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49. OPEN SEA MUSSEL FARMING AND ITS PRACTICAL ASPECTS

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ABSTRACT

This paper briefly recapitulates some of the experiments carried out by the Central Marine Fisheries Research Institute at its various research centres along the east and west coasts in culturing mussels in the open sea and sheltered bays. Variations in the technology of mussel farming, principally rope culture and raft culture have been experimented under field conditions. Local fishermen were involved under the Operational Research Project and Lab to Land Project with the main objective of developing mussel farming into an industry and to provide additional income to the fishermen. In the light of our experience, the problems involved and the constraints in the effective implementation are objectively reviewed. The possible remedial measures for overcoming some of these constraints are presented in this account.

Marine mussels feed on primary producers and non-living organic materials, and with a short food chain and low position in the food web, are efficient converters of these organisms into edible flesh; hence their production potential is immensely vast. An analysis of mussel farming around the world may reveal that the mussel fishery and farming have centred Europe and the major mussel producing countries are Spain, the Netherlands, France and Italy. In Spain, the cultivation of mussels on rafts has developed as a family business, each family owning on an average, two to three rafts for the operation (Bardach et al 1972). Larger operators may own up to 25 rafts and employ as many as ten people. The culture grounds are

owned by the Spanish Government and leased out to the private entrepreneurs (Hurlburt and Hurlburt 1980, Wallace 1980) Wallace 1980).

The natural distribution of mussels along the Indian coast is patchy. While dense settlement of the green mussel, *Perna viridis*, is recorded between Calicut and Cannanore, it is scanty along Karwar, Goa, Ratnagiri, Visakhapatnam, Kakinada, Madras, Pondicherry and Cuddalore. The brown mussel, *P. indica* is restricted to the south-west coast between Quilon to Cape Comorin. Limited mussel fishery along Vizhinjam (Appukuttan and Nair 1980), Malabar coast (Kuriakose 1980) and Kakinada (Narasimham 1980) has been reported. The open sea mussel farming practices were initiated

at Vizhinjam in the early seventies. Since 1978, various experiments were carried out along both east and west coasts on the open sea mussel farming. The raft culture technology originally borrowed from Japan and experimented by Spanish workers (Bardach et al 1972) was considered to be best suited for mussel culture since it offers an excellent three dimensional environment for better survival and faster growth rate (Andreu 1968). The brown mussel, *P. indica* were cultured on rafts in Vizhinjam bay (Appukuttan et al 1980) and green mussel at Calicut (Kuriakose 1980), Kakinada and Kovalam near Madras (Rangarajan and Narasimham 1980).

With the research experience on mussel farming, it was decided to implement it on a large scale through Operational Research Project and Lab to Land programmes which were carried out as a natural sequel to the National Demonstration Programmes that were being successfully carried out in the agricultural sector. The focal theme in these projects is to put to test the economic feasibility of the laboratory developed technology for a commercial-scale production, involving the local fishermen and in that process to identify the various constraints to evolve the most suitable technology for deriving full benefit for the participant fishermen.

Kovalam, a fishing village, 36 km south of Madras, where the Field laboratory of CMFRI has been carrying out experimental studies on mussel culture, was selected for introducing the Operational research project. Karikattukuppam, an adjacent fishing village, about 30 km south of Madras was identified for launching Lab to Land programme. Prior to implementation, a bench mark survey on the various socio-economic structures was carried out. Under the Operational research project, mussel culture work was initiated on the French-style pole culture. Though the seeded mussels grew to a size of 45 mm (total length), the fishermen could not reap the fruits of their hard labour as unexpected cyclone that crossed the coast near Kovalam in November 1978 uprooted all the poles. Floating rafts were used for undertaking mussel culture at Karikattukuppam. The fishermen, in the initial phase, undertook mussel seeding operation very enthusiastically. Learning by experience, the culture technology was partially modified to

suit the turbulent sea conditions. The first prototype submerged raft was fabricated and launched for mussel farming at Kovalam. On two occasions, marketable-size mussels to the tune of over 1t (shell-on weight) were harvested. In the course of implementation of these programmes slated for the economic uplift of the local fishermen, the essential R & D inputs needed are categorised as follows:

Need for a modified culture technology

During both the monsoon regimes south west and north-east, formation of depressions and cyclones are not unusual along Bay of Bengal (Easterson and Mahadevan 1980, Mukherjee et al 1982, 1983, Ramasastry et al 1984). Due to the turbulent sea conditions and strong underwater currents caused by such depressions, the culture ropes hung from the raft and occasionally the rafts also were partially or completely damaged. Similar constraint has also been reported from the west coast of India (Kuriakose 1980). Hence, the entire system of raft culture should be improved and rendered efficient to withstand the rough monsoon conditions of the open coastal waters so that year-round culture operation could be made. Shifting of operations from one locality to another according to change in weather conditions is a possible way of circumventing this problem.

Seed resource

A basic requirement for continual success of mussel culture is a consistent supply of mussel seed. A steady supply of mussel seed may be obtained through well organized hatcheries. Pending development of such hatcheries, the seed requirement may be met with from the natural spatfall since mussels in this area spawn almost throughout the year. The spat collectors have to be carefully selected and suspended from the culture raft synchronizing with the mussel spawning period. In a recent study, it has been recorded that an average of 10,000 spats may settle on a tile panel in an area of 15 cm x 15 cm (Selvaraj 1984). Considerable research efforts in this direction are needed so that proper hatcheries could be established. It is an advantageous factor that there is no dearth of seed resource from the wild. In this context, it may be pointed out that the leading

mussel producers in Europe have not faced any crisis of seed shortage due to abundant natural supply (Korringa 1976).

Capital input

Open sea mussel culture involves capital investment on raft and other ancillary materials. These are costly inputs which the common fishermen are unable to afford even if the project is subsidised. Further, the risks involved in maintaining the structure in the open sea are great, especially in areas prone to natural calamities. Under such circumstances, repayment of loans becomes extremely difficult. Above all, the fishermen are naturally reluctant to venture again into the sea for looking after the rafts, after their day's toil in the sea for their traditional fishing. Unlike agriculturists, the mental attitude of the fishermen is basically different. They are accustomed to immediate disposal of the catch and realisation of money.

Marketing

The problem of disposal of the cultured mussels at an economic price is a matter of serious concern. A detailed marketing survey showed that there is a low demand for mussel meat, especially on Sundays in most of the markets in Madras, and is yet to become a popular food item even amongst the meat eating population. The retail price varies from Rs. 5 to Rs. 8 per hundred mussels (Tampi and Selvaraj 1983). However, it must be mentioned that there is a good demand for mussel meat in Malabar coast.

Mussel cooking demonstration programme was organised by the Operational research project members and the fisherwomen at Kovalam were trained in cooking various mussel dishes. A pamphlet containing various cooking recipe also was released. Stuffed green mussels were fried and sold with the help of Tamilnadu Fisheries Department at the All India Tourist's Trade Fair at Madras. It indicated a sound response from the public who tasted the mussel flesh for the first time.

Need for short-term culture and adequate publicity

Mussel culture may be carried out on a short term of 3-4 months by which time it

attains marketable size (total length 60 mm). Such a venture could easily avoid harsh climatic conditions prevailing during south-west and north-east monsoon. The culture technology also needs improvisation.

Adequate publicity along east coast of India on the value of mussel as a nutritive food item may be given as that of the U. S. Government which carried out a wide spectrum of publicity campaign on mussel value during World War I and mussel had become a regular item in popular diet (Miller 1980). The present day mass communication media such as Radio and Television may be effectively used to popularise the importance of this low cost but protein rich food commodity.

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