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62. CONSTRAINTS IN IMPLEMENTION OF FARMING TECHNIQUES IN COMMERCIAL MOLLUSCAN SHELLFISH CULTURE

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ABSTRACT

In the past nearly two decades elaborate and unfailing techniques have been developed at some of the Research Centres of the Central Marine Fisheres Research Institute for the culture of oysters, clams, mussels etc. among the molluscan shellfish. Culture of pearls of perfect form in the pearl oyster species using indigenously developed techniques has also been initiated. The farming operations so far undertaken have been only on an experimental scale in pilot demonstration farms run by governmental effort in restricted areas. There are many constraints for conducting culture on a commercial scale, the chief among them being the acquisition of suitable farming sites with a right to ownership on lease. The availability of adequate seed resources of the species of consumer preference and facilities for transporting production to marketing centres or processing establishmants are items which need careful examination. Infrastructural facilities should include provision for depuration of the harvested production. The need for technical manpower to supervise and monitor operations and offer advice and guidance is essential. At the initial stages substantive financial support is also expected. The nature of the problems and the need to solve them to make molluscan culture commercially feasible and remunerative are outlined in the paper.

INTRODUCTION

Marine molluscs such as clams, cockles, edible oysters and mussels inhabiting wide areas both along the east and west coasts of India are being exploited from early times by coastal populations almost entirely from natural stocks. However, in a few places in the vicinities of big cities oysters are transported from natural beds or relaid in shallow hardened grounds for a little growth before they are supplied to interested parties on demand. The pearl and chank beds are under the monopolistic rights of the State Governments and their fisheries are regulated by suitable legislative measures. The chank fisheries are regular and annual but the pearl fisheries have serious setbacks, the grounds remaining barren for prolonged periods. Interest was envinced in oyster culture and pearl culture experiments by the Department of Fisheries of the Government of Tamil Nadu about fifty years back but the work was subsequently suspended. In short, earlier to the seventies of this century, none of the

molluscan species were under propagation by culture in this country. The Central Marine Fisheries Research Institute has realized the importance of developing methods of farming molluscs and evolved the techniques for the culture of oysters, mussels, clams and pearls (Silas et al 1982). The techniques have been repeatedly tested by the Institute by conducting culture on an experimental scale and the feasibility of undertaking large scale culture operations of chosen species of molluscs to achieve substantial increase in production both for use within the country and for supporting export trade besides creating employment for a large section of rural population has been indicated.

In experimental farming of oysters and massels the cost-benefits worked out have shown high rates of profits on investments. Pearl culture techniques worked out by the Central Marine Fisheries Research Institute have already been put into operation by the Southern Petro-Chemical Industries Corporation in collaboration with the Department of Fisheries of the Government of Tamil Nadu.

There is vast scope for carrying out culture of different groups of molluscs in suitable localities at commercial level of production by private entrepreneurs. However, this being a new line of industry in India there are some forseeable constraints which have to be removed to achieve progress.

ACQUISITION OF SUITABLE SITES FOR FARMING

The basic requirement for culture is a suitable farming site. As it exists, now, the coastal tracts and adjacent water areas are not marked out into plots to be leased out to shellfish farmers. Suitability of farm site is determined by the high productivity of waters and favourable hydrological conditions for growth and breeding of the species under propagation. The site has to be away from regions of heavy siltation and free from the menace of pests and predators. The location of the farm should be such that the farmer can carry out his avocation without hindrance to navigation or capture fisheries or any other activities in the area. Coastal waters are often contaminated with domestic, agricultural and industrial wastes and it is imperative that the waters of farming site should be free from such pollutants. The environs where different molluscan species thrive in respect of substrata supporting them as also the salinity tolerance levels etc. are varied and specific. It is therefore, necessary to select sites to meet the special requirements of the particular species to be cultured and these involve intensive preliminary investigations.

AVAILABILITY OF SEED

The shellfish farmers should be able to procure adequate quantities of seed from the natural beds in the open waters or from hatcheries. Hatchery production of seed is expensive and may not be within the means of a small scale farmer. Collection of seed from closeby natural beds may not be large enough to meet the farm requirements. There is lack of information on the distribution and magnitude of seed resources in different grounds. In respect of some oyster, mussel and clam species this information is gathered by the Central Marine Ftsheries Research Institute and other government organisations especially in some of the southern states but the work has to be extended to other coastal areas. Such information will enable establishment of a network of low cost seed collection centres. If the seed is to be collected from far off grounds the transport and proper handling of them present some difficulties. However, if the resource is large, the seedlings can be used to support export trade. The seedlings such as those of oysters can be hardened adopting methods in practice in other countries so that they can withstand the strain of transport over long distances. It may be mentioned here that hardening for relatively shorter duration is also advantageous to reduce mortality rates for culture within the same country as observed in Taiwan. If only a detailed distribution pattern of shellfish seed for all areas is available, much can be done to plan out transplantation techniques from one locality to another where it is required to

augment production with relatively less expense. Clams of several species lend themselves well for the purpose.

CULTURE TECHNIQUES, FARM EQUIPMENTS, SERVICE FACILITIES FOR FABRICATION AND MAINTENANCE OF RAFTS ETC.

Culture techniques employed should have a bearing on the extent of demand and utilisation of the production obtained. The present level of utilisation of molluscan shellfish for food purposes in the country is low to moderate being confined to restricted zones where the natural productlon is almost sufficient to meet the local requirements. There is, however, a growing awareness that the products are nutritious and that the potential resources should not be neglected but exploited by culture practices for improving the quality for wider acceptability and increase in quantity to support export trade after processing suitably. The techniques generally used broadly fall into two categories, one for cultute on substrata at bottom level and the other in the water column at various levels. The relative efficiencies of the two types of methods are well-known. The first type is relatively less expensive than the second which involves floatation devices, suspension gadgets etc. obtainable at no small investment. Conditions for off bottom culture of shellfish during monsoon months being not favourable due to rough condition of the seas or heavy gales, rafts and other devices have to be beached with the result that the duration of the culture operations have to be reduced to a period of about six months. The advantage of bottom culture operations is that they could be carried out continuously round the year.

The types of culture methods well tried and currently in practice at the experimental farming stations mainly make use of the following: 1) Durable wooden racks holding trays with oysterlings and shell rens or stakes in oyster culture, 2) Floating rafts with suspended ropes with attached seedlings in mussel culture, 3) Rafts with similar designs holding seeded pearl oysters in cages or frames for culture, 4) In clam culture for *Anadara, Meretrix* etc. seed are simply broadcast on sandy mudflats with equal success in raising good crops and 5) The hatchery techniques for raising the the seed of edible oysters, mussels and pearl oysters are necessarily elaborate in conditioning the adult shellfish for gonad maturation, in inducing them to spawn and in rearing the larvae to size of their settlement by feeding them on chosen cultures of microalgae. The pearl culture techniques are highly sophisticated in *seeding* of oysters with mantle grafts, the beads for this purpose being imported from Japan.

In general the techniques developed are being improved upon and refinements constantly made. The technologies developed by research are included in various training programmes to interested scientific and technical personnel. In locations where the farms are situated transfer of technology is carried out and the local small scale fishermen are given opportunities to actively participate in operational procedure of shellfish farming.

NEED FOR INFRASTRUCTURAL FACILITIES, EXTENSION, DEPURATION TECHNIQUES AND FINANCIAL ASSISTANCE

The infrastructural facilities required are varied. Of much importance is the availability of the services of a well trained technical person for offering advice and guidance to the shellfish farmer, at the initial stages in organising the farm, in fabricating specialised equipment and in providing basic amenities.

In the later stages he should supervise operations with managerial ability, until the farm production reaches the consumer in a suitable form. His role as an extension worker in popularing the shellfish as highly nutritious and health giving food is no less important.

Mussels, oysters or clams and the like are filter feeders which take in pathogens and accumulate harmful chemicals etc. from the ambient aquatic medium which gets contaminated by domestic, agricultural and industrial discharges. Shellfish from polluted waters may cause health hazards and instances are on record of shellfish poisoning in human beings

Sudden appearance of rich plankton blooms of some species like the dinoflagellate, *Gonyaulax* etc. result in shellfish toxicity. Molluscan shellfish at present in this country do not pass through inspection tests to certify to safety of their use as food items as it is done in some advanced countries. Depuration techniques using sea water treated with chlorine, ozone or U. V irradiation are effective in removing pathonic bacteria etc. to a considerable extent. The infrastructural facilities should necessarily include those for depuration.

As the molluscan shellfish culture is altogether a new venture, adequate financial support should come from governmental or other organizations as loans, subsidies etc. in the initial stages. Institutions like NABARD and I. D. B. I. could give financial assistance to entrepreneurs taking up large scale molluscan culture and scheduled and co-operative banks to small scale shellfish farmers by giving loans at concessional rates of interest.

In experimental farms commendable work has been done so as to initiate commercial production of shellfish. Constraints may be varied and many but once a beginning is made in commercial farming, solutions will be found to remove them. There are countries which have adopted advanced techniques for successful propagation of shellfish and this should go a long way to achieve success.

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