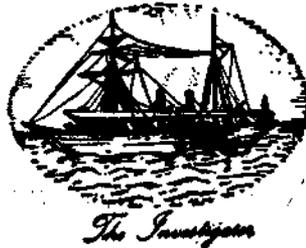


# PROCEEDINGS OF THE SYMPOSIUM ON COASTAL AQUACULTURE

*Held at Cochin*  
*From January 12 to 18, 1980*

## **PART 2 : MOLLUSCAN CULTURE**

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## EXPERIMENTAL CLAM CULTURE AT MULKI, DAKSHINA KANNADA

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### ABSTRACT

The clams *Meretrix casta* var. *ovum* and *M. meretrix* were cultured in pens in fish farm at Mulki. *M. c.* var. *ovum* of the size range 16 - 28 mm stocked in February, 1979 showed a growth of 9 mm between February and June. The average weight of the clams increased from 5.3 gm to 12.6 gm in four months. *M. meretrix* 16 - 28 mm in size stocked in January showed a growth of 22 mm in four months at the end of which a maximum size of 43 mm was reached. In the four months period, the average weight of the clams increased from 5.3 gm to 17.6 gm. The scope for culturing clams of *Meretrix* spp. in the estuarine systems of Karnataka Coast has been pointed out.

### INTRODUCTION

THE ESTUARIES along the west coast of India, particularly those of Karnataka are rich in clam resources (Jones, 1970; Alagarwami and Narasimham, 1973). In Karnataka estuaries clam beds comprising of a number of edible species like *Meretrix casta* var. *ovum*, *M. meretrix*, *Villorita cyprinoides*, *Paphia malabarica* and *Katelysia optima* are exploited regularly on a large scale for food and for the manufacture of lime. The present paper appraises the efforts undertaken at Mulki, Dakshina Kannada (South Kanara) in culturing clams of *Meretrix* spp. in pens constructed in brackish water area.

We express our sincere thanks to Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute for his encouragement and to Shri K. Nagappan Nayar, Shri S. Mahadevan and Shri K. A. Narasimham, C.M.F.R. Institute for critically reading the paper and giving helpful suggestions. We express our gratitude to Shri M. H. Dhulkhed for offering facilities and to the Department of fisheries, Government of Karnataka for permitting us to make use of their fish pond at the Government Fish Farm at Mulki.

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### MATERIAL AND METHODS

Clam culture was carried out in four rectangular pens (Fig. 1) constructed in a fish pond of the Karnataka State Fisheries Department Fish Farm at Mulki. The fish pond is on the eastern side of the creek branching off from

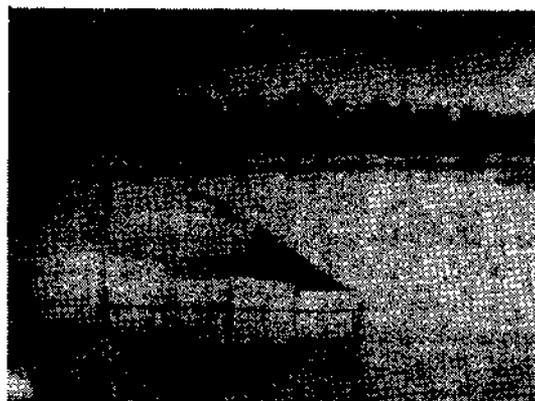


FIG. 1. Four pens constructed in a pond of Karnataka State Government Fish Farm at Mulki where clam culture was carried out.

Pavanji Estuary at Mulki. The depth of the pond was 0.5 m at low tide and 1.5 m at high tide and the bottom was sandy with some

amount of silt and clay. The size of the pens were (1) 7.6 m × 3.65 m (area 27.74 sq. m), (2) 11.5 m × 3.65 m (area 41.97 sq. m), (3) 6.5 m × 3.65 m (area 23.72 sq. m) and (4) 11.9 m × 3.65 m (area 43.43 sq. m). The pens were constructed with bamboo strip frames 1.5 m × 1.5 m in size. The bamboo frames were driven 20 cm into the bottom of the pond and they were tied together vertically with coir ropes and to the supporting vertical casurina poles fixed on the outer side of the pens to prevent the entry of predators. Small sized clams of *Meretrix casta* var. *ovum* and *M. meretrix* were collected from Sambhavi, Gurpur and Coondapur Estuaries in January, February and March 1979 and stocked in the pens at different densities. Data were collected on their growth in length and weight at monthly intervals. Data on salinity and temperature were recorded weekly once.

## RESULTS

### Stocking

Three pens were stocked with *Meretrix casta* var. *ovum* and one with *M. meretrix*. In pen one, 7,500 seed clams of *M.c.* var. *ovum* 4-8 mm in size (length) range collected from Gurpur Estuary were stocked in March 1979 at a density of 250 per sq. m. The total weight of the seed clams was 1.35 kg. In pen two, 2,620 clams of *M.c.* var. *ovum* 16-28 mm in size and 2.5-9.0 gm in weight (average weight 5.3 gm) were stocked at a density of 60 per sq. m. In pen three, 4,200 clams of *M. meretrix* 16-28 mm in size and 3.0-9.0 gm in weight (average weight 5.3 gm) were stocked in January 1979 at a density of 177 per sq. m. In pen four, 3,000 seed clams of *M.c.* var. *ovum* of the size range 4-8 mm weighing totally 0.54 kg were stocked in March 1979 at a density of 68 per sq. m.

### Growth of Clams

The size of *Meretrix casta* var. *ovum* in pen two showed an increase as reflected in modal

size shifting from 24 mm in February to 26 mm in March, 28 mm in April, 31 mm in May and 33 mm in June 1979 thus showing growth rate of 2 mm per month. In May, however it was higher being 3 mm. The total growth as indicated by the shifting of the modal size in the four months period was 9 mm and the increase in average size was 6.5 mm. The maximum size of clams increased from 28 mm in February to 37 mm in June. The average weight of the clams increased from 5.29 gm to 12.58 gm between February and June showing an increase of 7.29 gm. The average meat weight of the clams increased from 0.53 gm to 2.32 gm in the four months.

*Meretrix meretrix* exhibited an increase in size of 22 mm as shown by shifting of modes between January and May. A mode at 20 mm in January could be traced to 34 mm in March, 38 mm in April and 43 mm in May. The rate of growth was fast, 7 mm per month between January and March and later it was slow being 4 mm per month. The average size showed a steep increase from 23.6 mm to 34.0 mm between January and March and increased to 35.6 mm and 37.5 mm only in April and May respectively. The average weight of the clams increased from 5.3 gm to 17.6 gm. This shows an increment of 12.3 gm. The meat weight of the clams increased from 0.91 gm to 2.27 gm in the period showing a gain in weight of 1.36 gm.

### Survival

A total of 2,110 individuals of *M.c.* var. *ovum* out of 2,620 stocked in pen two in February 1979 survived at the end of four months in June, '79 indicating a survival rate of 80.5%. Of 4,200 clams of *M. meretrix* stocked in pen Three in January, '79, 3,047 survived in May, 1979 showing a survival rate of 75.5%. 10,500 seed clams of *M.c.* var. *ovum* stocked in pens One and Four in March 1979 did not survive. These seed clams were of very small size being 4-8 mm in length. The bottom of the pens

consisted of a good percentage (63.5%) of fine sand with grain size of 63  $\mu$  to 250  $\mu$  and 4.7% of silt and clay (Table 1). The mortality of the young clams could be due to their being smothered by fine sand, silt and clay, especially the first component which was predominant.

TABLE 1. Grain size analysis of the bottom sediment of pens in which clams were cultured

Size of grains (in $\mu$ )	Percentages
>1000	1.1
500 — 1000	5.8
250 — 500	24.9
125 — 250	44.2
63 — 125	19.3
<63	4.7

A yield of 31.79 kg of *M. casta* var. *ovum* was obtained from pen Two 41.97 sq. m. in area. From pen Three with an area of 23.72 sq. m, a yield of 53.62 kg of *M. meretrix* was got.

#### Hydrological conditions

Salinity of the water in the pens increased slowly over a limited range of 32.16‰ in January to 34.87‰ in April and decreased to 33.50‰ in May when there was rain on some days and influx of freshwater from the upper reaches of Pavanji river. The salinity decreased further to 32.38‰ in the first half of June and fresh water conditions prevailed during the second half of the month following heavy monsoon rains.

The water temperature in the pens also increased gradually from 30.3° C in January to 33.3° C in April and decreased to 32.8° C in May. The temperature showed an increase again in the first half of June and dropped to 27.3° C in the latter half of the month with the commencement of rains.

TABLE 2. Salinity and temperature of the water in pens in which clam culture was carried out at mulki

Months	Salinity ‰	Temperature °C
January '79	32.16	30.3
February	32.65	30.5
March	33.96	31.4
April	34.87	33.3
May	33.50	32.8
June First half	32.38	34.2
June Second half	0.00	27.3

The slow rate of growth of *Meretrix meretrix* in April and May may be due to the water temperature being higher with a range of 32.8° to 33.3° C compared to 31.0° to 31.4° C in previous months. In the afternoons the temperature was often 34 to 36° C in the summer months of April and May which may be responsible for marked retardation in growth. *M. c.* var. *ovum* appears to be a hardy form as the rate of growth of this species was not affected.

#### REMARKS

The results obtained in the present work indicate that there is good growth of the clams *Meretrix casta* var. *ovum* and *M. meretrix* reared in pens in estuarine environment. The survival rate has been quite high being 80.5% and 72.5% in *M. c.* var. *ovum* and *M. meretrix* respectively. This may be due to slightly larger initial size of the clams chosen for stocking taking into consideration the bottom of the pens which was containing some silt and clay apart from sand. In clam culture, survival rate is known to vary widely over a range of 30 to 75% and 50% is considered quite satisfactory (Chen, 1976). The yield of *Meretrix* spp. obtained in the present work is also quite good and it could be stated the two species

*M. c. var. ovum* and *M. meretrix* would be suitable for culture in pens in shallow creeks and estuarine systems and adjoining low-lying areas along Karnataka Coast.

Resources survey carried out earlier by the authors has revealed the existence of extensive

seed beds of *M. c. var. ovum* and *M. meretrix* particularly the former species in six estuaries of Dakshina Kannada District, namely Gurpur, Pavanji, Sambhavi, Swarnanadhi, Sitanadhi and Coondapur Estuaries. Therefore there is no likelihood of dearth of seed clams which would be needed for starting culture operations.

#### REFERENCES

ALAGARSWAMI, K. AND K. A. (NARASIMHAM 1973). Clam, cockle and oyster resources of the Indian coasts. *Proc. Symp. on Living Resources of the Seas arounds India*, C.M.F.R. Institute, Cochin, 648-658.

CHEN, T. P. 1976. *Aquaculture practices in Taiwan*. Fishing News Books Ltd., London.

JONES, S. 1970. The Molluscan fishery resource of India. *Proc. Symp. Mollusca*, Marine Biological Association of India, 3 : 906-918.