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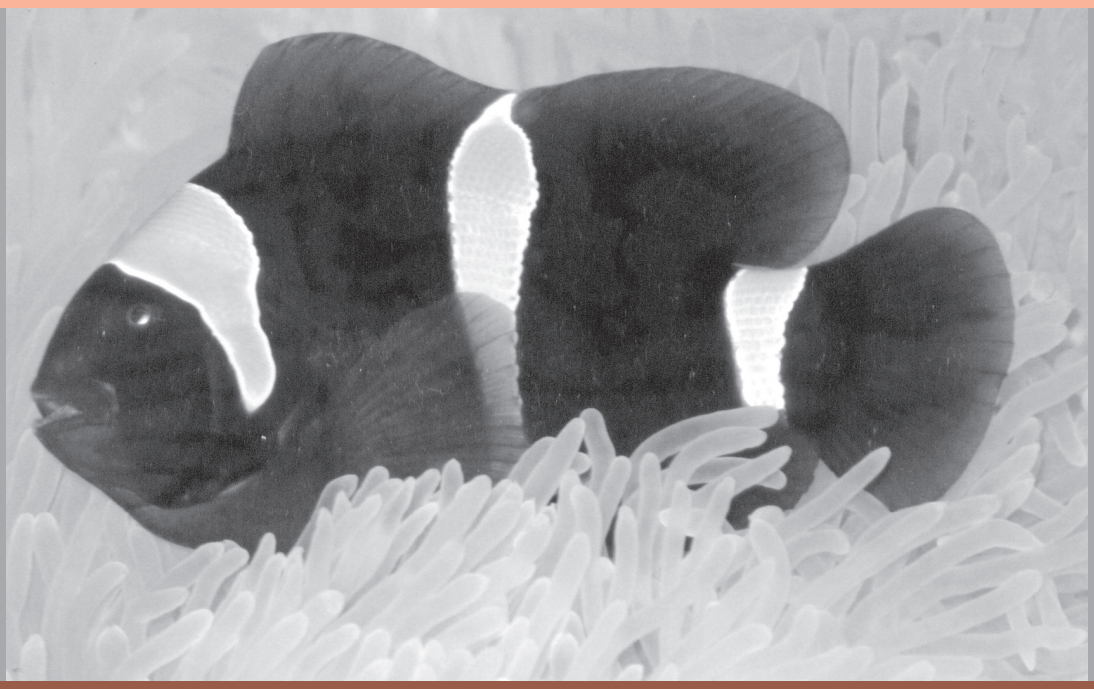

TECHNICAL AND EXTENSION SERIES

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE

COCHIN, INDIA

(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)

1199 Remote setting of the yellow clam *Paphia malabarica* and the pearl oyster *Pinctada fucata* in India

Paphia malabarica and *Pinctada fucata* are two commercially important bivalves of India, the former as an edible resource and the latter for the production of akoya and mabe pearls. The seed production techniques for these two bivalves has been developed at the Tuticorin Research Centre of CMFRI. Along the west coast of India, *Paphia malabarica* supports a very good fishery. Semi-culture or relaying of these clams by clam fishers is popular and the potential for clam maricultrue is also high since the domestic and export demand for this clam is high during the past two decades.

Remote setting is the technique of setting the pediveliger larvae produced in hatcheries at sites near the farm site away from the production site. The method of transporting the larvae is unique - they are sieved and packed in moist cloth and placed in containers under moist, cool condition without water.

The pearl oyster *Pinctada fucata*, though found in the paars of Gulf of Mannar and Palk Bay, has been found to have good survival and growth along the west coast. The experiments done on akoya pearl and mabe production indicated a good potential for

pearl farming. Availability of sufficient seed for commercial ventures is a problem. Feasibility of remote setting for the larvae of *P. fucata* was tried at the Marine Hatchery of CMFRI at Calicut along the west coast. Utilising the shellfish hatchery at Tuticorin, growth and survival of remote set spat of *Paphia malabarica* and *Pinctada fucata* in the post-set phase was monitored for 52 days in the hatchery.

The pediveliger larvae of *P. malabarica* and the pearl oyster *P. fucata*, produced in the Shellfish Hatchery of CMFRI at Tuticorin were used and the basic method of packing larvae for remote setting was followed (Fig.1). Two lakh larvae of the clam and 5000 larvae of the pearl oyster were filtered and wrapped in a moist cloth separately and placed in an ice box at a temperature of 24 to 28^{0}C. Two sets of 50,000 larvae of the clam and 1000 larvae of pearl oyster were transported in water and in dry moist condition without lowering the temperature and these were treated as control.

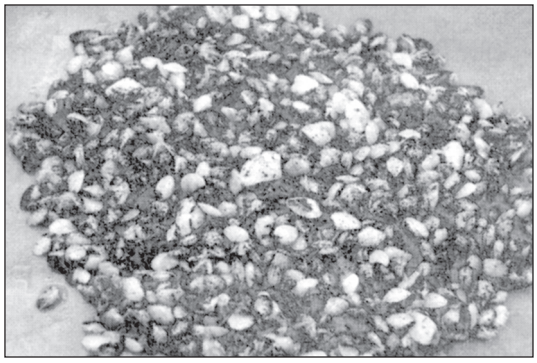

Fig. 1 Remote set seed of the clam *Paphia malabarica* produced at the Marine Hatchery of CMFRI at Calicut using the larvae from Shellfish hatchery at Tuticorin

On reaching the destination, after a transit period of 26 hrs, the larvae were released into seawater. Fifty thousand clam larvae were retained in the same container for 48 hrs to evaluate the survival in relation to time. The activity of the larvae immediately after transit were observed and the settlement percentage was calculated. The settled spat were reared in the hatchery.

For acclimatisation after the transit period, the larvae were released into one litre of filtered seawater and their activity monitored for 30 minutes. During this period the percentage of active and inactive larvae at intervals of ten minutes were monitored. After the activity of larvae was stabilized, they were released into rectangular FRP tanks of one tonne capacity, half filled with filtered seawater. The standard methods of rearing clam larvae and pearl oyster larvae using filtered seawater was followed for setting the larvae. Aeration was provided in the tanks with clam larvae, whereas the tanks with pearl oyster larvae were without aeration and covered with dark cloth.

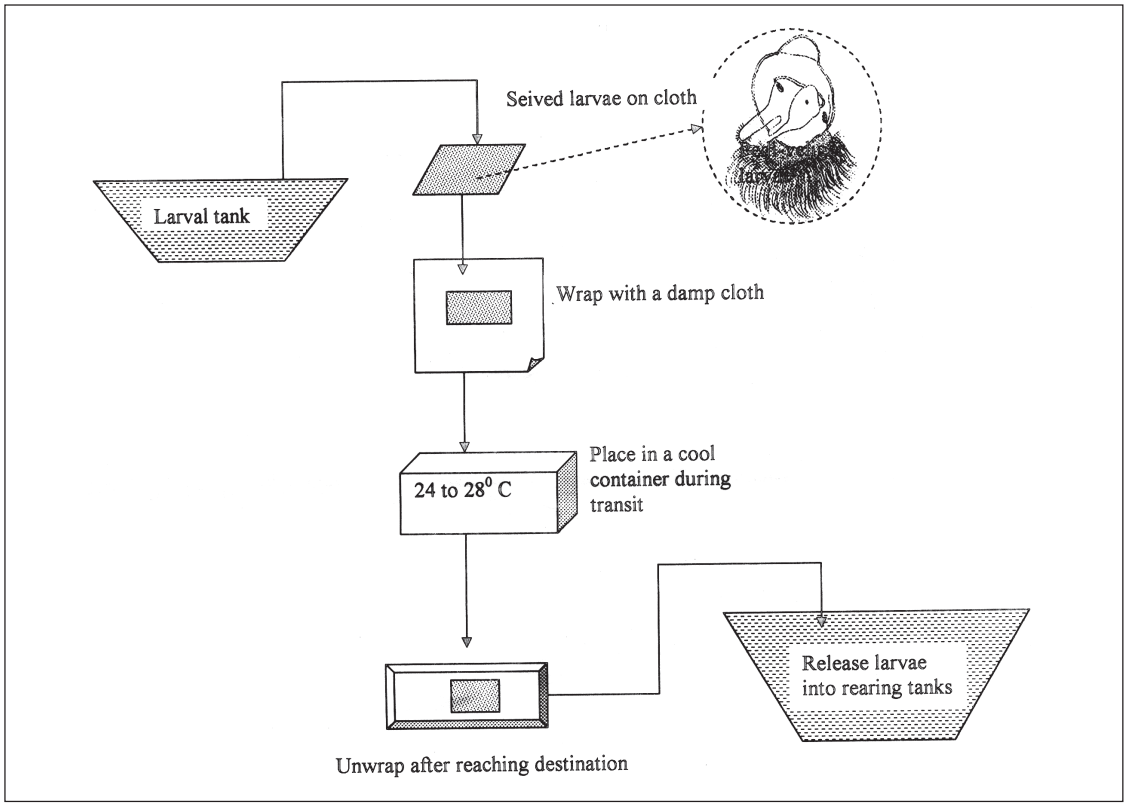

Fig. 2. Flow chart showing the handling of larvae for remote setting

Both the species could withstand the dry moist cool packing for a transit period of 26 hrs. The settlement percentage upto 3mm spat size was 2.3 and 5.7 respectively for *Paphia malabarica* and *Pinctada fucata* larvae. Complete mortality was observed for the control in wet packing and dry packing without lowering the temperature. The details are given in Table 1.

The results indicated that the pediveliger larvae of *P. malabarica* and *P. fucata* can be remote set provided the transit period is less than 48 hrs and the temperature below 28^{0}C.

The results imply the scope for developing bivalve larval settlement in distant areas and linking it with commercial farming / stock enhancement programs.

Growth and survival of remote set spat of *Paphia malabarica* and *Pinctada fucata* in the post-set phase

Growth and survival of remote set spat of *P. malabarica* and *P. fucata* in the post-set phase was monitored for a period 52 days in the hatchery. After 25 days the clams had an average length of 3.57 ± 1.25 mm and the

Table 1. Details of the remote setting experiments on pediveliger larvae of the clam *Paphia malabarica* and the pearl oyster *Pinctada fucata*

Sl no	Particulars	*Paphia malabarica*	*Pinctada fucata*
1	Number of larvae transported	2,00,000	5,000
2	Number of spat settled	4786	986
3	Percentage settlement of larvae transported by moist cool (24 to 28^{0}C) method (remote transport)	2.3	5.7
4	Control with water (temperature 28 to 31^{0}C)	100% mortality	4.1% settled
5	Duration of transit	26 hrs	26 hrs
6	Control without water and exposed to ambient temperature (28 to 34^{0}C)	100% mortality	100% mortality
7	Survival in 48 hrs transit period by moist cool method (24 to 29^{0}C)	100% mortality	

pearl oysters were 3.76 ± 0.76 mm. These were reared further at a stocking density of 60 spat L^{-1} till they became plantable size (Fig.2). During the experimental period the spat were maintained in salinity 31±3 ppt, temperature 27±4^{0}C; 50% water changed daily and aeration provided for 12 to 18 hrs. Mixed algal diet of *Chaetoceros+Isocrysis +Nannochloropsis* at a ratio of 1:2:1 was provided in two phases.

The length, width, thickness and weight of the spat were measured using a digital vernier calipers and a digital balance. The average and standard deviation were calculated from the observed individual measurements. These were used to calculate the instantaneous growth rate (IGR), which does not have time restriction.

The IGR was computed from the formula

$$IGR = \frac{Ln_t - Ln_i}{t}$$

where, Ln_t is the natural log of the length at time t and Ln_i is the natural log of the initial length.

The average length and weight measurements of the clam spat is given in Table 2 and the instataneous growth rates (IGR) during the 52 days culture period in given Table 3. The average biometric measurements and IGR of remote set *Pinctada fucata* given in Tables 4 and 5 respectively.

Table 2. Average biometric measurements of remote set clam *Paphia malabarica* starting from one month after settlement

	Length (mm)	Width (mm)	Twt (gm)
Days of	AVERAGE ±	AVERAGE ±	AVERAGE ±
culture	STDEV	STDEV	STDEV
30*	3.57±1.25	2.76±0.74	
45	5.38±1.41	4.05±0.98	
80	8.86±2.19	6.07±1.38	0.11±0.097
122	10.56±1.33	6.80±0.78	0.14±0.073
172	11.87±2.54	8.22±0.98	0.25±0.12

1* (30 days after settlement)

The average length of the clam spat after 30 days settlement was 3.57±1.25mm and width 2.76±1.250.74mm. These spat grew to 8.86±2.19mm in 35 days. The average IGR during this period was high 0.025 mm per day which decreased to 0.01 mm per day thereafter.

Table 3. Average Instantaneous growth rates of the clam *Paphia malabarica* at different length

Average length	IGR-L (mm/day)	IGR-W (mm/day)	IGR-WT (gm/day)
3.57	0.025	0.027	
5.38	0.020	0.024	
8.86	0.016	0.025	0.041
10.56	0.015	0.009	0.046

Table 4 Average biometric measurements of remote set pearl oyster *Pinctada fucata*

	Length (mm)	Width (mm)	Thickness (mm)	Total wt (gm)
Days of culture	AVG±STDEV	AVG±STDEV	AVG±STDEV	AVG±STDEV
30	3.56± 0.76	4.48±0.90		
45	5.48±1.58	6.98± 2.08		
80	8.28±2.08	9.76±2.22		0.060±0.038
125	9.48±1.27	10.91±1.41	2.44±0.27	0.015
134	14.85±3.05	18.13±3.32	4.2900±0.76	0.526±0.287

Table 5 Instantaneous Growth Rate (IGR) of length, width and total weight of the remote set pearl oyster *Pinctada fucata* at different mean lengths during the nursey rearing phase in the hatchery

Average Length (mm)	IGR-Length (mm/day)	IGR-Width (mm/day)	IGR-Thickness (mm/day)	IGR-Weight (gm/day)
3.56	0.029	0.030		
5.48	0.021	0.017		
8.28	0.014	0.011		-0.138
9.48	0.005	0.006	0.006	0.040

Remote set pearl oyster spat and clam spat had almost the same length one month after settlement. The pearl oyster spat reached 3.56 mm in one month after settlement and 8.28 mm in 80 days.

Remarks

The high initial growth rates and low IGR and mean lengths after 80 day period in the hatchery indicates that the spat must be shifted to farm for further growth after one and half to two month in the hatchery. The overall results of the experiment point to the scope for developing remote setting as an intermediary technique for providing seed for farmers and also for stock enhancement or conservation programs. The protocol for nursery phase has to be developed and the scope for increasing the percentage survival has to be investigated.

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