Project Report On

FRESH WATER PEARL PRODUCTION

SUBMITTED BY

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C O N T E N T S

CHAPTER – I

ABOUT THE PROMOTER

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CHAPTER – II
PRODUCTION TECHNOLOGY

Large scale availability of wild stock of freshwater pearl mussels in easily accessible habitats, operational easiness in management of their farms, absence of natural fouling, boring and predatory organism in freshwater ponds and overall cost effectiveness of their culture make the production of pearls from freshwater mussel more advantageous than marine pearl culture. The technology of pearl production from oyster remains essentially same for the production of pearls from freshwater mussels as well. It differs only on certain points that are dealt at the appropriate places below. The freshwater pearl culture farming involves six major steps sequentially given below:

1. Collection of mussels
2. Pre-operative conditioning
3. Surgery
4. Convalescence
5. Culture of implanted mussels
6. Harvesting of pearls.

a. Collection of Mussels:

The healthy mussels are collected manually from the freshwater bodies and are transferred to the farm. Mussels generally live partly buried in the sand or mud in shallow marginal areas of the stagnant to slow flowing habitat like ponds, tanks, lakes, rivers and reservoirs. The collection of pearl mussels from the natural bed is not always dependable, owing to their irregular production and water pollution. To ensure the sustainable supply of pearl mussel, hatchery production of mussel's seed is much more reliable for culture throughout the year. Once the mussels are raised from such seed, they are selected for grafting by considering their age, weight, stage of sexual maturity and health. The mussels of 1.2 to 2 years in age and 25g or above in body weight are ideal for pearl culture. Some times, mussels of smaller size are also used for implantation. Mussels should be sexually spent and in resting phase.

b. Pre-operative Conditioning:

Like oysters, the collected mussels are also conditioned prior to implantation, but menthol is not used for conditioning of freshwater mussels. The healthy mussels are transferred to laboratory and are cleaned thoroughly first for 2 to 3 days with aged tap water. Then it is treated with limewater (7.5mg/l) for another 2-3 days, followed by 1% (v/v) sodium hypochlorite to make them completely free from any infection. In the last, mussels are again washed with aged tap water for another 2-3 days to ensure the removal of chemicals used in previous treatments. Finally, the mussels are given an immersion treatment in chloramphenicol (100 mg/l) for 24 h. Now, such treated mussels are kept in crowded condition in captivity at a stocking density of 1 mussel/ liter tap water. Such pre-operative overcrowding condition causes weakening of adductor muscles resulting in opening of valves. Speculum is placed immediately between valves after their opening.

c. Surgery

Procurement of mantle tissue from the donor mussel for preparation of grafts is achieved in a similar way as described in case of oysters. The beads or nuclei used are generally made-up from mollusc shell or other calcareous materials such as eggshell powder blended

with suitable adhesive or stelon materials. Unlike oysters, implantations in the mussels are done very commonly at three sites *viz*., mantle cavity, mantle tissue and gonad.

i. Mantle Cavity Implantation:
Beads of 4-6 mm diameter are grafted into the mantle cavity region of mussel after opening their two valves (without causing injury to adductor muscle) and separating carefully the mantles of anterior sides from the shell using surgical appliances. Implantation can be achieved in mantle cavities of both the sides. After placing the beads at desired place, the gaps created for implantation are closed just by pushing the mantle onto the shell. This method is simple and most successful. The pearl product is generally shell-attached. This is the reason that mussels are sacrificed for pearl harvesting in this method.

ii. Mantle Tissue Implantation:
In this method, implantations of graft and nuclei are done on recipient mussels by two ways *viz*., non-nucleated and nucleated. In the non-nucleated type, only the mantle piece is inserted into the pocket 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 (2mm diameter) is introduced in the pocket. In both the procedures care is taken so that graft or nucleus does not come out of the pocket. Implantations can be done at mantle of both valves. The pearl product on non-nucleated implantation method is irregular in shape, while it is small and round in case of nucleated method.

iii. Gonadal Implantation:
In this procedure, the labial palps and gills of the mussel are gently pushed up with spatula and then an incision is made at the edge of the gonad of the mussel, using specially made knife. Then, a graft is inserted into the gonad followed by nucleus (2-4mm diameter). Care is taken to ensue that nucleus is in close contact with the outer epithelial layer of the graft and the intestine is not cut during the surgery.

d. Convalescence*:*
Immediately after operation, the grafted mussels are placed in specially made nylon bags (two mussels per bag) with ventral side up in position. These bags are hanged at a depth of 0.2m in tanks made of ferro-cement or fiberglass reinforced plastics containing aged tap water for post operation care for ten days. During this period, immersion treatment with antibiotic like chloramphenicol enhances the survival of operated mussels and help in faster wound healing. Plankton and algae rich water should be added in tanks after 3-4 days. The operated mussels are examined daily for removal of dead mussels and the ones that reject the nucleus.

e. Culture of Implanted Mussels:

Following convalescence, the implanted mussels are cultured in the ponds for 12-18 months. The mussels are kept in nylon bags (two mussels per bag) and are suspended at one-meter depth from bamboo or PVC pipes in the ponds. The mussels are cultured at stocking density of 20,000-30,000/ha. Regular examination of mussels with removal of dead ones and cleaning of bags is required throughout the culture period. Submerged and floating plants are not allowed to grow, as they impede penetration of the light diminishing thereby the production of plankton in the pond water. Phytoplankton and zooplanktons are

the important food items of mussels. They are strained together with other organic matters by the gills of the mussels and ingested as food. The plankton content of water can be increased through the application of organic or inorganic fertilizers. During dry months, water levels usually go down due to evaporation. Water loss should be made up by pumping water from the ground, river or other ponds.

f. Pearl Harvesting and Processing

At the end of the culture period, the pearls are harvested surgically, for which mussels are brought to the laboratory. Each mussel is opened by cutting the adductor muscles, exposing the body to have clear visibility of gonads, mantle cavity or mantle tissue, and pearls are removed. The mussels are sacrificed in case of mantle cavity peal production method. The pearls obtained are cleaned, graded and processed.

CHAPTER – III

MARKET POTENTIAL

India has great potential for pearl culture. The freshwater pearl mussels are available abundantly in easily accessible natural water bodies like pond, river, lakes, reservoirs etc. India possesses rich biodiversity of freshwater mussel with over fifty species described all over the country out of which three species viz. Lamellidensmarginalis, L. corrianus and Parreysiacorrugata are found to possess high potential for pearl formation. The wider area of inland farming is also available in various regions of the country.

In India, Central Marine Fisheries Research Institute (CMFRI), Cochin and Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar, have developed and mastered the techniques for oyster and mussel pearl production successfully. Therefore, perfect indigenous techniques and abundant resources provide good scope for pearl culture in India. Though, pearl culture is a long term investment, a huge profit can be made in a successful culture operation, as pearls are still in high demand world over. India can join with private firms and technical experts to enhance the pearl production efficiency.

CHAPTER- IV

ECONOMICS OF THE PROJECT

A. PROJECT PROFILE (Financial)

Sr. No.	PARAMETERS	VALUE
1	Species	Fresh Water Pearl Mussels
2	Production Capacity (Pearls per annum)	48,000
3	Product	Cultured Pearls
4	Cost of the project (Rs.)	12,21,000
5	Beneficiary Contribution (Rs.) @ 100%	12,21,000
6	Govt. Subsidy (Rs.) @ 50%	6,10,500
7	Financial Indicators	
	BC R	4.52 :1
	N P W 15% (Rs.)	1,07,948
	I R R %	106.22

B. BASIS & PRESUMPTIONS

I. Techno-economic parameters

1 Subsidy receives @50% from Govt. of India, Department of Animal Husbandry, Dairying & Fisheries

2 Tax on income ignored.

3 Promoters share includes self-contribution plus loan from friends and relatives.

4 There is no change in Government policies in next 5 years.

C. TOTAL COST OF PROJECT

Sr. No.	Particular	Unit	Unit Rate	Quantity	Amount in Rs.
I.	**Capital Cost**				
1	**Land**				Own
2	**Buildings**				
a.	Mussel Holding Pond (Size- 200 Sq.ft * 200 Sq.ft)	Lumpsum			1,00,000
b.	Shed for surgical activities (Size- 20 Sq.ft * 10 Sq.ft)	Lumpsum			25,000
c.	Culture Tanks	Lumpsum			10,000
3	**Machinery & Equipments**				
a.	Culture Units (PVC pipes, ropes & net)	Lumpsum			30,000
b.	Surgical sets	Sets	2,000	20	40,000
c.	Tables for surgical activities	Sets	1,000	20	20,000
4	**Miscellaneous** (Project Formulation, Market survey, Contengencies etc.)	Lumpsum			10,000
					2,35,000
II.	**Working Capital** (Requirements for the first year)				
a.	Mussels	Nos.	15	30,000	4,50,000
b.	Pearl Nucleus	Nos.	5	60,000	3,00,000
c.	Fertilizers & Chemicals	Lumpsum			1,00,000
d.	Manpower				
	Unskilled labours	Nos.	48,000	2	96,000
	Skilled worker for surgical operations	Mandays	2000	20	40,000
					9,86,000
	TOTAL COST OF PROJECT			**TOTAL (A+B)**	**12,21,000**

D. MEANS OF FINANCE

Sr. No.	Particular		Amount in Rs.
1)	Own Contribution (@ 100%)		12,21,000
		TOTAL	**12,21,000**
2)	Govt Subsidy Entitlement (@ 50%)		**6,10,500**

E. PROJECTION OF PERFORMANCE & PROFITABILITY

Sr. No.	Particular	Unit	Unit Rate	Quantity	I year	II year	III year	IV year	V year
I.	**Income**								
a.	**Sale of Pearls**								
	Mussles	Nos.			30,000	30,000	30,000	30,000	30,000
	Mortality of Mussles	%			20	20	20	20	20
	Mussles available for production	Nos.			24,000	24,000	24,000	24,000	24,000
	Production of pearls (@ 2 pearls per Mussles)	Nos.			48,000	48,000	48,000	48,000	48,000
	Sale of Pearls (@ Rs. 100 per pearl)	Rs.			48,00,000	48,00,000	48,00,000	48,00,000	48,00,000
b.	Govt. Subsidy	Rs.			6,10,500	-	-	-	-
				TOTAL (A)	**54,10,500**	**48,00,000**	**48,00,000**	**48,00,000**	**48,00,000**
II.	**Expenditure**								
a.	Mussels	Nos.	15	25,000	3,75,000	3,75,000	3,75,000	3,75,000	3,75,000
b.	Pearl Nucleus	Nos.	5	50,000	2,50,000	2,50,000	2,50,000	2,50,000	2,50,000
c.	Fertilizers & Chemicals	Lumpsum			90,000	90,000	90,000	90,000	90,000
d.	Manpower								
	Unskilled labours	Nos.	2	48,000	96,000	96,000	96,000	96,000	96,000
	Skilled worker for surgical operations	Mandays	2,000	20	40,000	40,000	40,000	40,000	40,000
				TOTAL (B)	**8,51,000**	**8,51,000**	**8,51,000**	**8,51,000**	**8,51,000**
III.	**Net Income**			**TOTAL (A-B)**	**45,59,500**	**39,49,000**	**39,49,000**	**39,49,000**	**39,49,000**

F. Financial Analysis

Particulars		I year	II year	III year	IV year	V year
Capital Costs		2,35,000				
Recurring cost		8,51,000	8,51,000	8,51,000	8,51,000	8,51,000
Total Cost		**10,86,000**	**8,51,000**	**8,51,000**	**8,51,000**	**8,51,000**
Benefit		45,59,500	39,49,000	39,49,000	39,49,000	39,49,000
Depreciated value of buildings @ 10%						79,043
Depreciated value of machinery & equipments @ 15%						38,565
Total Benefit		**45,59,500**	**39,49,000**	**39,49,000**	**39,49,000**	**40,66,608**
Net Benefit		**34,73,500**	**30,98,000**	**30,98,000**	**30,98,000**	**32,15,608**
Discounting Factor@ 15%		0.87	0.76	0.66	0.57	0.50
NPV cost at 15% DF		9,448	6,468	5,617	4,851	4,255
NPV benefits at 15% DF		39,668	30,012	26,063	22,509	20,333
NPW at 15% DF	**1,07,948**					
BCR at 15% DF	**4.52 :1**					
IRR %	**106.22**					