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CULTURE OF BROWN MUSSEL AT VIZHINJAM

K. K. APPUKUTTAN
T. PRABHAKARAN NAIR
MATHEW JOSEPH
K. T. THOMAS

Results of experiments on the culture of brown mussel in the Vizhinjam Bay and in the open sea are given. 25-29 mm spat collected during October and November from natural beds and grown on coir ropes suspended from 5×4 m rafts grow to 66 mm size in a period of 8 months, giving an average growth of 3.5 mm/month. In the open sea rafts the growth is still faster reaching 66 mm in 5 months at the rate of 5 mm growth per month. The possibility of a production of 150 tonnes of mussels/ha in the bay has been indicated.

INTRODUCTION

Jones (1968, *Seafood Exporters*, 3:21-28¹) and Davies (1970 *Proc. symp. Mollusca* 3 : 873-884²) have indicated the scope of mussel culture in India and in 1971, initial experiments on mussel culture work were taken up at Vizhinjam (Achari, 1975, *Indian Farming* 25 (6) : 36-37³). Various experiments conducted at Vizhinjam bay from 1971 have shown that floating raft culture is ideal along Indian coast owing to the enhanced growth rate and simple culture technique. If favourable conditions exist, raft culture or suspended culture of mussels is the most efficient method. This method avoids most serious problem of mussel culture, the predation of young mussels by starfishes and crabs. In the present account the results of experiments conducted on brown mussel culture at Vizhinjam inside the bay and in open sea from 1976 to 1979 are given.

DESCRIPTION OF FARM AREA AND ENVIRONMENTAL FEATURES

Vizhinjam is situated in the Neyyattinkara Taluk, in the Trivandrum District, south-west coast of India about 16 km south of Trivandrum city (Long. $76^{\circ}59'E$ -⁴ Lat. $8^{\circ}22' 30"N$). The beach is a narrow one and the bay area is enclosed by the breakwater construction of the Harbour jutting into the sea on the western side and Kottappuram on the eastern side (Fig. 1). This

bay is a protected area, ideally suited for culture work. The depth of the bay varies from 10 to 15 m and the area opposite to the breakwater in the open sea is 15 to 25 m deep. Natural settlement of mussel seed is abundant along the intertidal rocky area around Vizhinjam.

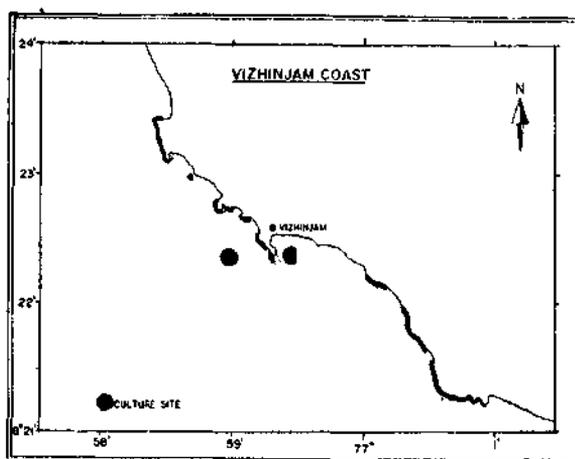


Fig. 1. Vizhinjam coast showing the culture sites

The seed mussel required for the experiments was collected easily from this area. The bay is protected from heavy wave action during monsoon and hence experiments could be continued round the year without disturbance. But the heavy surf action and drift restricted open sea mussel culture from December to

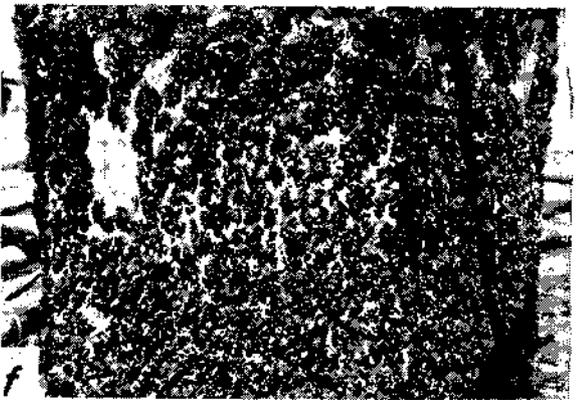
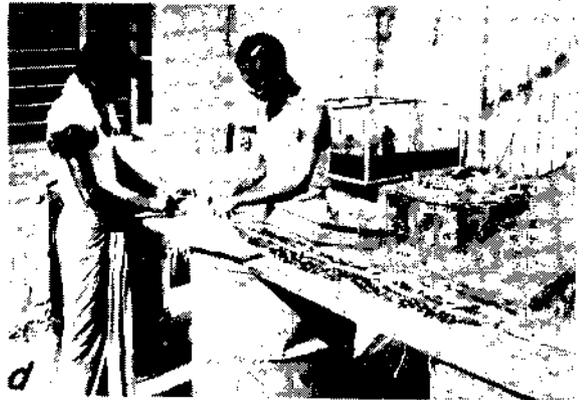
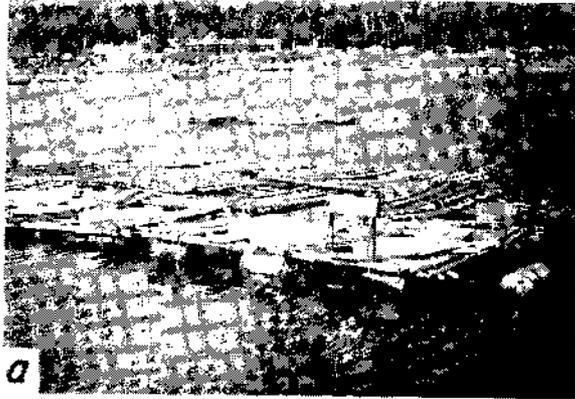


PLATE I. a. Floating rafts inside Vizhinjam bay. b. Collection of mussel seed from natural beds. c. Cleaning of mussel spat settlement. d. Seeding of mussel ropes. e. Spat settlers viz. roof tile, split nylon rope with young mussel attached to it. f. Iron hapa with mussel spat settlement.

May in 1978 and 1979. The bottom of the farm site is muddy mixed with loose sand. Water is clear upto 2 m depth.

The variation in salinity and temperature studied did not show marked changes in bay and open sea during this period. Water temperature ranged from 20.75° to 30.05°C, the lowest recorded in July 1978 and the highest in January-February period in 1977. In general, from May to October there was decline in the water temperature due to the onset of monsoon. The salinity ranged from 31.5 to 36.31‰. The minimum salinity observed was during monsoon (May-July) and maximum in the month of March and October. Similarly during monsoon period the silting percentage showed an increase and water is very turbid from May to October.

ROPE CULTURE METHOD

Description of rafts, floats, anchors, ropes and seeding technique :

Small rafts were used for all experiments at Vizhinjam. Square or rectangular rafts of 6 × 6 m or 5 × 4 m were launched in the bay and open sea (Plate I, a). The rafts were fabricated with teak wood and bamboo pole lashed by coir or nylon rope of 5 to 7 mm thickness. Metal drums of 200 litre capacity treated with anticorrosive paints were used as floats to give buoyancy for the rafts. Number of floats used for a single raft depended on the size of the raft. The rafts were moored by anchors with required length of anchor chain. For mussel seeding coir rope and nylon ropes with 12 to 14 mm thickness were used. Nylon rope was found more durable for seeding.

Brown mussel starts spawning in May which lasts till September and settlement of young mussels starts even from June. But the period of peak spawning is July to August and maximum settlement occurs from September to October. Seed in the size range of 25 to 29 mm is considered ideal for seeding. As the monsoon is active till early September, seed collection can be done for farming from October to December. Mussel seed is also available from nearby centres such as Avaduthura, Mulloor and places like Enayam, Colachal, Muttom and Neendakara.

Mussel seeds were collected from the natural bed using iron chisel along the Vizhinjam and adjacent area (Plate I, b). Estimated quantity of mussel seed available per sq. m area in and around Vizhinjam varies from 10 to 15 kg. Split nylon ropes, roof tiles, string of coconut shells, iron hapas covered with nylon screen, split old bamboo poles were also used in the farm site to collect young mussels for seeding. Split nylon ropes,

roof tiles and iron hapas showed good settlement of mussel spat during spawning period (Plate I, e & f). The seed mussel collected by divers from natural bed were cleaned to eliminate all fouling organisms (Plate I, c). These were spread over old cotton fishing net or cheap bandage cloth or mosquito netting of 25 mm width and the rope was kept over the netting. To avoid slipping of mussels in the initial stage of growth wooden pegs were inserted in the ropes at fixed intervals. The net was wrapped over the rope securing the mussel seeds and both the edges of netting were stitched using cotton twine (Plate I, d). After seeding the full length of the rope, the rope was suspended from the raft. The net disintegrated within a week. By this time the mussels got attached to the rope. Periodical cleaning and thinning of rope had to be done to eliminate fouling organisms and overcrowding of mussels.

In 1976, four rafts with 13 seeded coir ropes and 110 nylon ropes of average 6 m length each were suspended from the rafts. In 1977 two new rafts were launched in the open sea side with 36 ropes of 10 m length and kept there for 3 months from January to March. In 1978 to 1979 period 3 rafts with 114 ropes of 5.5 m average seeded length were kept in the open sea and 144 ropes were suspended in 6 rafts kept in the bay. The ropes kept in rafts were examined regularly for fouling organisms and other animals causing destruction to mussels. Due to heavy monsoon wave action, 2 rafts out of the 3 kept in open sea were completely damaged during June. The experiments showed that the mussel reaches the harvestable size of 50-55 mm inside the bay and 65-70 mm in the open sea farm by May.

RESULTS

In the Vizhinjam bay, the brown mussel reached the modal size of 55 to 66 mm, in 8 months, giving an average growth of 2.94 mm per month. In the 1979 experiments the growth rate observed was 3.54 mm. The ratio of flesh weight to shell weight was 41.31:58.69 in May. After June due to influx of freshwater there was a tendency for farm grown mussels to fall out. In the open sea relatively faster growth rate was observed. A modal size of 60-65 mm was attained within 5 months recording 5 mm growth per month. The flesh weight constituted 43.33% of the total weight of mussel in May. The average weight of mussel seed per meter length of rope (seeded portion) ranged from 1.4 to 2 kg and it attains 10 to 15 kg in 7 months in bay and 15 kg in the open sea in 5 months.

An estimated yield of 150 tonnes from one hectare area inside the bay appears possible. The cost of raft

of 6 × 6 meter size with all material required, including seeding, is Rs. 2500 to 3000. The price of mussel per tonne is estimated between Rs. 1,600 to 2,000 and from a single raft 3 tonnes of mussels could be harvested thus giving a total yield of Rs. 4,800 to 6,000. This estimate is based on the production rate inside the bay. In the open sea the production and cost have not been worked out.

DISCUSSION

Brown mussel culture as has been experimented upon at Vizhinjam is a semi-culture and needs only marginal attention in farm maintenance, thus making it easy for bringing it within the scope of small-scale and traditional fishermen to be engaged profitably utilizing their leisure hours. The expenses on the capital input and maintenance are also not prohibitive. The entire process of culture points to a production possibility of 150 tonnes of mussels per hectare in an environment like the bays. When compared with the low output from the natural bed, this yield can be considered as very profitable and dependable. Properly maintained, the rafts and the ropes employed for the culture can be recycled into use for atleast a period of 3 to 4 years. In the open sea conditions off Vizhinjam several difficulties had been encountered of which, the most important is the instability of the raft during monsoon period. Methods to overcome by developing a suitable technique are being tried out. But even as at present it is possible to obtain a minimum of a single harvest during a year taking advantage of the following factors :—

- (1) Seed availability in size ranging from 20-25 mm from natural grounds during October-November.

- (2) Post monsoon lull extending from November to June.
- (3) Ability of the brown mussel to reach the harvestable size of 60-65 mm within this period.
- (4) Absence of noticeable disease problem amongst the stock under farming conditions.

Although predation is not a serious problem, it has been seen that due to some man-made disturbances in the surrounding ecosystem sporadic cases of invasion by predators like *Rhabdosargus* takes place, but this problem has to be studied in full depth before concluding whether it is a constant threat or only a passing phase. Tackling other bottom dwelling predators is an efficiency inherent in the rope culture itself, wherein the ropes are suspended well above the bottom. But attacks like those from lobsters as noticed in this area do require careful planning to devise methods like trapping them in this area.

Open sea mussel culture off Vizhinjam is beset with a few problems of social nature as well. The objection raised by the local fishing community that the rafts positioned in the near shore waters interfere with their gill netting and boat seining activity is a problem which has to be solved. Very often their action has resulted in our withdrawing the rafts to safer areas. It would be necessary therefore to evolve a mutually acceptable approach while trying to establish open sea mussel culture off the coastal areas of Vizhinjam. The profitability of mussel culture and the lucrative price that may be offered for the produce are two factors which would influence the future of open sea mussel culture.