

CMFRI bulletin 43

APRIL 1989



MARINE LIVING RESOURCES OF THE UNION TERRITORY OF LAKSHADWEEP —

**An Indicative Survey
With Suggestions For Development**

**CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
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Bulletins are issued periodically by Central Marine Fisheries Research Institute to interpret current knowledge in the various fields of research on marine fisheries and allied subjects in India

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Limited Circulation

10. POTENTIAL FOR DEVELOPMENT OF PEARL CULTURE

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INTRODUCTION

Subsequent to the development of technology for pearl culture by the Central Marine Fisheries Research Institute at Tuticorin in 1972 (Alagarwami, 1974), the Department of Fisheries of Lakshadweep evinced interest in exploring the possibility of establishing pearl culture in the islands. Pearl oysters were located in the islands, collected and reared from time to time. The programme took a more definite shape after some of the Officers of the Department of Fisheries were trained in pearl culture at the CMFR Institute at Tuticorin in 1979 and again in 1983 and 1986. Experimental pearl culture was initiated in Agatti and Bangaram and some cultured pearls have been produced. By way of fostering their effort further, the Institute supplied 10,000 spat of *Pinctada fucata* raised in the pearl oyster hatchery at Tuticorin for transplantation in Lakshadweep. During the indicative survey of the fisheries potential of Lakshadweep carried out by the CMFR Institute during January-March, 1987, first-hand information was collected on the occurrence of pearl oyster in the islands and the status of experimental pearl culture being carried out in Agatti and Bangaram. The information is presented in this paper and potential for pearl culture in Lakshadweep is discussed.

OBSERVATIONS

Distribution of pearl oyster

During the survey, pearl oysters were collected from Androth, Kavarathi, Kalpeni, Suheli, Agatti, Bangaram, Kadmat, Kiltan, Chetlat and Bitra. Their distribution was very sparse in the intertidal flats and in the lagoons. In Agatti, pearl oyster was observed on the eastern side from the middle of the island to the southern end. The density was about 50/100m². A total of 51 spat ranging between 5.2 to 22.2 mm was collected. In Kavarathi, the density was still less at 1/100 m². Totally 8 spat in size range of 6.2-28.6mm were collected. In Kadmat and Kiltan, the population was very thin and the size range was 8-12mm.

Androth has no lagoon and pearl oyster was present on the northern and southern intertidal flats of the island. A total of 21 spat ranging 11-21.8 mm were collected. The density was about 3/100m².

In Suheli par pearl oyster was seen both in lagoon at a depth of 2m and in the shoreward area of the intertidal reef crests on the eastern side par. A total of 17 spat in the size range of 9.4-21.6 mm was collected. The density was about 2/100 m².

In the lagoons of Kalpeni, Bangaram, Bitra and Chetlat only a few spat could be collected. In Bangaram, 8 spat (8-23 mm), Bitra, 2 spat (5.8-12.0mm), Chetlat, 4 spat in Kalpeni, 5 spat (9.5-17.3 mm) were collected. The estimated population density was 2/100m² in Bangaram, Bitra and Kalpeni and 1/100 m² in Chetlat.

The survey indicated that except Minicoy and Amini, the other inhabited islands and some of the uninhabited islands have some pearl oyster settlement. Surprisingly enough, all the pearl oysters collected were spat measuring less than 30 mm which may be around 6-9 month old. Larger oysters, either live or dead could not be seen anywhere in the islands. All the spat collected are flat with poor shell cavity and may belong to two species, *Pinctada sugillata* and *P. albina* or *P. albina sugillata* (Reeve) vide Hynd, 1955. At the size examined, it was difficult to determine the species identity.

Experience of the Department of Fisheries of Lakshadweep has shown that the growth rate of native pearl oysters in the Islands was very poor and they reached a size of 38-42mm (8.0-9.5 g) in a period of 2½ to 3 years. The nacre quality of these oysters is relatively poor.

Experimental transplantation of pearl oyster from mainland

An attempt was made in 1986 to transplant spat of *Pinctada fucata* produced in the hatchery at Tuticorin to Lakshadweep. The consignment consisted of a total of 10000 spat of which 7500 were in the size range 9.2-18.0mm with average

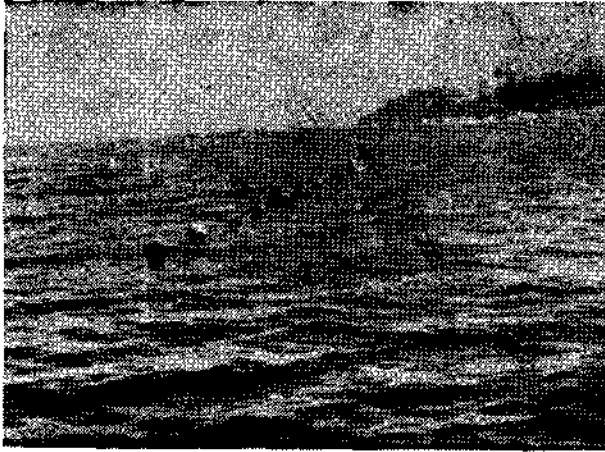


Fig. 1. Pearl oyster culture in the Agatti lagoon by long-line

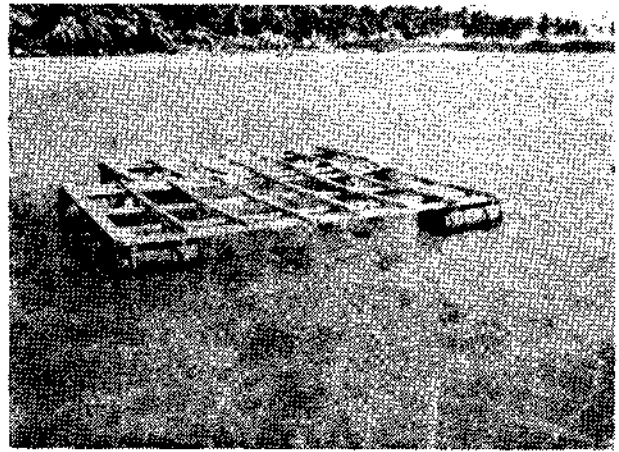


Fig. 4. Raft culture of pearl oyster in the Bangarem lagoon

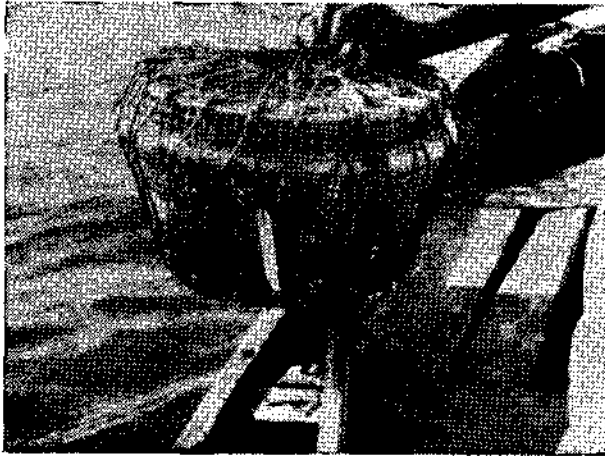


Fig. 2. Pearl oyster spat are reared in plastic basket

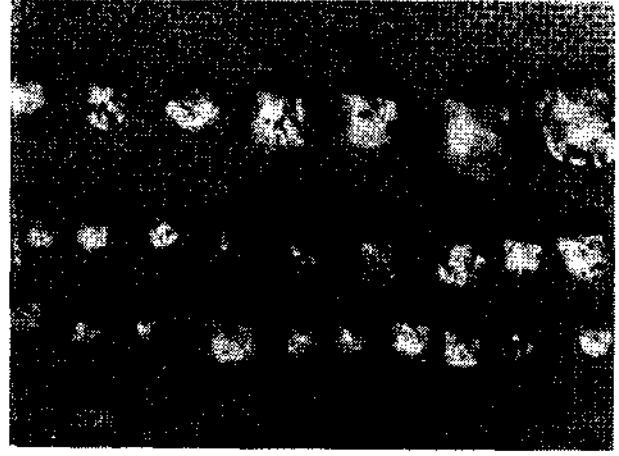


Fig. 5. Native pearl oyster spat of the intertidal reef flat of Agatti island

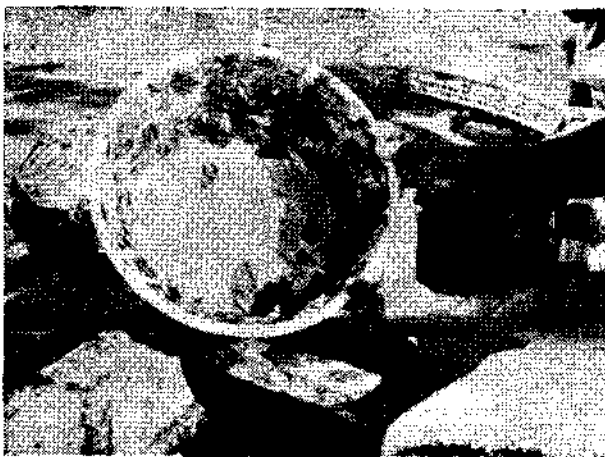


Fig. 3. A rearing basket with pearl oysters spat attached to the sides

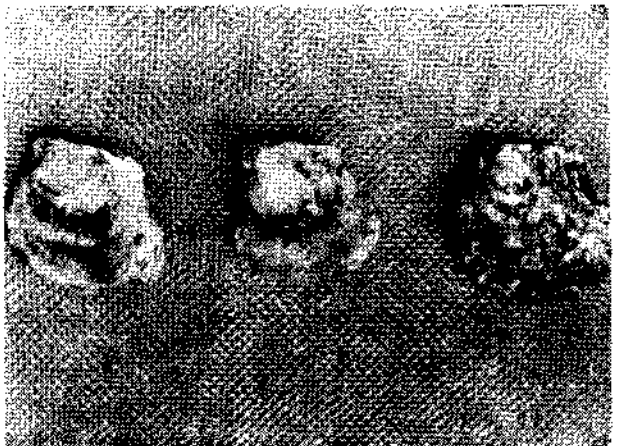


Fig. 6. Native pearl oysters after 2 1/2 -3 years of rearing in the Agatti farm

weight of 0.5 g and 2500 were about 3.7 mm size and 0.025 g weight.

The spat were packed in leak-proof polythene bags of about 10 l capacity with 3 l of filtered sea water at the rate of 750 per bag. The bag was filled with oxygen and tied tightly. It was placed in tin container of 18 l capacity. The consignment was taken by road from Tuticorin to Cochin with a journey time of 12 h. On reaching Cochin, the spat were released in sea water in plastic basins and aerated. The spat were taken in open plastic basins on board a passenger ship. During the voyage of 27 h from Cochin to Agatti, sea water was frequently changed. The spat reached the destination without suffering any mortality. They were transplanted in the farms at Agatti and Bangaram.

Experimental pearl oyster culture in Lakshadweep

The Department of Fisheries, Lakshadweep had initiated a pearl culture programme at Agatti and Bangaram. The pearl oyster spat are collected from the intertidal reef flat on the eastern side of Agatti and are temporarily farmed in the lagoon on the western side of the island. Long-line is used to suspend the baskets with oysters. Glass and plastic floats of 12"-18" diameter numbering 12 are interconnected and anchored at both ends. The plastic basket is covered by a velon screen bag of mesh size 1 mm. The lagoon bottom is sandy with luxurious growth of seagrass. The depth is about 2.5 m at high tide. The bag and the basket had profuse growth of algae on the outer side. The main fouling organisms on the pearl oysters at Agatti were seaweeds, simple and compound ascidians and calcareous tube-dwelling polychaetes. Barnacles were absent. Due to high winds and waves, the farm in Agatti lagoon had to be dismantled during south-west monsoon season.

Bangaram island offered a suitable site for pearl culture in the Lakshadweep islands. Bangaram, Tinnakara and Parli are sand banks in the middle of the extensive lagoon. Bangaram is almost in the middle of the lagoon. The lagoon close to the eastern shore of Bangaram is about 5-7m deep. The bottom is of calcareous sand. The northern shore extends eastwards as sand bank, giving additional protection. The

area near the jetty is protected from winds and waves and is not affected by the monsoon currents. Year-round pearl oyster culture is possible here. The Department of Fisheries set up a pearl culture farm in Bangaram in 1982. Raft culture has been adopted to farm the pearl oysters. A good growth of algae was seen on the plastic baskets containing oysters. The fouling organisms on the oysters were calcareous tubes of polychaetes and simple and compound ascidians. The predators were *Cymatium*, a gastropod, and crabs and they gain entry into the oyster baskets in the larval stages. Destruction of spat by these predators had been sometimes very extensive.

During the present survey, observations were made on the pearl oyster spat transplanted from Tuticorin to Agatti and Bangaram. In 4 months, the oysters had reached an average length (dorso-ventral measurement) of 22.4mm and thickness of 6.6 mm in Agatti and length of 28.3 mm and thickness of 8.1 mm in Bangaram. The health of oyster and growth were found to be better in Bangaram than in Agatti.

PROSPECTS FOR PEARL CULTURE

Commercial pearl culture has been a common feature of some of the oceanic islands in the south-western Pacific. The lagoons and reef flats of these islands have natural population of pearl oyster, particularly the black-lip *Pinctada margaritifera*, which are used in production of black pearls. Lagoons of oceanic islands have many advantages for farming of pearl oysters and production of cultured pearls, particularly from the environment view-point. Generally these relate to protection from winds and waves, depth, nature of bottom, sea water exchange between the ocean and the lagoon productivity and relatively greater efficiency with which a culture system in a semi-enclosed area can be managed. Marutea lagoon in the Tuamotu-Gambier Archipelago of French Polynesia is the centre of intense pearl culture activity for production of expensive black pearls (Ward 1985). Malanesia and Micronesia also have some pearl culture activity in the Pacific.

In the light of the above background of lagoon based pearl culture in oceanic islands, some of the islands of Lakshadweep would appear to have the potential for pearl oyster culture. Experience has shown that Bangaram

island has some of the ideal conditions. The lagoon is well protected and has a depth of 5-7m with a calcareous sandy bottom. Being a semi-enclosed lagoon oceanic water exchange is good. The growth of pearl oyster is better in Bangaram than in Agatti. The shell colour and growth margins of transplanted oysters in Bangaram appear natural indicating that the environment is suitable for the health and growth of the farmed oysters. Due to protection and depth, raft culture is feasible throughout the year. However, further observations are necessary to see if the oyster attains its maximum growth potential in terms of size, weight and shell cavity in normal time.

The native pearl oyster resource in the islands has so far proved to be very scanty and is not of the species required for commercial pearl culture. The oysters are of the flat type, resembling some that have been seen in the coastal areas and harbour basin of the mainland (Alagarwami, 1977) which are not suitable for pearl production owing to smaller size, flatness of shells and poor quality of nacre. The natural population has been seen to grow only to 38-42 mm (8-9.5 g) in 2½-3 years. It is not clear from this data whether the stock occurring in the islands has a very low growth potential in terms of size and weight. This can be clearly understood only after parallel culture of native stock of the islands and that of *P. fucata* transplanted from the mainland is carried out for about 3 years. Based on the current knowledge, it would seem that no worthwhile pearl culture is possible with the pearl oysters naturally occurring in Lakshadweep.

Transplantation of *P. fucata* from mainland to the islands has been carried out very successfully in the first instance in 1986. Detailed observations on their survival, growth and propagation on a continuous basis over a period of time is necessary. If the species establishes itself through spawning and spatfall, it will prove ideal for pearl culture. Otherwise periodic transplantation would be required. In future it may also be necessary to develop a routine quarantine procedure against possible transmittance of pathogenic organisms and predators from the mainland to the islands. The present stock of transplanted *P. fucata* may be partly

used for nucleus implantation for production of cultured pearls. Pearl production should be evaluated using parameters such as rates of survival, nucleus retention and gross production and quality of pearls.

Besides *P. fucata* it is also proposed to test lagoon's potential for transplantation of *P. margaritifera* when the species is bred successfully in the hatchery at Tuticorin and high survival rate is achieved in future. The young spat of this species does not survive in the inshore farm at Tuticorin. The black-lip pearl oyster is native to Andaman and Nicobar Islands (Alagarwami, 1983) and would appear to prefer oceanic condition than the sub-continent's coastal condition. Perhaps, it may survive better in the lagoons of Lakshadweep and this hypothesis is to be checked by experimentation.

ACKNOWLEDGEMENTS

The authors are grateful to Shri George Varghese, Director of Fisheries, Kavaratti and other officials of the Fisheries Department of Lakshadweep for the data and the information on the experimental pearl culture in Agatti and Bangaram.

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