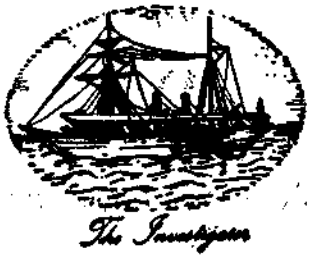
PROCEEDINGS OF THE SYMPOSIUM ON COASTAL AQUACULTURE

Held at Cochin

From January 12 to 18, 1980

PART 2 : MOLLUSCAN CULTURE

(Issued on 31st December 1983)



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Price : Rs. 350.00

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COCHIN-682 011, INDIA

SYMPOSIUM SERIES 6

Abbreviation

Proc. Symp. Coastal Aquaculture, Pt. 2

PRINTED IN INDIA BY K. G. JOHN AT THE DIOCESAN PRESS, MADRAS 7 AND PUBLISHED BY E. G. SILAS ON BEHALF OF THE MARINE BIOLOGICAL ASSOCIATION OF INDIA, COCHIN-682 011.

Proc. Symp. Coastal Aquaculture, 1983, 2 : 564-568

GROWTH OF THE CLAM *MERETRIX CASTA* (CHEMNITZ) TRANSPLANTED IN THE VELLAR ESTUARY

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ABSTRACT

The backwater clam *Meretrix casta* on transplantation in the Vellar Estuary, was observed to grow from 7.5 mm in length in September 1976 to 41.5 mm by October 1977 attaining 34 mm in 13 months. Corresponding increase in breadth, depth and weight was 29.9 mm, 24.8 mm and 31.07 gm respectively. Growth was retarded in October-December when low salinity prevailed in the estuary. Growth was fast in January-March when salinity and temperature began to rise. Growth was moderate to low from April to September which was the spawning period for the species in Vellar Estuary. Growth of the transplanted individuals was much faster than those in the natural bed. Dimensional relationships of breadth, depth and weight on length of the cultured clams were also estimated.

INTRODUCTION

AMONG the commercially important clams, the backwater clam *Meretrix casta* (Chemnitz) is one of the most important along the coasts of India. Large quantities of this clam are collected for food and for its use as bait. Shells are utilized for making lime. Studies on the growth of this species were made by Abraham (1953) from Adyar Estuary, Durve (1970, 1973) from Marine Fish Farm at Mandapam, Seshappa (1967) from Beypore and Korapuzha Estuaries, Salih (1973) from Cochin area, Parulekar *et al.* (1973) from Goa region and by Harkantra (1975) from Kali Estuary. Though rich beds of this species with an estimated production of 3300 tonnes was observed in Vellar Estuary (Anonymous, 1978), so far no information is available on the growth of this species from this area. An attempt was made to study the growth of *M. casta* on transplantation as well as in the natural bed during the period from September, 1976 to October, 1977 and the results are presented in this account.

I gratefully acknowledge Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute, Cochin for suggesting the problem and for his encouragement throughout the period of investigation. My thanks are due to Shri K. A. Narasimham of this Institute for critically going through the manuscript and suggesting improvements.

MATERIAL AND METHODS

Seed of *M. casta* numbering 2,000 were collected from a clam bed in Vellar Estuary near railway bridge (6 km from river mouth) in September, 1976 and were transplanted into a dealwood box of the size 75 × 50 × 15 cm, containing sand upto 8 cm depth. The box was covered with a nylon fishing net and kept in the estuary near the Marine Biological Station (2 km from river mouth) at ½ metre depth below low tide level on the ground. Possibly due to persistent low salinity of the waters during the time of transplantation and also due to predation by crabs in spite of netting, heavy mortality was observed in September-December and by January, 1977 only 420 clams were living. Later on by strengthening the netting further mortality

due to predation was prevented. Sampling was done monthly once and each time 100 specimens were studied for length and a subsample of 30 specimens for breadth, depth and weight. The linear measurements were taken upto 0.1 mm and the weight upto 0.01 gm precision and were done as per the method followed by Abraham (1953). For the length frequency studies, 1 mm groupings were made. In November, 1977 the experiment was abandoned as the box was washed away due to unprecedented flood in Vellar. For comparative study, samples were also collected from the natural bed except in the monsoon season when floods in the estuary made the collections difficult. Data on salinity and temperature were also collected.

Observations

Length frequency of *M. casta* from the natural bed is given in Fig. 1. Due to fishing, settlement and growth of new broods and

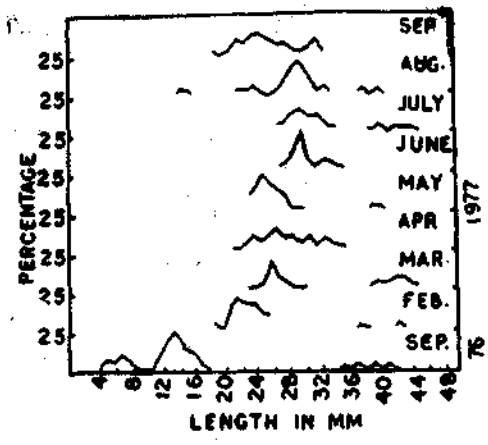

Fig. 1. Length frequency of *M. casta* in natural bed.

also possibly due to migration of adult clams (Parulekar *et al.*, 1973; Harkantra, 1975) considerable fluctuations were observed in the length frequency distribution. A prominent size group with mode at 14 mm in September 1976 can be traced to 22 mm in February 77, 26 mm in March, 27 mm in April, 30 mm in June and 32 mm in September thus showing a growth of 18 mm in 12 months.

Progression of modal groups in the transplanted sample is given in Fig. 2 from which it can be seen that the seed of *M. casta* transplanted at a length range of 4.0—8.0 mm in

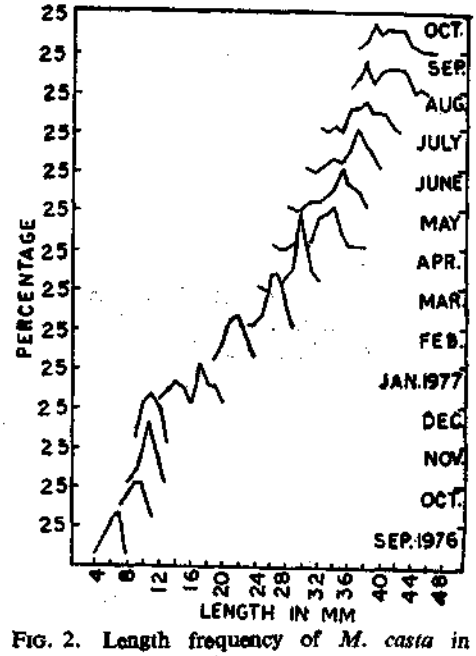

Fig. 2. Length frequency of *M. casta* in the transplanted sample.

September 1976 reached a length of 37-47 mm by October 1977 showing a minimum growth of 33 mm and a maximum growth of 39 mm. In Fig. 3 are plotted the monthly values of length and the corresponding values of depth, breadth and weight. It is evident that the clams measuring 7.5 mm in September 1976 have grown to 41.5 mm in October 1977. Corresponding increase in breadth was from 5.4 mm to 35.3 mm, in depth it was from 3.4 mm to 26.2 mm and in weight the increase was from 0.27 gm to 31.34 gm. Net growth observed in 13 months was 34 mm in length, 29.9 mm in breadth, 22.8 mm in depth and 31.07 gm in weight.

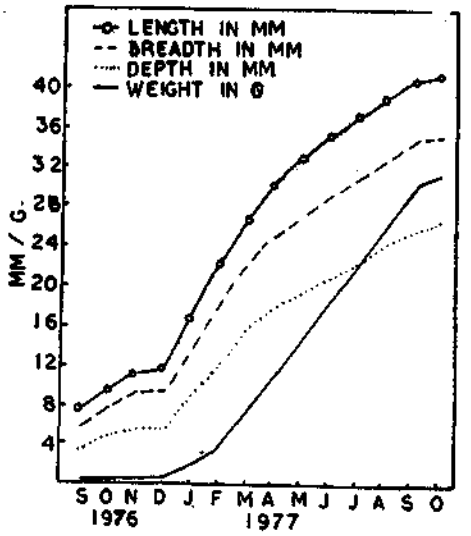

FIG. 3. Monthwise mean values of length, breadth, depth and weight of *M. casta* in the transplanted sample.

density varied from 2,500 to 5,000 live clams per square metre depending on the factors such as seed settlement, mortality, fishing and movement.

The rate of growth in length, breadth, depth and weight in the transplanted clams in each month is given in Table 1 from which it can be seen that the rate of growth was not uniform throughout the period of observation. From September to December the growth in length was only 3.9 mm, from January to March 15.4 mm, April to June 8.5 mm, July to September 5.3 mm and from September to October 0.9 mm. When studied in relation to the environmental parameters like salinity and temperature (given in the same Table) the slow growth period from September to December coincides with low salinity and temperature values due to monsoon. Fast growth was

TABLE 1. *Monthly rate of growth of* M. Casta *in length, breadth, depth and weight in relation to salinity and temperature*

Month	Growth in length (mm)	Growth in breadth (mm)	Growth in depth (mm)	Growth in weight (gm)	Temperature (°C)	Salinity (‰)
September 1976 ..	..	..	..	..	29.0	19.10
October ..	2.0	2.0	1.5	0.09	29.5	20.50
November ..	1.7	1.8	0.8	0.07	28.0	20.50
December ..	0.2	0.1	0.2	0.04	25.0	23.10
January 1977 ..	5.4	4.4	3.1	1.03	27.3	25.61
February ..	5.8	4.7	2.6	2.05	28.2	25.61
March ..	4.2	4.2	3.9	3.63	29.0	24.16
April ..	3.4	2.5	2.3	3.65	29.4	32.60
May ..	3.1	2.3	1.4	4.02	30.2	33.58
June ..	2.0	2.0	1.8	3.67	31.0	33.82
July ..	1.9	1.4	1.5	3.38	30.2	34.65
August ..	1.6	2.3	1.8	3.54	28.4	32.43
September ..	1.8	1.5	1.4	4.25	29.0	31.42
October ..	0.9	0.7	0.5	1.65	28.5	8.09

The growth observed in the transplanted clams was very fast when compared to the growth in the natural bed and such instance of high growth was earlier observed by Durve (1973) in *M. casta*. This may probably be due to less competition for space and food in the transplanted area than in natural bed where the observed in January to March when the temperature and salinity are rising. From April onwards, the growth was observed to be slow. During these months, settlement of seed clams was observed in the Vellar Estuary indicating that these months may be the active spawning period of *M. casta*. Abraham (1953) observed

that *M. casta* matures at a very small size of 12 mm and all the specimens among the transplanted ones are potential spawners and therefore a slower growth rate is probable. The retarded growth in October may be due to lowering of salinity and temperature due to the onset of monsoon.

A comparison of salinity and temperature and rate of growth, indicates that active growth was noticed when the salinity was 25‰-30‰ and the temperature 27-29°C, moderate to slow growth was observed when the salinity was 33‰-36‰ and a temperature of 30-31°C and the growth was retarded when the salinity was below 20‰ and the temperature 25°C. Slower growth rate observed by Durve (1970) in *M. casta* in the Marine Fish Farm may be due to high salinity and temperature in the farm.

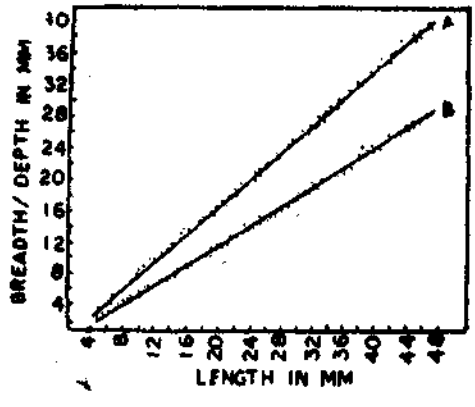

FIG. 4. Relationships of breadth (A) and depth (B) on length. (Dark line denotes the calculated values.)

Dimensional relationship

Relationships of breadth and depth on length (Fig. 4) and weight on length (Fig. 5) are expressed by simple allometric equation $y=a+bx$ where x is the length and y the variable and a and b are constants. The values obtained are :

Breadth :	- 0.1845 + 0.8324 x
Depth :	- 1.3195 + 0.6309 x
Weight :	- 0.000 4425 + 3.1476 x

When the correlation coefficient was calculated, it was observed that all of them are highly significant (r=0.995 and P=0.001). The

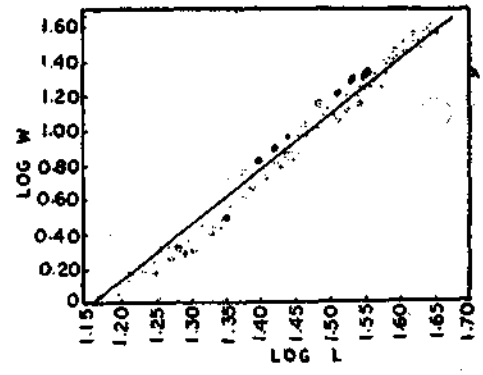

FIG. 5. Relationship of log W on log l. (Dark line denotes the calculated values.)

calculated values for depth, breadth and weight, when compared to the mean values of each month show a striking similarity except in higher size groups where the deviation was observed to be high.

DISCUSSION

Abraham (1953) concluded that *M. casta* spawned in August can attain 29.5 mm length by next April in Adyar Estuary. Durve (1970) observed a growth of 11.74 mm in length in 19 months for the same species in a pond at Marine Fish Farm at Mandapam. Later in another experiment, he (Durve, 1973) estimated a growth of 14.4 mm in length from November to April on transplantation. Salih (1973) observed a growth of 33.5 mm in 9 months and 35.4 mm in 11 months in different broods. In Goa region, Parulekar *et al.* (1973) calculated that an individual of *M. casta* of 5.9 mm in length recruited in October 1971 reached

38.9 mm by the end of 1972 showing 32 mm growth. Harkantra (1975) observed that *M. casta* of Kali Estuary 15 mm in length reaches 40 mm by June and then the growth was found to be static. Except for the observations of Durve (1970), in all other cases the growth of *M. casta* was not uniform but showed variations with changes in the environmental conditions. Growth was found to be retarded or slowed down twice in a year first due to low salinity caused by monsoon floods and secondly due to spawning activity which was always observed to be in the months of high salinity and temperature. Such a trend is noted in the present observation also.

There is much similarity in the growth in *M. casta* reported by Abraham (1953) from Adayar Estuary and that of the same species from Vellar Estuary. Probably this may be due to their close location and also were affected by similar factors especially hydrological conditions.

Present investigation is significant for aquaculture of clams since it indicates the suitable period of seeding when the growth is fast (January to February) and harvesting when the growth is retarded (earlier to October) so as to get maximum return.

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