



Fig.4 Stocking



Fig.5 Feeding

Fig.6 2mm Spat

## Upwelling System

Upwelling system is of 1500 litre volume having two race way compartments. Each compartment has 8 wells provided with the bottom mesh of 2 mm size. Here the spat can be grown from 2 mm to seed size of 20 mm in 60 days. Water flows from these compartments up through the mesh upwards (upwelling) in the wells to the middle drainage section through a half inch pipe and from where water is drained to the reservoir. The water from the reservoir is continuously pumped back to the compartments (Fig.7). Stocking rate in the upwelling wells is from 50000-100000 nos. depending on size and flow rate. In the micron nursery, the feed is given in the ratio of 2:1:1 (*Chaetoceros calcitrans*, *Isochrysis galbana*, *Nanochloropsis salina*).



Fig.7 Upwelling system

Every alternate day the wells are cleaned by seawater using a spray nozzle (Fig.8) connected to a 0.5 hp pump and water is fully drained from the compartments and reservoirs and refilled with fresh sea water. About 0.05 - 0.1 million spat can be nursery-reared to seed size (8-12 mm) in a micro-nursery cage within 45 days and 17-20 mm in 60 days (Fig. 9).



Fig.8 Cleaning the well by seawater using a spray nozzle



Fig.9 Harvesting

## Economics of Mussel farming by hatchery produced seed (Rack and ren method)

- Mussel farm of 100 ropes can be seeded (0.2 million seeds) at a cost = Rs.10,000/-
- Anticipated production = 0.8 ton
- Total operational cost= Rs.75000/-
- Gross income = Rs.2,40,000/-
- Net income =Rs.1,65,000/-

There is a high demand for mussel seed as the quantity of seed available from the wild is erratic and most of the time it reaches the farmer in low quality. Mussel seeds of required quality and quantity can be made available using the present technology.

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# MICRO-NURSERY FOR SEED PRODUCTION OF GREEN MUSSEL



Developed by  
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Vizhinjam Research Centre of ICAR-CMFRI has developed a micro-nursery system with down-welling and up-welling subsystems for the settlement and metamorphosis of floating larvae to spat and for further nursery rearing of green mussel spat to produce seed (>20mm) suitable for farming. This will make large scale mussel seed production possible in the hatchery.



- ICAR-CMFRI has designed and developed a micro-nursery system for bivalve seed production which is first of its kind in India.
- The system will make the large-scale hatchery production of bivalve seed possible in India.
- Seed can be supplied @ Rs.50/- for 1000 seeds.
- Two million mussel seed can be produced per cycle from the pilot scale system installed at CMFRI Vizhinjam Research Centre.
- 1000 seed ropes can be prepared using 2 million spat (2000 seeds per 1 metre rope) or it can be sown on the bottom for further rearing.
- A production of 0.8 ton can be achieved from 1000 m seeded rope.
- Micro nursery system minimizes the space and labour requirement in the hatchery making it cost effective.

*Perna viridis* (Linnaeus,1758), the Asian green mussel, is a highly sought after seafood delicacy especially in the West coast of India. Hatchery production of mussel seed is obligatory for increasing the mussel production.

Ripe green mussel, *P.viridis* is induced spawn by thermal stimulation in the hatchery. Fertilized egg passes through morula, D-veliger, umbo, eye-spot, pediveliger and plantigrade stages before settling as spat. (Fig.1 (a to h)). Eye-spot larval stage (18 to 21 days) (Fig.2) is transferred to the micro nursery system for further rearing.

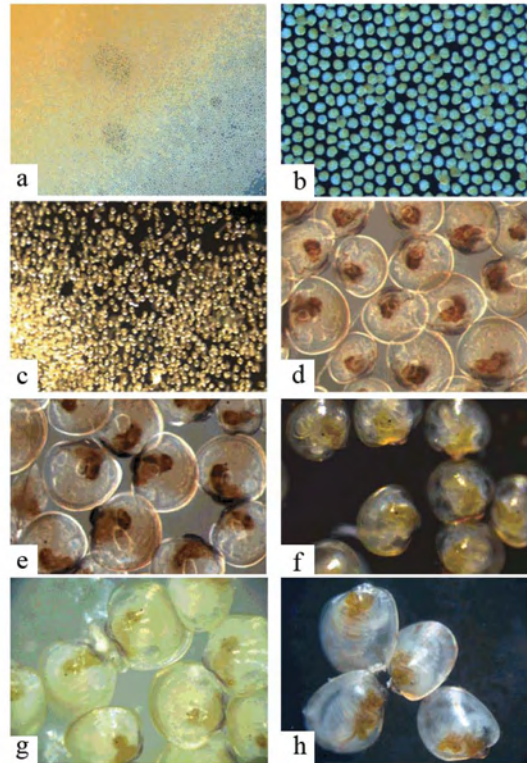


Fig.1 (a to h)  
a: Fertilized egg of *P. viridis*  
b: Morula stage  
c: D-veliger stage  
d: Umbo stage  
e: Eye-spot stage  
f: Pediveliger stage  
g: Plantigrade stage  
h: Spat



Fig.2 Eye-spot larvae ready to be transferred to the downweller

## Micro-nursery system

Micro-nursery system consists of down-welling and upwelling subsystems with separate reservoir tanks and pumps for providing water circulation. In the down-welling system, eyed stage larvae of mussel, oyster or clam can be stocked at high density for settlement and growth. When the settled spat reaches 2 mm size it can be transferred to the upwelling system for further rearing.

## Down-welling System



Down-welling system is of 2000 litre capacity divided into 4 compartments of equal size. Each compartment has eight PVC wells of 30 cm diameter and 25 cm height making a total of 32 wells. Wells are provided with airlift mechanism for pumping water to the well from the compartments. To the compartments, water is being continuously pumped (0.2hp) from the reservoir, which overflows back to the reservoir. Bottom of the well is covered by mesh cloth and eyed larvae are stocked in the wells provided with 150µ (Fig. 4).

In all the 32 wells water passes from surface at the rate of 50000 to 150000 larvae per well. The required quantity of the feed is added directly to the reservoir (Fig. 5). The eyed stage will metamorphose and settle in the wells and can be grown till 2 mm size (20 days) before they are transferred to the upwelling system (Fig. 6).