EXPERIMENTAL STUDY OF THE SETTLEMENT AND COLLECTION OF PEARL OYSTER SPAT FROM TUTICORIN AREA

K. NAGAPPAN NAYAR, S. MAHADEVAN,
K. RAMADOSS, N. SUNDARAM AND C. T. RAJAN

Central Marine Fisheries Research Institute, Substation, Tuticorin.

ABSTRACT

For the first time settlement and growth of pearl oysters have been observed on granite stones forming the embankments of the New Tuticorin Port. Large numbers of pearl oyster spat have also been collected by employing different types of spat collectors and the rate of growth of the oysters in the farm has been studied.

Pearl oyster spat settle down and grow mainly on dead coral reef or 'Paar' as in the Gulf of Mannar or even in shallow areas where submerged dead coral reefs exist as in the Gulf of Kutch (Mahadevan and Nagappan Nayar 1973, 1974). Observations have also brought to light the settlement of oysters, though stray, on the heavily fouled surfaces of iron piles of pier, underside of steel drums used as floats for long time, channel buoys, keels and gunwales of permanently anchored launches.

With the object of conducting investigations and experiments on the culture of bivalve molluscs at Tuticorin the sheltered basin of the New Tuticorin Port was chosen and a farm was established within the the accessible distance of the breakwater walls. The general layout and the location are shown in diagram

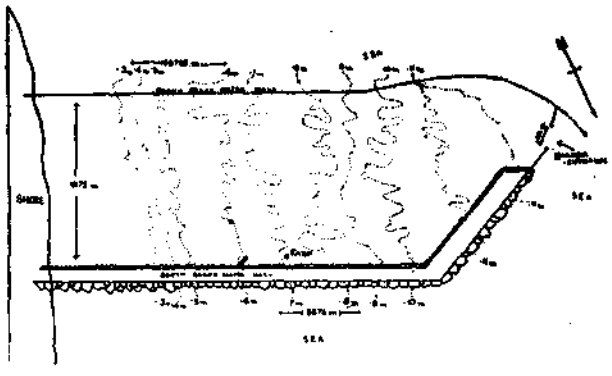
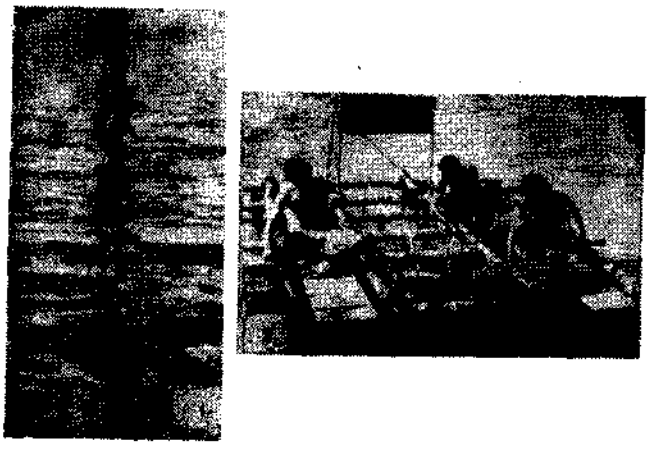


FIG. 1. The lay out of the New Tuticorin Port area and the location of the farm.

1. A wooden raft 3.75 x 2.5 m was floated over 7 metre depth zone (Photograph 1) from which the following spat collections were suspended as suitable intervals and depth.

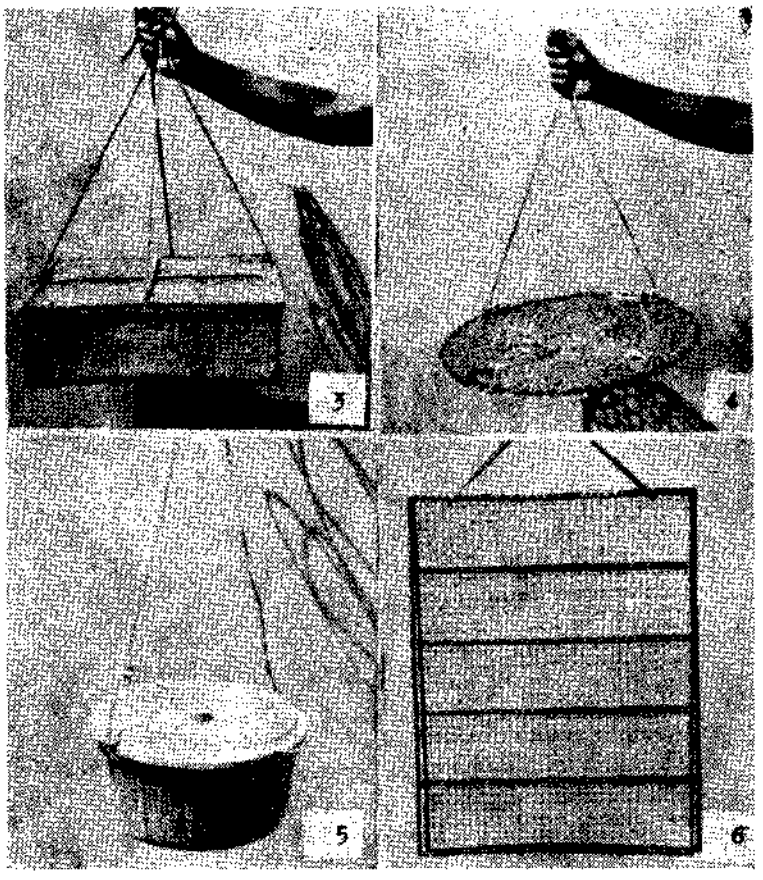
1. Pearl oyster shell string of 2 metre length. (Photograph 2).
2. 40 x 40 13 cm size iron frame made into a cage with I mm thick nylon twine netting having 10 mm meshes (Photograph 3)
3. Nylon twine meshed iron ring of diameter 50 cm. (Photograph 4)



Photograph 1. Shell string spat collector. 2. Wooden Raft

4. Perforated and slotted plastic baskets of bright colour, duly weighted (Photograph 5)
5. Polypropylene and coir rope of 2 metres length vertically suspended duly weighted with stone.
6. 45 x 60 cm iron frame closely netted with nylon twine (Photograph 6).

In the course of routine observations pearl oyster spat settlement was noticed in February 1974. The incidence of spat in different spat collectors is given in Table 1. All the surface offered except coir rope had spat settled on them. It may also be mentioned that quite a number of spat were found settled on the inner side of the perforated plastic basket. Maximum number of pearl oyster spat were noticed during April and May 1974. Nylon twine meshes of circular and square cages appeared to be the best substratum taking into account the number of spat per unit surface.



Photograph. 3. Square frame cage. 4. Iron ring with nylon mesh 5. Perforated plastic basket. 6. Rectangular frame with nylon mesh.

In addition to the spat of *Pinctada fucata* (Gould), there were many spat with translucent shells and oblique shape which belong to other species of *Pinctada*. Care was taken to separate them. Rao (1970), Rao and Rao (1974) have listed *P. fucata* (Gould), *P. chemitzii*, (*Phillipi*), *P. sugillata* (Reeve) and *P. anomioides* (Reeve) as occurring in the Gulf of Mannar. *P. sugillata* and *P. anomioides* are represented in the present collections in addition to *P. Chemnitzii*.

After taking size-frequency measurements the spat of *Pinctada fucata* only were transferred to plastic baskets and suspended from the rafts to study the growth pattern. Monthly sampling of he size frequency was made. It may be noticed from Figure 2 that during the interval of 8 months the spat of 20 mm size had grown to 55 mm and the oysters appeared very healthy.

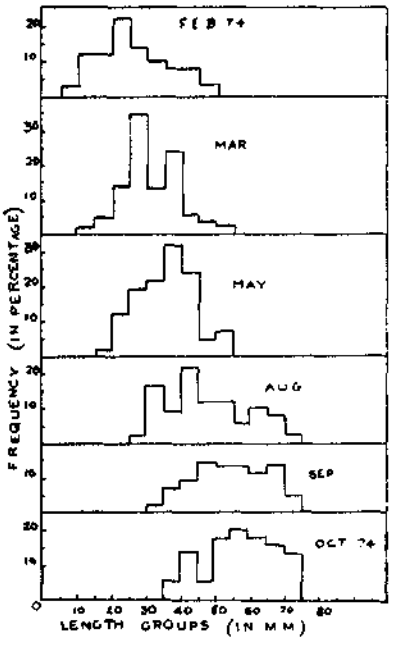
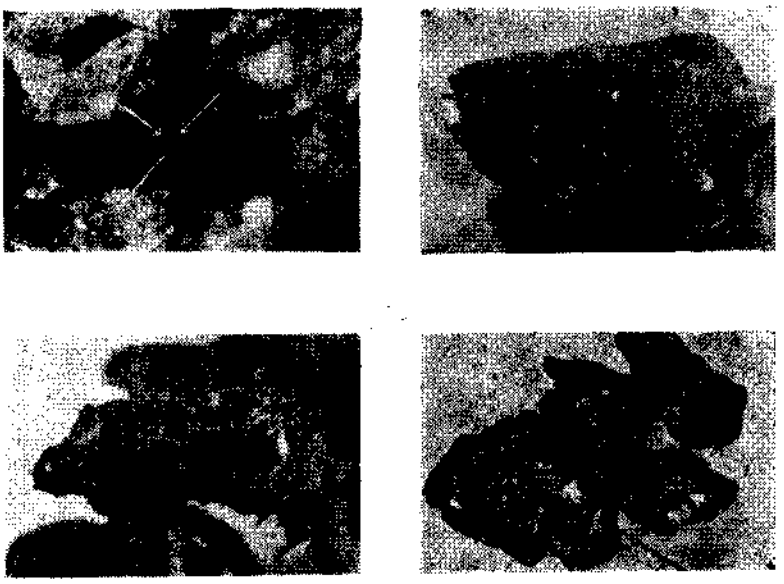


FIG. 2. The size frequency of the pearl oyster *Pinctada fucata* in the farm.

The encouraging result of the study of spat collection and growth in the farm warranted a search of the adjoining submerged granite stones on the near-by south breakwater wall to find out whether these would offer a suitable sub-stratum for spat settlement. Snorkel-diving observaions showed a very good number of pearl oysters thriving well, attached to the dark underside of stones (Photographs 7-10). The pearl oysters and spat collected from this substratum belonged to more than one species. Over 5000 oysters were collected in a stretch of 50 metres averaging 50 oysters per sq. metre. This rules out the possibility of fortuitous occurrence of pearl oysters in this habitat.

TABLE 1. *Intensity of spat settlement on different types of spat collectors*

	NUMBER OF SPAT ON							
	Pearl oyster shell string	Nylon webbing rectangular frame	Nylon rope	Coir rope	Nylon twine meshed iron ring	Nylon twine meshed cage	Steel drum	Perforated and slotted plastic basket
February, 1974	—	—	29	—	Upper: 72 Lower: 12	Inside: 72 Outside: 11	14	Interior : 24 Exterior : 5
March, 1974	12	—	45	—	Upper: 82 Lower: 18	Inside: 75 Outside: 4	18	Interior : 35 Exterior : 10
April, 1974	18	8	34	—	Upper: 84 Lower: 12	Inside: 74 Outside: 15	10	Interior : 15 Exterior : 7
May, 1974	25	12	52	—	Upper: 132 Lower: 25	Inside: 98 Outside: 14	6	Interior : 8 Exterior : 3
June, 1974	21	6	52	—	Upper: 98 Lower: 18	Inside: 62 Outside: 12	7	Interior : 10 Exterior : 4
July, 1974	18	—	12	—	Upper: 42 Lower: 8	Inside: 32 Outside: 10	5	Interior : 8 Exterior : 4
August, 1974	9	—	8	—	Upper: 32 Lower: 4	Inside: 15 Outside: 8	2	Interior : 12 Exterior : 2



Photograph 7. Granite stone showing well grown pearl ofsters (arrows indicate pearl oysters) 8. Spat found attached to the underside of the granite stone. Two grown up oysters may also be noticed. 9 and 10. Granite stone pieces with oysters attached thereon.

Length-frequency analysis of the samples thus collected revealed that the spat settlement should have taken place several months earlier since specimens ranged up to 55 mm size. The granite stones in which oysters were found presented a surface encrusted with polyzoans and compound ascidian colonies besides barnacle settlement. Oyster spat settlement was curiously absent on fresh stones and on large round boulders. Stones stacked on the outer seaward side of the breakwater wall, luxuriously overgrown with the green algae *Caulerpa* sp. and *Valoniopsis* sp. were also examined but not a single spat was collected from this type of environment. The above observations reveal for the first time that granite stone substratum is also good for oyster settlement and growth. But primary settlers and encrusting organisms appear to be essential for oysters to settle subsequently.

It is worthwhile pointing out that the New Tuticorin Port is located in the vicinity of the inner series of pearl banks of the central section of the Gulf of Mannar, only a few kilometer offshore. Therefore it is not surprising to notice the oyster spat settlement in this area. But what is interesting is the difference in the percentage composiiton of the species found in the natural beds when compared with the shore settlement. Analyses of the species composition of pearl oysters taken from the natural beds lying between 12m-22m off Tuticorin showed that *P. fucata* constituted 99.9 per cent of the population (Mahadevan

and Nagappan Nayar 1967) with stray specimens of *P. chemnitzii* noticed especially from the mud covered paar areas opposite to Pinnakayal village. Collections from the farm site however reveal the existence of two more species. *P. fucata* constitutes only 64.20 per cent of the collections in this area. Perhaps depth plays an important role in the distributional pattern of *P. anomiodes* and *P. sugillata,* these being mostly confined to suitable substrata encountered very near the surface of the sea.

In view of the recent success achieved at Tuticorin in cultured pearl production (Alagarswami and Qasim 1973) regular supply of spat for further culture operations has to be ensured. The present results show that there is vast scope for collecting enough spat by using nylon meshed cages. The utility of *Pinctada* species other than *P. fucata* in culture pearl production can also be experimented upon.

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