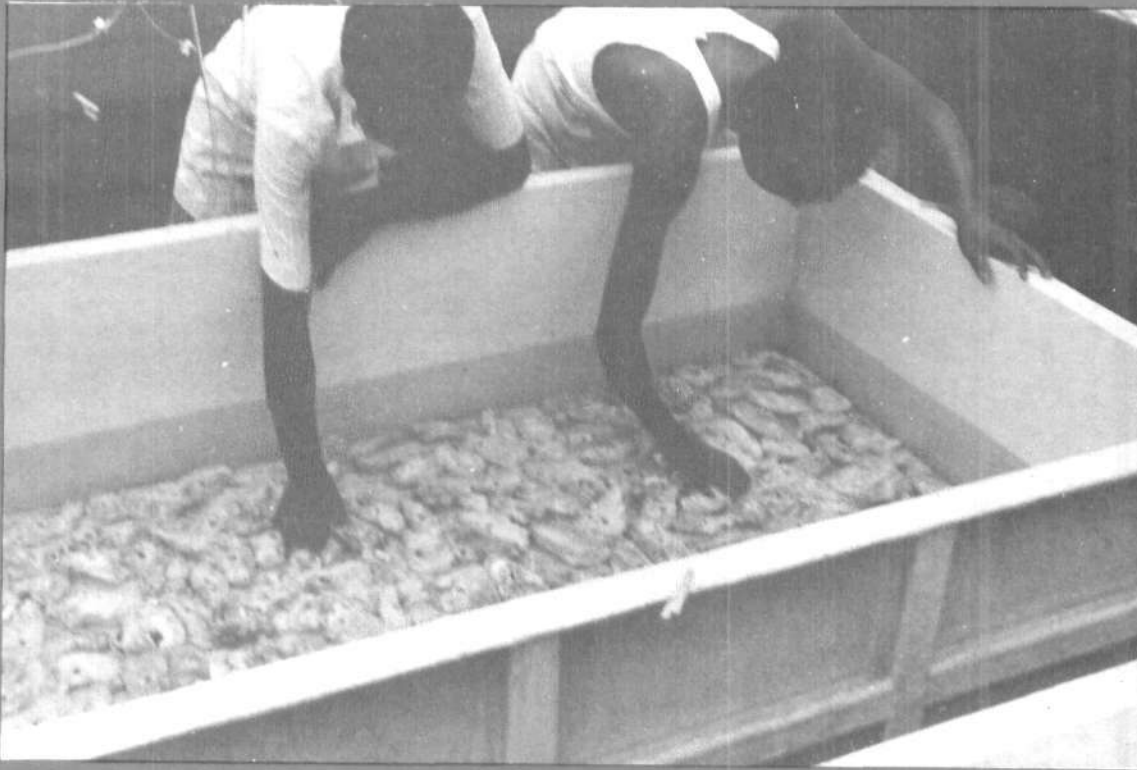




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PROSPECTS FOR DEVELOPMENT OF OYSTER CULTURE IN INDIA

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Introduction

Oyster culture has long history dating back to the first century B. C. when the Romans have practised it. In 1988 oyster production by aquaculture was 10 lakh tonnes, mostly coming from temperate countries. In the same year Korea produced 2.86 lakh tonnes, followed by Japan 2.71 lakh tonnes, U. S. A. 1.37 lakh tonnes and France 1.33 lakh tonnes. In 1989 about 20,000 tonnes of oysters valued at US \$ 67 million found place in global exports. At present oysters account for 36% of the world aquaculture production of molluscs from the sea.

Oysters occur all along the Indian coasts in backwaters, bays and estuaries forming subsistence fisheries. The meat is consumed locally and of late there is growing demand for it in some parts of the country. The shell is used in lime based industries. At present oyster culture is not practised in the country except for the experimental culture conducted by the CMFRI.

Oyster resources

Six species of oysters namely *Crassostrea madrasensis* (Preston), *C. rivularis* (Gould), *C. gryphoides* (Schlotheim), *Saccostrea cucullata* (Born), *Saxostrea cucullata* (Awati and Rai) and *Hyastissa hyotis* (Linnaeus) occur in Indian waters. The first four species are of commercial value. The oyster beds are distributed in several centres along the Indian coast and production from these beds is not monitored on regular basis. However, the surveys conducted by the CMFRI at some of the important production centres indicate the landings at less than 2000 t/whole weight/year.

In Orissa, beds of *C. madrasensis* are located in Bahuda estuary near Sonapur and at the mouth of the Chilka lake. In Andhra Pradesh, oyster beds are distributed in Sarada estuary near Visakhapatnam, Bhimunipatnam backwater, the banks of Upputeru canal (Kakinada), Gokulapalli backwaters and Krishnapatnam. In

Gokulapalli, oysters are regularly exploited. Of all the maritime states, Tamil Nadu has rich oyster resources. Near Madras, in Pulicat backwaters oyster beds cover about 10 ha and standing stock of oysters has been estimated at 1320 t. Ennore backwaters have 45 ha oyster beds with standing stock of 18,600 t and oysters are regularly exploited by the fisherfolk. There are oyster beds of 1.6 ha in Vaigal estuary near Athankarai with biomass of 389 t. At Tuticorin three oyster beds extending in an area of 3.25 ha sustain considerable oyster population. Oyster beds exist in Killai backwaters, Pazhayar estuary, Muthupet swamps and Thambaparani estuary. *C. madrasensis* occurs in Andaman Islands at Port Blair, Havelock island, Mayabunder and Dighipur. In Kerala the oyster populations are small and their growth and condition have been reported to be poor in the Ashtamudi and Vembanad lakes and Cochin backwaters. In north Kerala in the estuaries of Mahe, the creeks of Dharmadam, Valapattanam, Neeleshwar and Chandragiri oysters are known to occur and there is regular exploitation. In Karnataka, oyster resources are distributed in Nethravathi, Mulki, Udavara, Venkatpur, Coondapoor and Kali estuaries and oysters are regularly exploited.

C. gryphoides occurs along the west coast of India, particularly in northern Karnataka, Goa, Maharashtra and Gujarat. In Maharashtra this species is found in several creeks and backwaters and is regularly exploited. At several places along the Gulf of Kutch this species occurs and the population density is low.

C. rivularis is found in the coastal waters and creeks of Gujarat where the oysters are exploited for the shells. This species is known to occur along with *C. gryphoides* in Mahim, Ratnagiri and Jaytapur in Maharashtra.

Saccostrea cucullata is found on rocky substrata in marine environment in shallow coastal and intertidal areas. It occurs all along mainland coast of India and Andaman and Lakshadweep islands.

Oyster culture

The Indian edible oyster *C. madrasensis* is a highly suitable candidate species for culture. It grows fast, attains large size and tolerates wide salinity variations. The CMFRI has given thrust to researches on oyster culture for the last 15 years, culminating in the development of a complete package of oyster culture technology, including hatchery production of seed of this species.

Seed collection from nature : After ascertaining the ripeness of gonads of oysters and the appearance of oyster larvae in the plankton, spat collectors such as lime-coated tiles, oyster shells etc. are laid in the sea. The oyster larvae settle on these collectors as spat and are reared for 2-3 months in net bags.

Seed collected from the natural grounds accounts for major share of oyster production by farming.

Seed production in the hatchery : The CMFRI has succeeded in developing the hatchery technology for oyster seed production in 1982. Since then the techniques have been standardised for mass production of oyster seed. In the hatchery, the operations involve selection and holding of brood stock, induced spawning by thermal stimulation, larval rearing, preparation of spat collectors, spat rearing and culture of algal food. In about 3 weeks the larvae settle as spat, with a survival of about 10%. The spat are hardy and as they grow, the mortality rate is much reduced.

On-bottom culture : As the name suggests, the oyster seed are grown directly on the sea bed, either intertidally or subtidally. In either case the substratum should be reasonably firm. The oyster seed, attached to the spat collectors, are planted on the bottom and in one year they grow to the marketable size of about 86 mm. This method is low-intensive, both for capital and labour. It is practised extensively in the U.S.A. and production is about 5 t/ha/year. In India on-bottom farming of oysters is yet to be experimented.

Off-bottom culture : There are several methods and the advantages are relatively rapid growth and good meat yield, higher production in unit area and less vulnerability to attacks by benthic predators like crabs and starfishes. However, the methods are capital and labour intensive when compared to on-bottom culture.

In the rack and string method, shell strings with oyster spat attached to shells are suspended from racks in shallow waters. Production is estimated at 80 t/ha/year.

In the rack and tray method, cultch free seed oysters are stocked in box type cages and suspended from racks. The annual production per hectare is estimated at 120 t. Though production is high, this method requires large capital investment.

In the stake method, oyster shells with spat attached to them are nailed to wooden poles and these poles are driven into the substratum. Production by this method is estimated at 22 t/ha/year.

All these methods can be adopted in shallow waters, below 3 m depth. In deeper waters rafts are used for floatation.

In recent times, particularly in Japan and Korea, there is a shift to longline method of oyster culture. The oyster seed is either directly fixed on a rope or shell strings containing oyster seed are suspended from a rope. The rope is held in position by a series of floating barrels. This method is followed in deeper waters. Longlines withstand rough sea conditions better than rafts. This method is yet to be experimented in our country.

Where oyster meat is consumed fresh with one shell valve removed, the shape of the shell is important for serving on the table. Cultch-free oyster spat grown by rack and tray method generally attain uniform shape to meet this requirement.

Suggestions for development of oyster culture

For the development of oyster culture in the country well co-ordinated and concerted efforts are required in several directions.

It is necessary to conduct a survey of oyster resources and areas suitable for oyster farming along the Indian coast. The CMFRI has initiated a programme on these aspects and data have been collected for the entire Tamil Nadu coast and parts of Kerala and Andhra Pradesh. A comprehensive picture about oyster resources and sites suitable for oyster farming is necessary for all maritime states.

After identification of sites for oyster culture, a programme on a small scale, for location testing may be taken up before embarking on a large scale project. A study of this type helps to assess whether the oysters are interacting favourably with the environment resulting in good growth and production.

While considerable information, relevant to culture, is available on *C. madrasensis*, little is known about *C. gryphoides* which is dominant along the Maharashtra and Gujarat coasts. The suitability of this species for culture is to be studied, particularly in these two states. Gujarat State Fisheries Department has successfully transported *C. madrasensis* seed from Tuticorin hatchery to Sikka and made attempts to study the suitability of this species for culture in Gujarat waters. The reports indicate that growth is slow at 30 mm/year. However, further work is required in this direction.

The coastal areas suitable for oyster culture should be made available to prospective oyster farmers on lease basis and suitable legislation is to be enacted for this purpose after taking into consideration, activities such as traditional fishing.

Concurrent with the development of oyster culture, monitoring of the water quality of the oyster growing areas is to be undertaken. The coastal waters are prone to bacterial, heavy metal and pesticide pollution which adversely affect the quality of the oyster meat. Also depuration facilities are to be developed at important production centres.

Prospective entrepreneurs require lots of information on the economics of different types of oyster culture and the cost of seed production in the hatchery. The data generated in the operation of a Research project by the CMFRI are used in working some of these aspects and the results are indicative of the potential. Operation of semi-commercial scale projects is the need of the hour to evaluate the economics. A beginning is made in this direction by the collaborative project on edible oyster culture between NABARD and CMFRI, being operated at Tuticorin.

Product development is an important area requiring thrust. Both low cost and value added items are to be developed from oyster meat to cater to the requirements of different categories of consumers. Market research and extension are necessary to popularise these products. Also overseas markets are to be explored for the export of oyster products. Export of live oysters is promising and needs careful evaluation.

Several inputs are required for oyster farming. Financial institutions can play a crucial role in extending credit facilities at concessional rates to the entrepreneurs venturing into oyster culture.

There is lack of awareness among the prospective entrepreneurs about the benefits that would accrue by taking up oyster farming. Demonstration of oyster culture and publication of relevant material in popular style help to overcome this problem and the CMFRI is acting on these lines.