out the problems encountered in pearl culture in India.

Preliminary works are under way to produce pearls of 6 – 8 mm diameter. As pearl production is a long term process, diversification to hatchery/production of young ones from nature, mother oyster culture, implantation and convalescence, post operative culture, harvest of pearls and processing, marketing/ jewellery products, by products etc. and export are to be studied in detail. The most essential component is the production of shell bead nucleus. A world bank aided NATP project is in progress for the production of shell bead nucleus from indigenous molluscan shells using the machineries developed by CMFRI.
and CIFT. All these aspects will come to limelight if Marine Pearl Parks are identified and demarcated in respective coastal areas.

The Central Marine Fisheries Research Institute has imparted training to candidates from India and abroad on different aspects of pearl culture. Special training was given to technicians and researchers from 11 countries of South East Asia, France and Bahrain. Apart from training the fishers, CMFRI has supplied pearl oyster spat and implanted pearl oysters to the groups involved in pearl culture from an ICAR Revolving Fund Project. Good pearls were harvested from the oysters grown by the fisher group. Group farming in pearl culture is ideal for coastal fishers as a part time avocation, income generation and promotion of entrepreneurship in the country.

Earlier, CMFRI has imparted the technical know how to different government agencies in Kerala, Tamil Nadu, Gujarat and Lakshadweep to take up pearl culture as a commercial venture. Due to technical reasons the ventures couldn’t be continued. A critical analysis has shown that the longer gestation period, the labour intensive production mechanism, absence of legal protection for farming areas, huge investment for spat production and grow out of oysters were some of the limiting factors for complete success for pearl oyster and pearl production in a commercial manner. Whereas group farming as tested in Valinokkam small-scale operation and utilization of nucleated pearl oysters by women farmers under M.S. Swaminathan Research Foundation were found to be most viable and feasible. It is felt that the entire pearl production process can be phased out as different enterprises such as, seed production, grow out of oysters, nucleation of oysters, and grow out of nucleated oysters and pearl marketing. However separate self-help groups under the technical guidance of CMFRI can take up each activity. Financial assistance can be sought from NABARD, state fisheries departments and banks by submitting appropriate project proposals. From the government side immediate steps are to be made to demarcate suitable areas for pearl culture along the coastline of India and declare these farming areas as marine pearl parks.

## MEDIA

### Malayala Panchangam

The First Newspaper

Even before the idea of a united Kerala State was born, the first Malayalam paper Malayala Panchangam commenced publication aiming at Malayalam speaking people. The release of Malayala Panchangam was instrumental for such other publications being brought out later from Travancore, Kochi and Malabar.

**Paul Manalil**

The history of Malayalam journalism begins with ‘The Malayalam Almanac’, which has its popular name Malayala Panchangam. It is believed that Rajyasamacharam is the first newspaper in Malayalam, which started publishing from Thalassery in June 1847. But one year ahead of this the former came out from Thalassery. Thus, no doubt, Malayalam journalism had its origin in Malayala Panchangam.

During those days, Basal Mission activities in North Kerala flourished under Dr. Herman Gundert with headquarters at Illikkunnu in Thalassery. It has to be corrected that the Malayalam Almanac published from there in 1846 is the first contemporary publication in Malayalam.

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A step forward in its expansion programmes was Rajyasamacharam brought out by the Basal Mission. The development since Rajyasamacharam found expression when the Mission started another publication Paschimodayam in October 1847.

The first newspaper Malayala Panchangam that was the precursor in introducing literacy in the state could be Government printed by a hand press. As the title was given in English along with Malayalam, it later came to be known in English as ‘Almanac’.

For all-purpose of references like marriage, birth, death etc., people depended on Panchangam inscribed and preserved in Thaliyolas. As people reposed much confidence in Panchangam, the Basal Mission thought, a newspaper to be brought out with the same title and similar character would get immediate