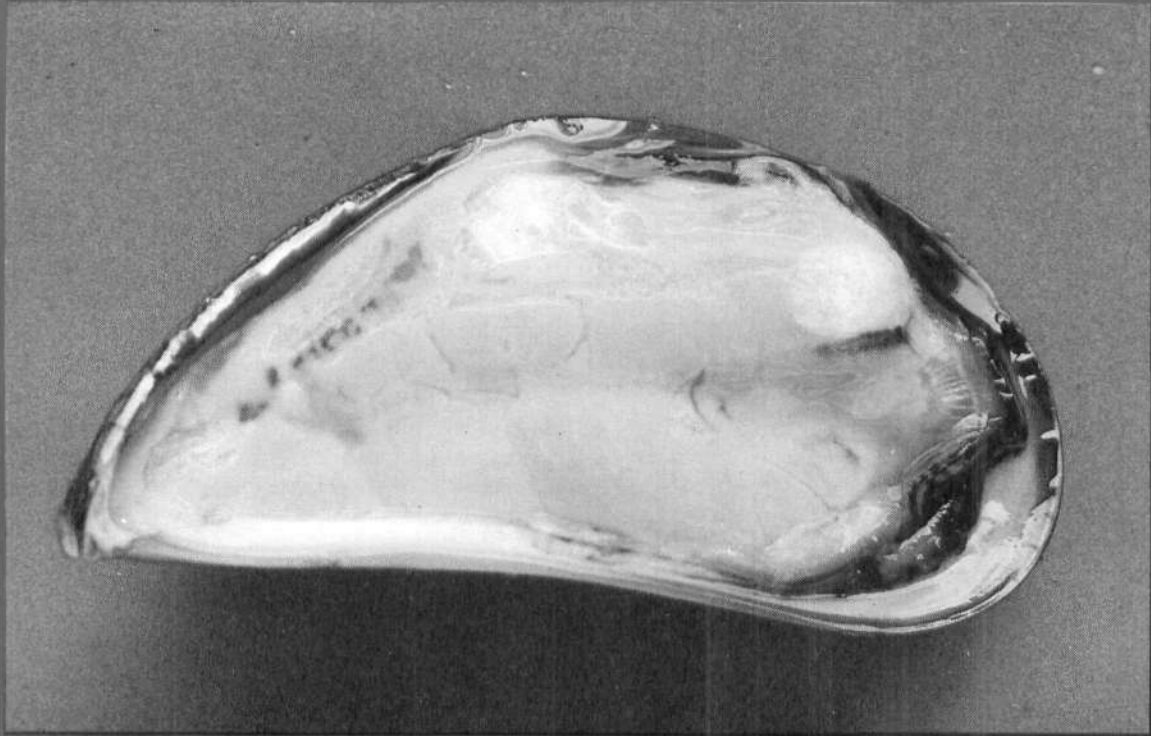




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भारतीय कृषि अनुसंधान परिषद
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936 MUSSEL CULTURE IN MULKY ESTUARY, DAKSHINA KANNADA DISTRICT, KARNATAKA DURING 1997-'99

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Introduction

Mussel farming has developed only to a limited scale in Karnataka, even though the technology for culture perfected by the CMFRI was available since the early seventies. This was mainly due to want of initiative from entrepreneurs, lack of awareness, marketability and finance. Over the past few years, the Mangalore Research Centre of the Central Marine Fisheries Research Institute, has been taking efforts to popularise mussel culture in Dakshina Kannada district of Karnataka. During 1996-'97, the Research Centre had demonstrated mussel culture at Mulky estuary using rack and rope method and produced 400 kg of shell-on mussels grown in a period of five months and thus proved the feasibility of estuarine mussel culture in the State (Mohamed *et al.*, 1998, *Mar. Fish. Infor. Serv., T & E Ser.*, 155, p. 10-15). Encouraged by this results, a group of five fishermen from Mulky came forward to take up mussel culture during 1997-'98. The culture work was carried out under the technical guidance of the MRC of CMFRI. The Brackish water Fish Farmer's Development Agency (BFDA), Brahmavor, participated in the culture programme with a financial grant of Rs.10,000. Again in 1998-'99 the mussel culture was continued in the Mulky estuary. The following account presents the mussel culture work carried out by the Research Centre during 1997/'98-1998/'99 in association with the fishermen of the Mulky area.

Culture site

Mulky estuary, located about 35 km north of Mangalore is an important bivalve fishing centre of Karnataka. It is formed by the confluence of two rivers, the Sambhavi and Pavanji, that flow in opposite direction and join the Ara-

bian Sea near Chitrapu. During the southwest monsoon period (June-August) the estuary receives copious supply of freshwater from the rivers. The site for mussel culture work during 1997-'98 was selected about 3.5 km from the barmouth of Mulky estuary towards the River Sambhavi. The bottom was muddy in the selected site. During 1998-'99 mussel farming attempt was made at Chitrapu, also 5 km south of Mulky where the river Pavanji confluences with the sea. The bottom of the selected site in this area was sandy. Water samples were collected at regular intervals from the sites during November-December, just before the commencement of culture activities and continued till harvest.

Culture season

Mussel seeds of 15-25 mm size suitable for culture are available at the natural mussel beds in the intertidal rocky areas of Dakshina Kannada coast from October onwards. The culture site is found to have optimal hydrographic conditions for a period of eight months (October-May). During the freshwater influx in the estuary commencing with the onset of monsoon, the salinity level reaches very low (<10 ppt) in which the mussels cannot survive. There is a period of six months (December-May) suitable for growing the mussels to a marketable size of about 80 mm.

Culture method

Rack construction: Racks were constructed using bamboo poles of 3 to 3.5 m length. Poles were driven vertically into the bottom at 3 m intervals to which poles were tied horizontally at the top, to form a square shaped structure of 3 x 3m size. Similarly 12 racks were erected in two rows of six each, covering a water spread area of 108 sq.m in the

Mulky estuary during November 1997-'98 (Fig.1). The same structure was strengthened and used for culture experiments during the subsequent year. In Chitrapu, six racks of 3 x 3 m size were fabricated in a single row at a depth of two metres, covering a waterspread area of 54 sq.m.

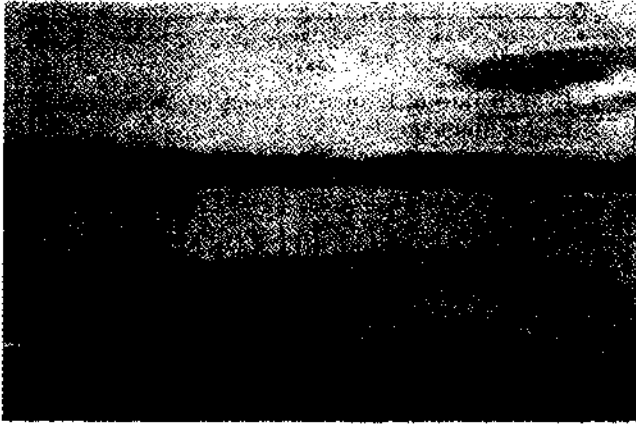


Fig. 1. Racks used for mussel culture in Mulky estuary in Site I.

Seed collection: As there is no hatchery production of seeds at present, the mussel culture is depended on the seed collected from the wild. Preliminary survey conducted by the Research Centre showed that the intertidal rocky areas along the coast especially, off Someshwara (south of Mangalore), Suratkal, Padubidri, Kaup (north of Mangalore) harbour rich mussel populations of green mussel (*Perna viridis*). Appreciable quantity of seeds were available from these natural mussel beds during November-December. The local mussel pickers of Someshwara supplied the mussel seed required for the culture. The mussel seeds were of different size, mixed with seaweeds and debris.

The seeds were packed in wet gunny bags and transported to the culture site at Mulky during the cool morning hours. The seeds were immediately transferred to plastic sheets, cleared off adhering seaweeds and barnacles and washed with estuarine water to remove silt and debris. The seeds were then kept in plastic tubs containing water from the estuary.

Seeding: During 1997-'98 season, unsorted

mussel seeds of 20.5 mm average size were seeded involving the fishermen. Coir ropes of 18 and 12mm diameter were used for seeding. The seeding density was 750g/m initially, subsequently it was doubled. The seeds were placed around the wet rope and securely wrapped with 20-25 cm wide cotton mosquito net cloth. The length of seeded rope was 1 m. After seeding, the ropes were tied with stone weight at the lower end and suspended from the rack by the other end using nylon ropes at 30 cm apart. The seeding on 440 nos. of 1 m long ropes was done over a period of 20 days in batches depending upon the seed availability. The seeds got attached to the ropes by means of freshly secreted byssus threads in two to three days and the cloth cover disintegrated in water within about 10 days. During 1997-'98 season, the seeding density was observed to be high as the 12 mm coir ropes could not bear the weight of the mussel after 5-6 months growth period. Because of this, during 1998-'99 season the seeding rate was reduced to 750 to 1,000 g/m and also the coir ropes were reinforced with 4 mm nylon rope. During 1998-'99 in the Mulky estuary 334 nos. of 1 m and 144 nos. of 0.75 m long seeded ropes were suspended from the rack during December 1998. At Chitrapu, 500 nos. of 0.75 m long seeded ropes were suspended from the rack in January 1999.

Environmental parameters

The salinity in the culture site showed an ascending trend from November-December and thereafter it stabilised during the culture period, till the onset of monsoon. It varied from 23.6 to 35.4 ppt and in the subsequent year it ranged from 30.4 to 35.7 ppt. Dissolved oxygen and pH were within the normal range and showed minimum variations during the culture period.

Nutrient content of the water (Fig. 2) was relatively high. Phosphate concentration varied from 0.26 to 1.25 $\mu\text{g-at/l}$, and silicate from 8.2 to 45.3 $\mu\text{g-at/l}$ during 1997-'98 season and during the subsequent year this was 0.55 to

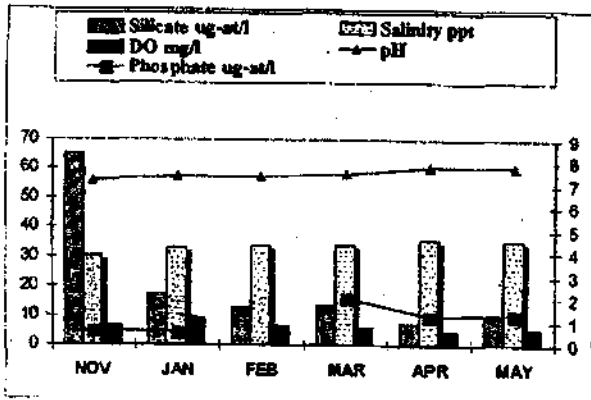


Fig. 2. Environmental parameters of seawater collected from mussel culture site in Mulky estuary (1998-'99).

2.05 µg-at/l and 7.09 to 65.2 µg-at/l respectively.

Growth rates

Monitoring was done regularly with regard to growth and survival. During the initial weeks of 1997-'98 considerable slipping of mussels took place in some ropes due to poor attachment.

The growth of mussels in length and weight in six months is depicted in Figs. 3 and 4. During 1997-'98, mussels with an average size of 20.5 mm at the time of seeding in December-January, attained a size of 74.08 mm at the time of harvest (second week of June) after 171 days, giving an average monthly growth rate of 9.5 mm. The average meat content, at the time of harvest was 26% (wet weight).

During 1998-'99, in Site 1 (Mulky) the mussels with an average size of 21 mm at seeding, reached a size of 77 mm in 186 days showing an average monthly growth rate of 9.03 mm. In Site 2 (Chitrapu) the mussels with an average

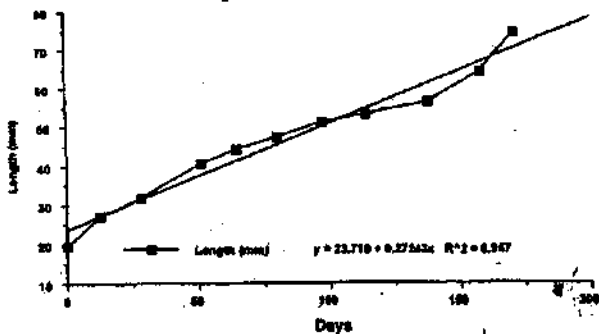


Fig. 3. Growth rate of farmed mussels in Mulky estuary during 1997-'98.

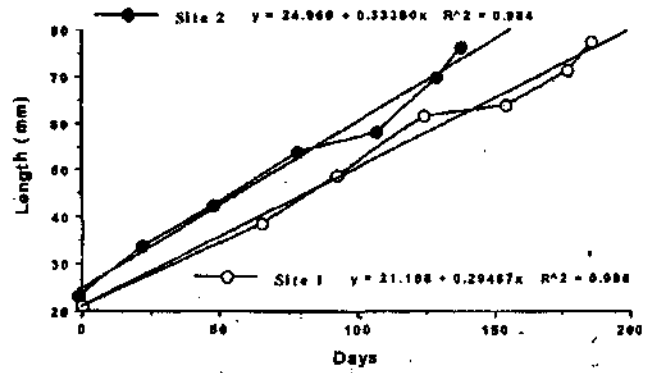


Fig. 4. Growth rate of farmed mussels in Mulky estuary during 1998-'99.

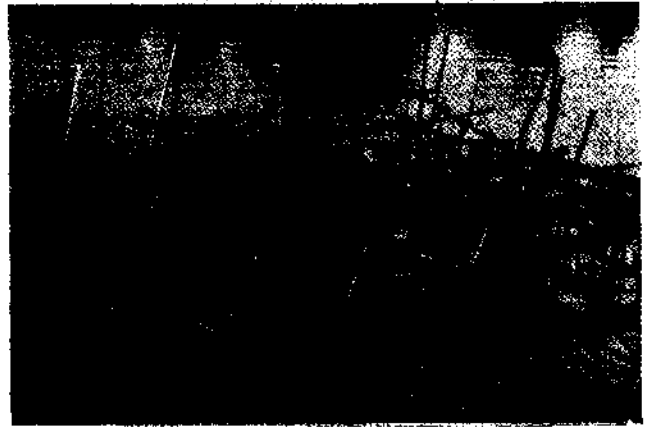


Fig. 5. Racks used for mussel culture in Mulky estuary in Site 2.

age size of 23 mm, at seeding reached a size of 76 mm in 145 days. Here the monthly growth rate was 10.96 mm. At site 2 slippage of mussels occurred in some ropes. Sediment accumulation occurred in the middle portion of the rack in this site. This affected the seeded ropes suspended in the middle of the rack.

Production

During 1997-'98, about 25 ropes with fully grown mussels were lost completely as the 12mm coir ropes used were unable to bear the weight of mussels during the latter part of the culture period. A total of 1,500 kg of shell-on mussels were harvested at the end of 171 days.

During 1998-'99, 1,000 kg of shell-on mussels were harvested in the first week of June. The remaining mussels (about 5,000 kg) were found dead due to the sudden drop in salinity resulting from the heavy influx of fresh water due to heavy rain during the first week of June.

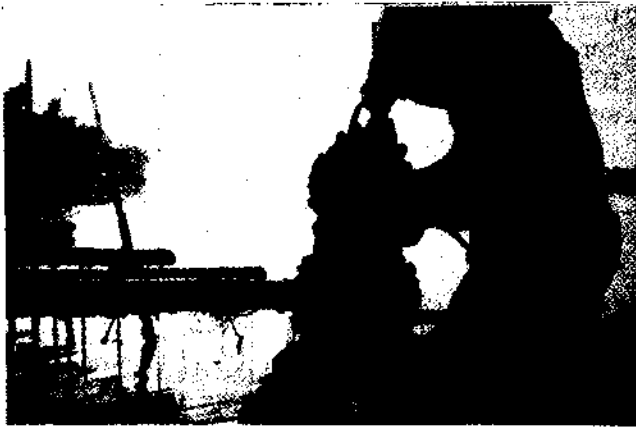


Fig. 6. Ropes with mussels ready for harvest.

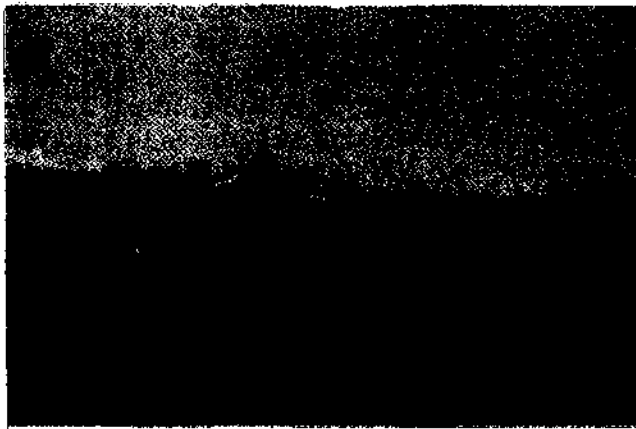


Fig. 7. Mussel harvest.

Associated fauna

Some settlements of barnacles were observed after 60 days of transplantation. In the Mulky estuary accumulation of silt was negligible. Barnacle settlement was not intense and there was no adverse effect on the growing



Fig. 8. A portion of the harvested mussels from Mulky estuary.

mussels. In Chitrapu, there was no barnacle settlement but silt accumulation was observed.

Marketing

Since local demand for mussels was poor, an attempt to study the market response in Goa for mussels was made. About 100 kg of mussels were transported in wet gunny bags by rail to Goa during the last week of May 1997. It took 24 hours to reach the mussels to the market. About 25% mortality occurred during transportation and the medium sized mussels fetched low price (less than Rs. 3/kg shell-on mussels) in the Goan market. During the first week of June mussel marketing was tried in Mangalore local market. There was good de-

TABLE 1. Production details of mussel culture in Mulky estuary

Particulars	1998-'99		
	1997-'98 Mulky	Site 1 (Mulky)	Site 2 (Chitrapu)
Total seeded ropes (Nos.)	440	478	500
Seeding rate	750 & 1,500 g/m	750-1,000g/m	750-1,000g/m
Length of seeded rope	1m	1m & 0.75 m	0.75 m
Total units harvested	374	165	0
Size of seed used	20.5 mm	21 mm	23 mm
Duration of culture	171 days	186 days	145 days
Av. shell-on wt. of mussel	25 g	38.3 g	33.9 g
Meat content (%)	26	20	22
Count/kg	50	40	45
Monthly growth rate	9.5 mm	9.03 mm	10.96 mm



Fig. 9. Harvested mussel ropes.

mand for shell-on mussels in local bars and restaurants. Initially the selling price realised was very low (Rs. 6/ kg shell-on weight). With some publicity, the demand for farm grown mussels picked up from hotels fetching higher price (Rs. 15/kg shell-on weight). During 1998-'99 season also a small quantity of mussels was sold to some of the local hotels. The local demand for mussel meat is limited. However, there is good demand from the Malabar consumers.

The mussel farmed during 1997-'98 in the Mulky estuary was harvested during the first and second weeks of June, 1998. In order to give wide publicity of the mussel culture prospects in Dakshina Kannada district a mussel 'harvest mela' was organised by the Karnataka Fisheries Department, BFDA and MRC of CMFRI at Mulky during the second week of June '98.

Cost estimates

Expenditure for one crop during 1997-'98 amounted to Rs. 15,126 of which Rs. 5,623 went

back to the beneficiaries as labour cost for rack construction, seeding, suspension of the seeded ropes, monitoring and final harvest of the mussels. Thus the actual expense with the beneficiaries involvement was only Rs. 9,503. The total revenue from the sales realised was Rs. 11, 475 giving a profit of Rs. 1,972 (profit percentage 20).

During 1998-'99 season the economics of the mussel culture work could not be worked out as the mussels were lost due to the early onset of monsoon prior to their harvest.

Remarks

During 1997-'98 season, the mussel culture activities were carried out at Mulky estuary with the active participation of local fishermen and the growth rate was studied. Culture work was continued at two places in Mulky estuary during 1998-'99 season. The growth rate of mussels in Chitrapu area was higher than that observed in Mulky area. During 1998-'99 season, the meat content of the harvested mussel was low as they had spawned before the harvest.

The culture works carried out at Mulky estuary reveal that mussel culture can be profitably done during October-May months in Mulky estuary. The fishermen group can take up the culture activities as a part-time venture as the culture involves minimum labour only during the initial period and thereafter it needs little husbandry work. There is good demand for mussels in monsoon months when supply of marine fish is less due to ban on mechanised fishing. Mussels harvested in May can be processed and marketed for sale during the lean season, for which infrastructural facilities have to be developed. Once the marketing infrastructure is developed mussel culture activities can be taken up by more fishermen group in a profitable manner.

Acknowledgment

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