

GROWTH OF THE OYSTER *CRASSOSTREA MADRASENSIS* (PRESTON) IN THE PULICAT LAKE, SOUTH INDIA

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ABSTRACT

Growth of the edible oyster *Crassostrea madrasensis* in Pulicat Lake has been studied by the size frequency method during the period from October 1980 to October 1981. The oyster spat collected on lime-coated tiles were suspended from a rack in the lake and reared. A mean growth of 17.6 mm in one month, 28.1 mm in 2 months, 38.1 mm in 3 months, 74.2 mm in 6 months and 92 mm and with a maximum height of 113 mm at the end of one year was observed. The rate of growth is vigorous from November to April and then it decreased. The slow rate of growth during April-May is ascertained to maturation and spawning of oysters during this period. Mortality of oysters due to predation and depletion of oxygen in the lake amounted to 57.7%. Maximum mortality was observed between the sizes of 40 mm and 79 mm.

INTRODUCTION

IN RECENT YEARS, considerable emphasis has been given in India to culture the edible bivalve molluscs such as oysters, mussels and clams, since they form a subsidiary fishery in most of the coastal and estuarine regions. Culture of edible oysters has already been attempted by Hornell (1908) at Pulicat, but due to some unknown reasons, the follow up programme was stopped. Later, Paul (1942), Rao (1951), Rao and Nayar (1956), Devanesan and Chacko (1955), Sundaram and Ramadhoss (1978), Nayar and Mahadevan (1983), Thangavelu and Sundaram (1983), Dhulkhed and Ramamurthy (1983), Rao *et al.* (1983), Joseph and Joseph (1983), Purushan *et al.* (1983) and Parulekar *et al.* (1983) have attempted to culture the oysters by collecting the oyster spat by employing the various types of spat collectors in different estuaries, backwaters and coastal regions of India

Studies on the growth of the edible oyster spat have been made by Paul (1942) in Madras Harbour, Rao and Nayar (1956) in Adyar Estuary, Rao *et al.* (1983) in Vaigai Estuary and Joseph and Madhystha (1983) in Mulki Estuary. Silas *et al.* (1982) have reported on the methods of oyster farming and growth of the oysters at Tuticorin Bay. In the present paper, an attempt has been made to study the growth of the spat of *C. madrasensis* collected from the tiles laid in Pulicat Lake.

MATERIAL AND METHODS

Spat of *Crassostrea madrasensis* were obtained by keeping the lime-coated tiles on a rack 2 m × 1.5 m erected in Pulicat Lake opposite to the Estuarine Biological Laboratory of the Madras Christian College. The juveniles of the *C. madrasensis* were allowed to grow on the tiles, till they reach a mean size of 28 mm and then they were scraped from the tiles, put into small synthetic nylon bag of 45 cm × 20 cm in size and with mesh size of 15 mm. A total

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of 183 oysters were placed in the cage and it was suspended from a rack along with other oyster bags so as to be immersed in water constantly. Periodical cleaning was undertaken to remove the algal growth and also the predatory organisms if any inside the oyster bags. Monthly measurements of the oysters have been taken regularly by means of a vernier caliper for all the spat and mortality of the oysters was also noted.

GROWTH IN HEIGHT

Growth of the edible oyster spat was found to be very fast during the first six months (Fig. 1) and thereafter it slowed down. The

found to be 15.9 mm and thus mean size of 54.1 ± 7.6 mm was attained. The fast growth during this period may be due to the availability of food organisms, the phytoplankton which are abundant in the lake. In the next month growth was retarded and a mean size of 63.2 ± 11.2 mm was noticed in March. This may be due to less availability of food organisms as they were less common in the gut of oysters during this month (Thangavelu, 1983). Growth of the oysterlings was similar to that of previous month and a mean size of 74.2 ± 11.2 mm has attained in April. Monthly average growth was found to be 12.4 mm for the 6 months.

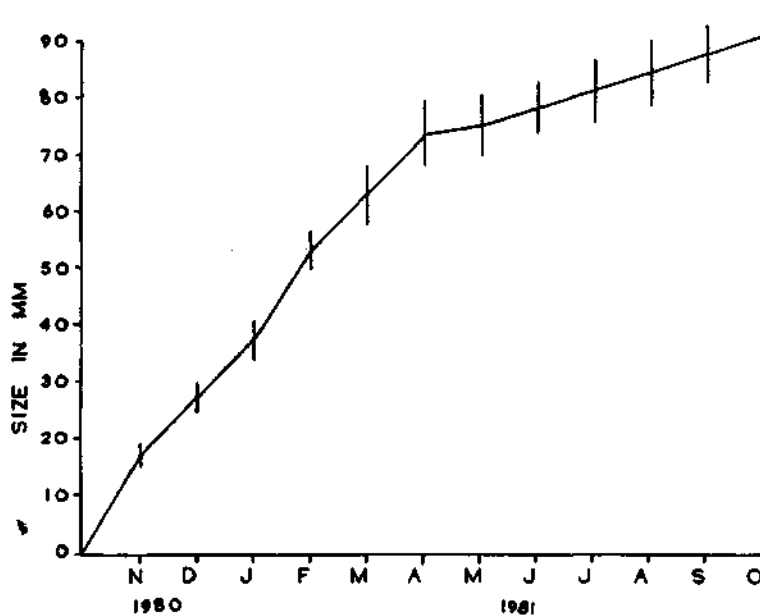


FIG. 1. Growth of edible oyster *Crassostrea madrasensis* from the Pulicat Lake.

oyster spat which settled during October 1980 attained a mean size of 17.6 ± 4.4 mm in November 1980. In December 1980 and January 1981 the growth was 10.6 and 10 mm and the mean sizes in the two months were 28.2 ± 6.3 and 38.2 ± 7.1 mm respectively. The growth of the oysterlings was very fast in February and average growth was

Monthly growth increments of oysters were very less in the period from April to October. Mean size of oysterlings was 75.9 mm in May reach a maximum of 87.9 mm. This might be probably due to the diversion of energy drawn from food, for maturation of gonads. From the month of May to October, the oysters showed very slow growth and the average

growth increment during this period was observed to be 3 mm per month. The oysters grow to a mean and maximum sizes of 92.1 mm and 113 mm in October, '81 respectively.

From this it is clearly seen that the oysters grow very fast for the first six months and during the next six months growth rate diminishes very considerably. However, shell thickness seems to add continuously during the second half of the year.

MORTALITY

Spat collected during the summer season (April-May, 1980) were kept in nylon bags which were suspended in the lake from horizontal poles opposite to the Estuarine Biological Station and after they attained a mean size of 52.4 mm, all the oysterlings have been found dead during October as a result of freshwater influx into the area. In addition, floating algae putrified and settled on the oyster cages. In October, areas of freshwater influx were avoided and lime-coated tiles were kept in an area where the water was saline. Among the 183 oysters, 57.7% of the oysters have been found dead before attaining the marketable size due to various reasons. Mortality due to predation of crab was calculated to 4.4% for the whole year. Small ones of crabs such as *Charybdis cruciata*, *Scylla serrata* which enter the cages of oysters and thereby make a hole on the shell of young oysters and feed on the oysters. The size of oysters ranging between 40 and 89 mm form the prey of crabs, of which the maximum percentage (66.6%) was found between 40 and 49 mm and the remaining size groups appear to be very less. Maximum percentage (53.6%) of mortality was mainly due to suffocation or depletion of oxygen as a result of occurrence of thick algal growth and also floating algae in the water media where the oysters were suspended. Diurnal variations in oxygen revealed depletion of oxygen usually occur in the early morning hours which might have caused the oysters to die (Thangavelu, 1983).

DISCUSSION

The above study indicates that the growth of the oyster *C. madrasensis* is rapid during the early part of the growing period which is similar to the oyster *O. virginica* of New England coast as reported by Loosanoff and Nomejko (1949), but it differs from that of *O. gigas* in which the growth is better in the second half of the year. Durve and Bal (1962) stated that in *C. gryphoides* of the west coast there is a rapid rate of growth during the period of constant high salinity, cessation of growth during the period of low salinity. A significant feature is the sharp drop in the growth of *C. madrasensis* from April to May which may be due to the spawning of oysters as it was observed in the scallop *Pecten irradians* (Belding, 1910) and Pismo clam *Tivela stultorum* (Coe, 1947). Orton (1928) found that growth in the European oysters *Ostrea edulis* is also inhibited during the spawning season. Loosanoff and Nomejko (1949) have also mentioned that the rate of growth diminishes during the period of gametogenesis in the spring and early summer, and later during the fattening period in September and October. However, Seki (1937) has observed rapid growth of the oyster *O. gigas* during the spawning season.

Paul (1942) has observed that *C. madrasensis* attained 21.5 mm in 44 days and 66 mm in 8 months. Rao and Nayar (1956) have recorded that this species grows to a size of 35 mm in one month and three weeks and 84 mm in eleven months in Adyar Estuary. Silas *et al.* (1982) have stated that *C. madrasensis* cultured at Tuticorin exhibits growth of 52 mm at the end of three months and 90 mm at the end of one year. In the Vaigai Estuary, the same species attains a mean size of 86.7 mm and a maximum of 110 mm at the end of one year (Rao *et al.*, 1980). Purushan *et al.* (1983) reported the attainment of the mean and maximum growth of the edible oyster were 61.8 and 68 mm within a period of 169

days. In the Pulicat Lake, the oyster attained a mean size of 17.6 mm at the end of the first month, 28.2 mm at the end of 2 months, 38 mm at the end of 3 months, 74 mm at the end of 6 months and 92 mm at the end of one year with a maximum of 113 mm. The growth of the oyster in the first four months

is slightly lesser than that reported by Rao and Nayar (1956) in Adyar estuary and Silas *et al.* (1982) at Tuticorin; and it is higher than the growth rate observed by Paul (1942) in the Madras harbour and Joseph (1979) and Joseph and Madhystha (1983) at the Mulki Estuary.

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