



D.R PEARL FARM

PEARL INDUSTRY INTRODUCTION

When it comes to pearl production in the world, China tops the list. The cultivation of pearl includes; Natural pearls, Seawater cultured pearls and Freshwater cultured pearls.

There are two basic varieties of cultured pearls; freshwater and saltwater. Freshwater pearls are grown primarily in man-made lakes and reservoirs in China. Saltwater pearls which include Tahitian and South Sea are grown in bays, inlets and atolls in many places around the world.

India is importing pearl of Rs. 2,200 billion in financial year 2018 & Rs. 1,888 billion in financial year 2019 and now the industry is projecting of Rs. 4,350 billion till the financial year 2025 with 15% growth.

INTRODUCTION TO VARIOUS PEARL PRODUCTION INDIAN MUSSELS

When we talk about Indian pearl producing mussels then there are 40 varieties which are found in India in various places like ponds, rivers and lakes. But there are 3 main categories of pearl producing mussels in India and they are as follows :-

- A) LEMLLIDENS MARGINALIS :- It is among the most preferred freshwater species used as food by ethnic groups in Nepal, India and Bangladesh. It is found in lower and upper gangetic plains in India, Myanmar, Nepal and Sri Lanka. They are used for freshwater pearl farming in various states of India because of the good nacre formation inside the body.



This breed is found in both lentic (stagnant) and lotic (moving) Water bodies like ponds, rivers, lakes and dams. But it mostly prefers moving water. The size of these mussels vary between 7-10 cm. This variety is highly used for pearl farming in India and Bangladesh.

- B) **LEMILLIDENS CORRIANUS** :- It is a freshwater species found in sand, silt and mud substrate of large lowland rivers , ponds and dams. This species prefers lotic water bodies with a very rich macro zoo benthic community.



This is the most commonly used mussel across India for pearl farming business because this species is commonly found everywhere in India in large quantity. The nacre formation in this mussel is also good as Lemllidens Marginalis.

- C) **PARREYSIA CORRUGATA** :- It's a another freshwater species which is capable of producing pearls. It's shows a nomadic movements as it keeps moving from one place to another place on regular basis. They outer shell colour of this is mostly green in colour and the surface of this mussel is quite smooth. Nacre formation in this mussel is quite similar to Lemllidens Marginalis and Lemllidens Corrianus.



NOTE :- Technically all kind of freshwater mussels are capable of producing pearls but due to bad quality of nacre the quality of pearls formed in other bivalve mussels is of inferior quality and have no financial value. So these 3 varieties mentioned above are considered most suitable for pearl production.

VARIOUS PHASES OF PEARL FRMING PRODUCTIONS

- 1) POND CONSTRUCTION AND CULTURING :-** This is first and one of the most important phase of pearl production as the construction should be done with the right dynamics.



Minimum pond size to start pearl culture can be as small as 60 ft (Length) × 40 ft (Wide) × 10 ft (Depth) for 10,000 mussels. Firstly dig a pond in rectangular shape then use lime powder 1kg/2.5 dismil in empty pond then after 7 days fill water upto 10 ft then prepare a paste by mixing 20kg/25dismil dry cow dunk & 10kg/ 25dismil sarson khalli in a 4ft by 4ft cemented tank .leave that mixture for a week on 8th day take one bucket fill with water mix D.A.P 2 kg/25dismil with water in bucket and then mix that D.A.P water with the paste in cemented tank (mix it well) and after 2 hrs put that filtered mix in the pond filled with 10 ft of water then leave the pond for 8 -10 days. When the water turns green it is an indication than the pond is ready to use for mussel deployment.

NOTE - This process is applicable for once and for natural new pond only.For old pond the solutions will be different .



Firstly dig a pond in rectangular shape then set pond liner after that fill water upto 3 ft after that use lime powder 0.5kg/2.5 dismil in water then after 7 days fill water upto 10 ft then prepare a paste by mixing 20kg/25dismil dry cow dunk & 10kg/ 25dismil sarson khalli in a 4ft by 4ft cemented tank .leave that mixture for a week on 8th day take one bucket fill with water mix D.A.P 2 kg/25dismil with water in bucket and then mix that D.A.P water with the paste in cemented tank (mix it well) and after 2 hrs start aerating water and put that filtered mix in the pond filled with 10 ft of water then leave the pond for 8 -10 days. When the water turns green it is an indication than the pond is ready to use for mussel deployment.

NOTE - This process is applicable for once and for artificial new pond only.

2) FEED PREPARATION FOR MUSSELS :-



NATURAL POND - Preparing food or feed for mussels is most importance as it plays a key role in the growth of mussels and subsequently nacre formation. Take a 4 ft (w) × 4 ft (L) × 2 ft (D) rectangular cemented tank filled with water, add 10 kgs of cow dung along with 5 kg sarson khalli. Algae and other phytoplankton will start developing in the tank in 7 days. Once the water turns greens then the water will be deployed in the pond. This process will be repeated once in every 15 days. Once the water turns greens then the water will be deployed in the pond.

ARTIFICIAL POND - Such kind of ponds require special care. Take a circular tank or rectangular tank of (4 ft w × 4 ft D) fill it with water then add 10 kgs of dry cow dung. Let it ferment for 24 hours. Once the mix is fermented for 24 hours filter the water with filter cloth. Put the filtered water in all the four corners and middle of the pond. This process will be repeated once in every 15 days. Along with this once in every 7 days 1kg/acer artificial feed will be used.

3) CHECKING AND CONTROLLING WATER QUALITY :- Due to various fluids released by mussels and various natural chemical reactions happens and sometimes harmful chemicals are also formed in the pond which can lead to increased mortality rate of mussels. Various types of chemical compound that can form in a pond like :- ammonia, P.H, nitrogen, nitrite, nitrate, etc.

CONTENT	STANDARD	PRECAUTION
P.H LEVEL	6.5 – 8.5 PPM	To increase use limestone To decrease use vinegar
AMMONIA	Less then 0. 25ppm	Decrease 20% water and fresh 20% water. Keep repeating the process till its zero or Micro life S2 solution.
NITRATE	0	Decrease 20% water and fresh 20% water. Keep repeating the process till its zero.
NITRITE	0	Decrease 20% water and fresh 20% water. Keep repeating the process till its zero.
TEMPERATURE OF WATER	28-32 Degree Celsius	N.A
CHLORINE	CAMPDEN TABLET	1 Tablet is sufficient to treat 20 gallons of water.
Oxygen	Above 4 ppm	Check D.O once in 3 days
T.D.S (Total Dissolved Solid)	Between 300 to 400 ppm	Add minerals

Note :- 1. All the equipment's and chemicals to make various tests on water quality are available on amazon & flipkart website.

2. PH, Ammonia and oxygen levels of pond should be checked in every 7 days.

4) PRE-OPERATIVE CARE :- A day before operating the mussels for surgery take them out from the main pond and put them in half filled water tray in upside down position without feed according to 1litre/Mussel so that the muscles of the mussel become relaxed and surgery can take place in a effective way. Once the muscles of mussel are relaxed the chances of injuries in internal organs are less.

5) VARIOUS TYPES OF SURGERIES :-

- A) MANTLE CAVITY
- B) MANTLE TISSUE
- C) GONADAL

A) MANTLE CAVITY :- In this type of surgery firstly the mussel is opened with the help of opener. Then either the half round or designer nucleus is implanted beneath the tissues of mussel by lifting the tissue on both the sides of mussel. Which means a mussel is nucleated on both the sides. Then the tissue is put back in its original place without harming the mussel. In this process the nucleus is implanted between the mantle cavity and mantle tissue. Then after 18-24 months the desired shape of pearl is harvested and the process gets completed.

B) MANTLE TISSUE :- Firstly take 2 mussel then consider one mussel as a donor mussel who donates its tissue and the second one as a recipient mussel who receives the tissue from the donor mussel. Make small grafts of 2mm size from the tissue which is taken from the donor mussel. This is done by preparing a mantle ribbon (a complete strip of tissue in the shape of ribbon), in this process the donor mussel gets sacrificed. Then the implantation takes place, in which very small pockets are created in the tissue of the mussel, this implantation can be of 2 types i.e. nucleated one and non-nucleated one. Which means it's up to your choice to use nucleus or not to use nucleus.

One thing which needs to be taken care of is the maintenance of tissue in the entire process. So once the tissue is taken out from the donor mussel then the tissue should never remain dry, so in order to take care of dryness a liquid medicine called 'EOSINE' is constantly put on the tissue so that it doesn't get dry and always remains wet.

C) GONADAL :- In this type of surgery also we need to do the grafting. First make a cut at the edge of the gonad of the mussel. Then put a graft inside the cut, then put the nucleus and then again put the graft. Then the mussel is closed slowly. While making cut in the gonad make sure that the cuts are made with precision so that the intestine of the mussel doesn't get hurt. Only round nucleus are implanted in this surgery therefore only round pearls are produced via this process. It takes approximately around 30-36 months to form a round pearl.

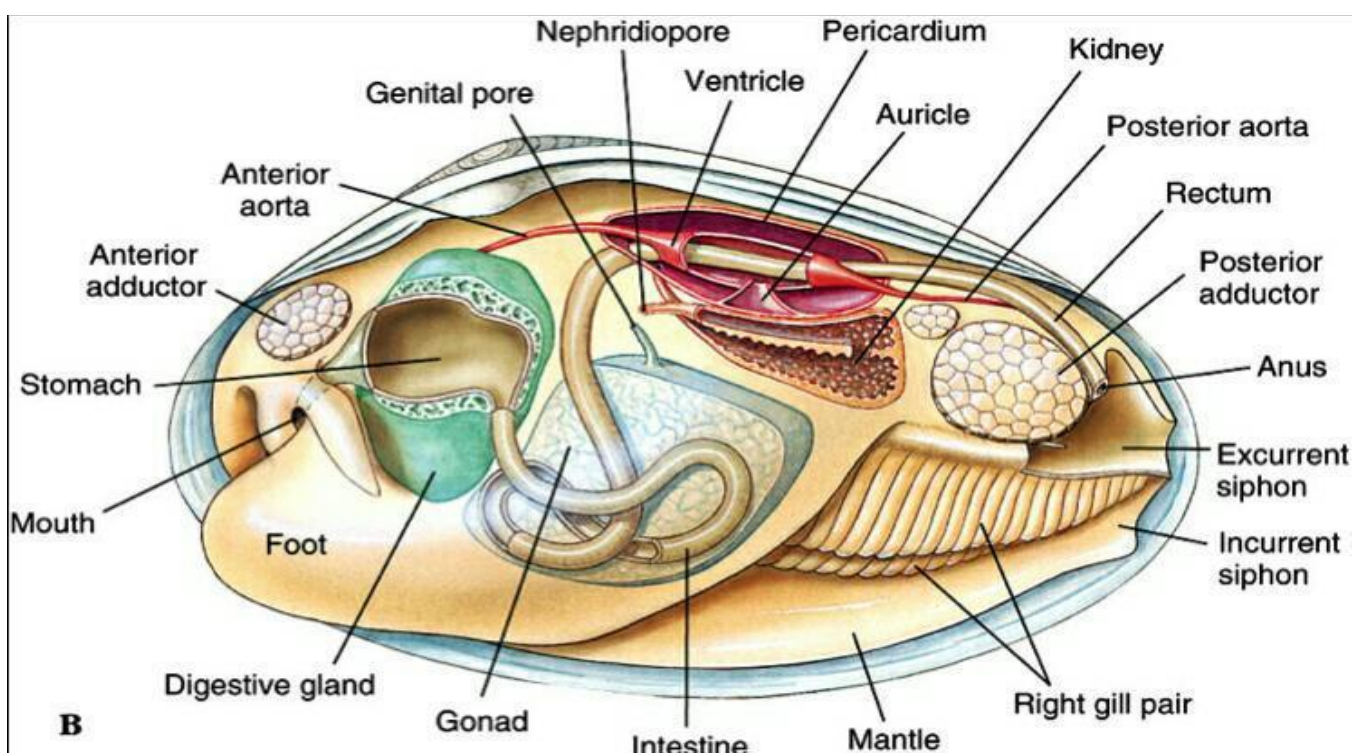
6) POST-OPERATIVE CARE :- Before starting the surgery fill a tray with normal water and add a pinch of chloramphenicol tablet in water and mix it well. Once the surgery of the mussels is over the mussel are kept in the antibiotic water for 1 day, then on the next day transfer the mussels in the net and deploy them in the pond.

7) DEPLOYING MUSSELS IN TANK AND PONDS :- Before deploying mussels in the main pond a netting with small pockets is made. After preparation of nets the mussels are fitted in the net. Then the nets which are holding the mussels is deployed in the pond in such a way that the net remains 1ft above the ground level so that they can be adjusted in the later stages throughout the year according to the weather conditions.

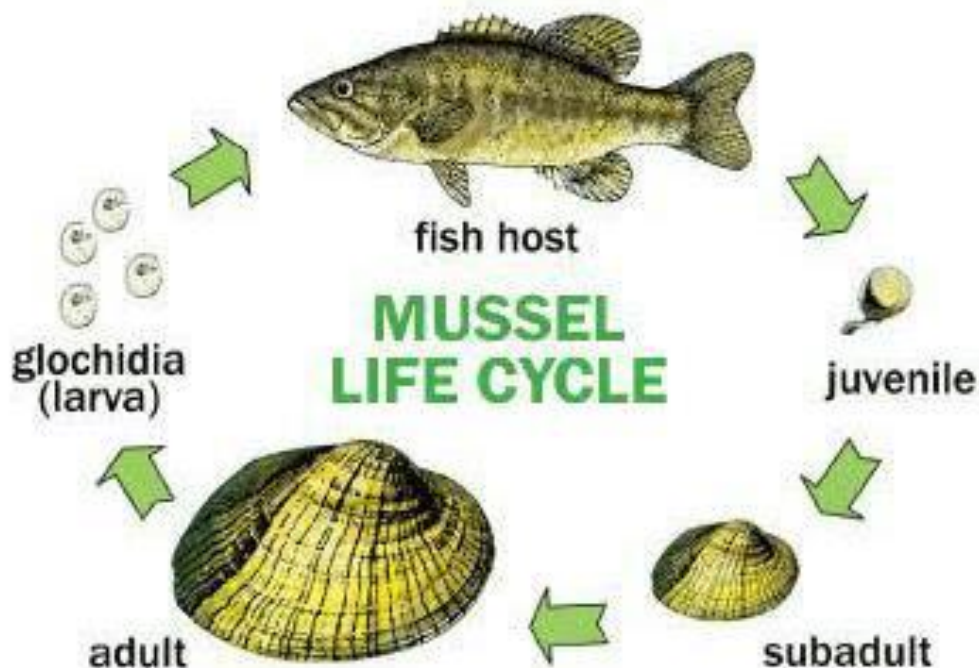
8) MAINTENANCE OF POND AND TANKS :- Everything has a depreciating impact in the same way the pond and tanks used for pearl farming business needs care and maintenance on regular basis. There are certain situations norms which needs to be followed on strictly basis like never allow the inflow of sewage or polluted water , washing cloths and taking bath in ponds and tanks as it can lead to some kind of chemical reaction which can be harmful for the health of mussels.

9) HARVESTING OF PEARLS :- Depending upon the type of nucleus the pearls are harvested. If the designer nucleus is implanted then the pearls can be harvested after the span of 18-24 months depending upon the nacre formation on nucleus. If the round or half round nucleuses are implanted then it can take a period pf 18-24 months. In round pearl harvesting is done then the mussels can be reused after the care of two months and when the mussels live the entire span of life there are chances to produce the pinnacle quality of pearls. In case of designer pearls the mussels are sacrificed.

10) STRUCTURE OF MUSSEL :-



11) MUSSELS LIFE CYCLE :-



Freshwater mussels have an unusual life cycle. They can live from about 10 to 40 years. Females brood eggs in modified sections of the gills, called marsupia, where they develop into bivalve larvae called glochidia, bearing a pair of hooks on the apex of each shell valve.

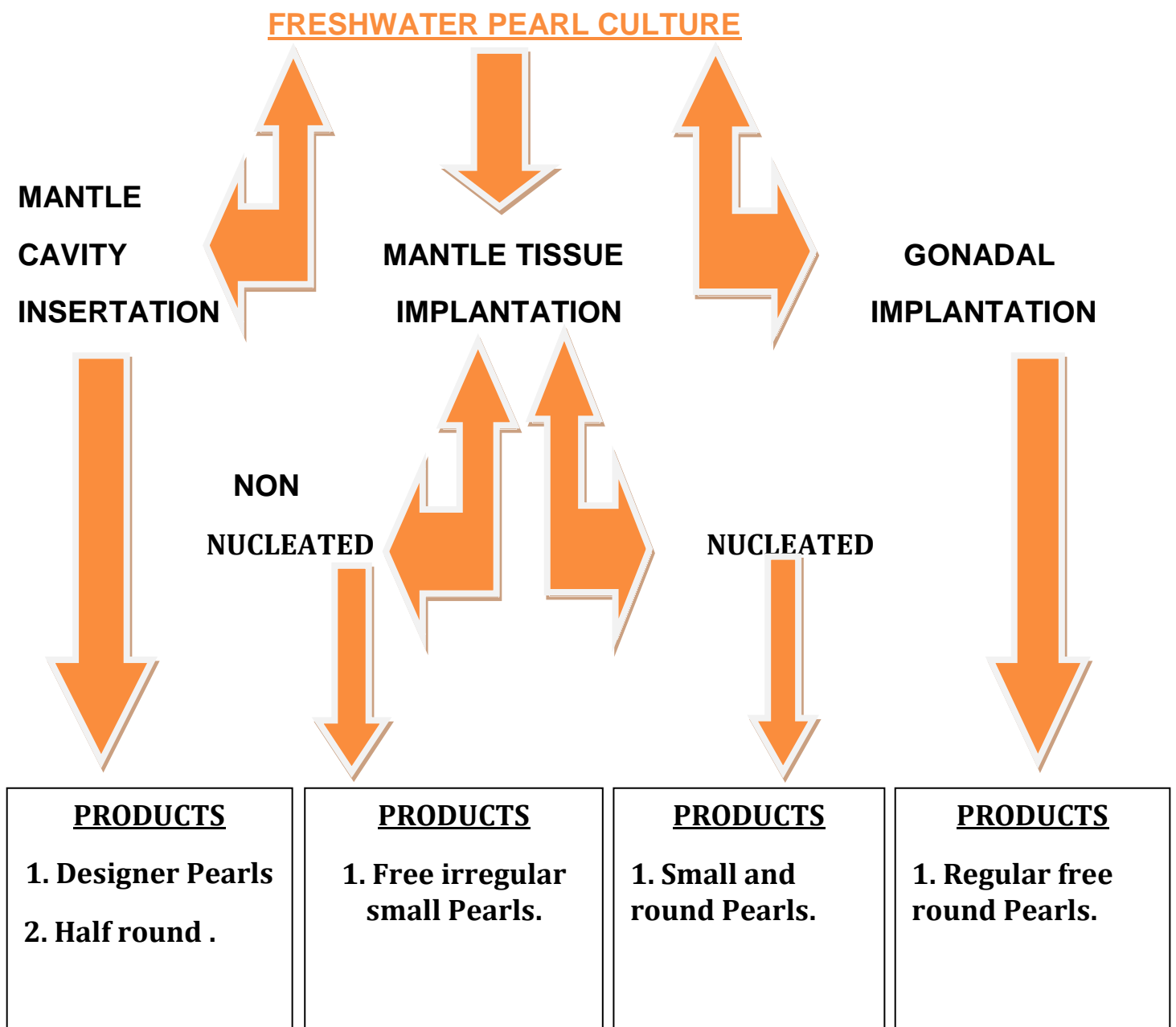
Most species brood in spring and summer. Mussels need a fish host to complete the reproductive cycle.

The method of host infection greatly varies from species to species. Some species release small structure containing glochidia called conglutinates which float freely in water and gets attached to the gills of the host fish subsequently.

Once the glochidia is released from the female, the get attached to the gills or fins of the appropriate host fish complete the development process.

Metamorphosis takes place within weeks depending on the species and temperature. The glochidia transforms into microscopic juvenile and then drops off. Then it's takes almost 2 years for a mussel to be used as a pearl farming mussel.

12) FRESHWATER PEARL CULTURE STRUCTURE :-



THANKS AND REGARDS

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