

## FRESHWATER PEARL CULTURE

Pearl is a natural gem and is produced by a mollusc. While the demand of pearls in India and elsewhere is increasing, due to over exploitation and pollution, their supplies from nature have reduced. India is importing a large quantity of cultured pearls every year from the international markets to meet the domestic demand. The Central Institute of Freshwater Aquaculture (CIFA), Bhubneshwar has developed technology of freshwater pearl culture from common freshwater mussels, widely distributed in freshwater habitats throughout the country.

Generally a natural pearl is of small size and irregular shape. A cultured pearl is also a natural pearl, the only difference being the human intervention in surgical implantation of a live mantle graft and nucleus for hastening pearl formation to the desired size, shape, colour and lusture. In India, three species of commonly available freshwater mussels viz., *Lammelidens marginalis*, *L. corrianus* and *Parreysia corrugata* can be used to produce good quality pearls.



Freshwater pearl culture

## TECHNOLOGY

In nature, a pearl is formed when a foreign particle viz., piece of sand, insects etc. by chance enters into the body of mussel and the mussel can not throw that out and instead makes a shiny coating on the particle layer by layer. This simple phenomenon is being exploited in pearl culture practices. As a farming practice, the freshwater pearl culture operation involves six major steps sequentially:

- Collection of mussels,
- Pre-operative conditioning,
- Surgery,
- Post-operative care,
- Pond culture, and
- Harvesting of pearls.

### Collection of Mussels

The healthy mussels should be collected manually from the freshwater bodies like pond, river etc. and kept in buckets or containers having water. The ideal mussel size to be used for pearl culture should be of 8–10 cm.

### Pre-operative Conditioning

The collected mussels should be kept in crowded condition in captivity (1 mussel/liter of water) with aged tap water for pre-operative conditioning for 2 to 3 days. This pre-operative conditioning helps in weakening of adductor muscles for easy handling during surgery.

### Mussel Surgery

Depending on the place of surgery, the implantation is of three types viz., mantle cavity implantation, mantle tissue implantation and gonadal. The key raw materials required during the surgical implantations are beads or nuclei, which are usually made from mollusc shell or other calcareous materials.

*Mantle cavity implantation:* In this procedure round (4–8 mm diameter) or designed (images of any shape) beads are inserted into the mantle cavity region of mussel (skin like structure covered on each side of the body of mussel) after opening the two valves (without causing injury to mussels at both ends) of animal and separating carefully the mantles of anterior sides from the shell by help of surgical set. Implantation could be done in mantle cavities of both the valves. In case of implantation of designed beads care should be that the design portion faces the mantle. After placing the beads in desired place the gaps created during implantation should be closed by pushing the mantle onto the shell.

*Mantle tissue implantation:* Here the mussels are divided into two groups; the donor and the recipient mussels. The first step in this procedure is preparation of graft (small pieces of mantle tissue). This is done by preparing a mantle ribbon (a strip of mantle along the ventral side of the mussel) from a donor mussel, which is sacrificed, and cutting that into small pieces (2 × 2 mm). The implantation is done on recipient mussels, which are of two types viz., non-nucleated and nucleated. In the former, only the graft pieces are introduced into the pockets created at the inner side of posterior pallial mantle present at the ventral region of the mussel. In the nucleated method, a graft piece followed by a small nucleus (2 mm diameter) is introduced in the pockets. In both the procedures care should

be taken that graft or nucleus does not come out of the pocket. Implantations could be done at mantle ribbon of both valves.

*Gonadal implantation:* This procedure also involves preparation of grafts similar to mantle tissue method. First a cut is made at the edge of the gonad of the mussel. Then a graft is inserted into the gonad followed by nucleus (2–4 mm diameter) so that the nucleus and graft are in close contact. Care should be that nucleus touches the outer epithelial layer of the graft and the intestine is not cut during the surgery.

### Post-Operative Care

Implanted mussels are kept in post-operative care unit in nylon bags for 10 days with antibiotic treatment and supply of natural food. The units should be daily examined and dead mussels and the ones that reject the nucleus should be removed.

### Pond Culture

After post-operative care the implanted mussels should be stocked in the ponds by keeping them in nylon bags (2 mussels per bag) and hanging from bamboo or PVC pipes and placed in ponds at one meter depth. The mussels are cultured at stocking density of 20,000–30,000/ha. The ponds should be periodically fertilized with organic manure and inorganic fertilizer to sustain the plankton productivity. Periodical checking of mussels with removal of dead ones and cleaning of bags should be carried out throughout the culture period of 12–18 months.

### Pearl Harvest

The mussels should be harvested at the end of the culture period. The individual pearls can be taken out from the mantle tissue or gonad of the live mussels. The mussels are sacrificed in case of mantle cavity method. The products obtained through different surgical implantation methods vary. In the mantle cavity method these are shell attached half round, in mantle tissue method as unattached, small irregular or round pearls; while in gonadal method as unattached big irregular or round pearls.

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