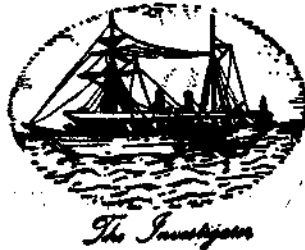


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PART 2 : MOLLUSCAN CULTURE

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CULTURE EXPERIMENTS ON THE EDIBLE OYSTER *CRASSOSTERA MADRASENSIS* IN THE BHEEMUNIPATNAM BACKWATER

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ABSTRACT

Studies on the possibilities of culture of edible oyster *Crassostrea madrasensis* in the Bheemunipatnam Backwater were conducted during 1977-79. Spat collection experiments using different types of spat collectors showed that empty oyster shells and close meshed plastic baskets were most efficient. Setting of spat on the spat collectors kept near the bottom was more than on those kept suspended off bottom. Spatfall was observed throughout the year with peaks in March and October. The oyster attained a size of about 8 cm during the first year. Low salinity during monsoon months appeared to retard growth.

INTRODUCTION

THE CULTURE of edible oyster *Crassostrea madrasensis* has assumed importance in India in the recent years. Hornell (1910) and Paul (1942) gave preliminary accounts of the growth of spat of *Ostrea (Crassostrea) madrasensis* Preston, while Rao and Nayar (1956) dealt in detail with the growth of the same from the Madras Coast. However, no work has been done on this oyster from the north-east coast of India. Observations on the spat collection and growth of this species in the Bheemunipatnam Backwater are presented in this paper.

The authors are grateful to Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute, Cochin for his constant encouragement during the course of this work.

MATERIAL AND METHODS

The settlement and rate of growth of the spat of *C. madrasensis* were studied from bimonthly samples of spat collected from an experimental

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rack, set up near the natural oyster bed in Bheemunipatnam Backwater at Nagamayyapalem during 1977-79. The bed is shallow and is situated 3 km north of the bar mouth and has good tidal flow. Different spat collectors, viz., tiles, asbestos sheets, coir ropes, wooden poles, iron meshed cages and oyster shells were used. Plastic baskets with close mesh were also used during 1979. The spat were removed from the collectors when they attained a size of 30-40 mm and reared in iron meshed cages. In order to eliminate any bias in the estimation of growth by using monthly modal values, mean height for every month were also calculated and the mean growth curve drawn. Data were collected on temperature, salinity and pH to see if they have any bearing on the growth and spawning of the oysters.

SETTING OF OYSTER SPAT

The results of the present study reveal that although the setting of spat has been observed almost throughout the year, two well marked spawning periods, i.e., February-June and September-December are present. March and October appeared to be months of peak setting.

Of all the spat collectors set up near the experimental rack, oyster shells, iron cages with close mesh had good setting while close meshed plastic baskets showed very intensive setting. Further, the spat collectors kept on or near the bottom had more spat than those kept off bottom. During the successful seasons, spat setting on oyster shells at the rate of 4 to 20 numbers per 10 cm² in 1977 and 1978 and at the rate of 15 to 50 numbers per 10 cm² in 1979 was observed. Spat setting on the close meshed plastic baskets during October-December 1979 season was unprecedented and so intensive (100-120 numbers per 10 cm²) that the entire area of the basket, especially the inside, was filled with spat; sometimes a second layer of setting over the first was seen.

in 22 months if length increments in terms of modal values and mean monthly values respectively are taken into consideration. In October 1979 a modal size was seen at 12 mm which shifted to 27 mm in November and 47 mm in December 1979.

The minimum, maximum, mean and modal heights observed during 1978-79 given in Fig. 1. The growth values at the end of February, March, April, May and June 1978 as read from the mean curve (Fig. 1) are 12.7 mm, 23.9 mm, 32.0 mm, 38.5 mm and 44.0 mm. The monthly rate of increase in the size of the juvenile oysters was highest (12.7 mm) in February and later values gradually declined to 5.5 mm in June 1978. Apart from slight increase in July

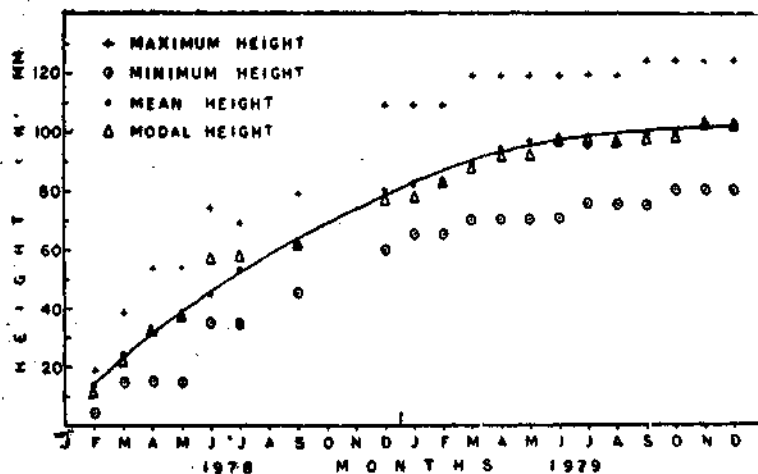


Fig. 1. The growth curve of *Crassostrea madrasensis* of 1978 year class.

Growth of spat

Spat, with a modal size of 12 mm were seen in February 1977. This mode could be traced to the mode at 62 mm in October 1977.

The growth of the spat of modal size of 12 mm in February 1978 could be traced till December 1979. The brood would have originated in January 1978 and a growth of 77.0 mm and 81.8 mm in 12 months and 102 mm and 101.5 mm

1978, the values remained either almost steady or declined until December 1979.

Temperature, salinity and pH of backwater

The temperature of backwater fluctuated from 25.0°C in January to 32.2°C in May during 1977 while it ranged from 22.0°C in October to 33.0°C in May during 1978 (Fig. 2). Water temperature was low from October to December 1978, and high in other months.

However, in 1979 temperature varied between 24.0°C and 28.0°C.

There were wide fluctuations in salinity due to incursion of flood waters in 1977 (8.8‰—32.8‰) and 1978 (7.4‰—34.4‰) with higher values during the first six or seven months followed by lower values during the rest of the year. However, in 1979 salinity values did not show much fluctuation and they ranged from 25.5‰ to 34.9‰.

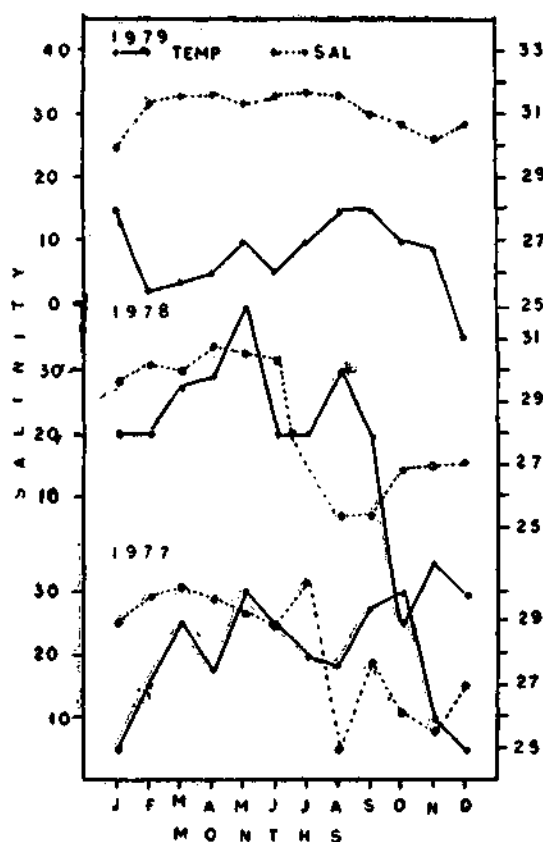


Fig. 2. Monthly variations in the mean values of temperature and salinity in the Bheemuni-patnam Backwater during 1977-79.

The range in variation in pH values of the waters near the experimental rack was 8.0—8.2 in 1977 and 8.0—8.1 in 1978. The pH values ranged from 7.6 to 8.2 during 1979.

AGE AT WHICH THE OYSTERS REACH MARKETABLE SIZE

It is known, from earlier observations (Rao and Nayar, 1956) that *C. madrasensis* in Madras Backwater, attained a marketable size of 84 mm (maximum size) in one year. The present study reveals that *C. madrasensis* in Bheemuni-patnam Backwaters reaches maximum and mean sizes of 110 mm and 81.8 mm at the end of twelve months.

DISCUSSION

Hornell (1910) showed that in about 1½ months the spat of the *O. (= C.) madrasensis* attain a size of 27 mm. During the present culture experiments the spat of early 1978 brood exhibit a maximum height of 34-39 mm and a mean height of 21.6-23.9 mm in two months. The October 1979 brood however, registered a maximum growth of 47 mm and a mean height of 30.7 mm in two months. The significantly better growth of the October brood coincided with the presence of comparatively clean water devoid of barnacles and other encrustations and better salinity conditions ranging from 26.6-29.0‰ as opposed to 8.8-15.6‰ in 1977 and 14.7-15.8‰ in 1978. Rao and Nayar 1956 observed maximum height of 61 mm in 6 months and 84 mm in 12 months and 109 mm in 17 months. The present investigations showed maximum height of 70 mm, 110 mm and 119 mm at the end of 6, 12 and 17 months respectively, showing higher growth rate.

Rao and Nayar (1956) observed that the growth of the oyster is retarded to some extent under constant high salinity conditions and is slackened by constant low salinity. Durve and Bal (1962) stated that in *C. gryphoides* of the west coast there is rapid rate of growth when the salinity is moderate, retardation of growth during the period of constant high salinity, cessation of growth during the period

of low salinity. During the present investigations it was noticed that the growth were usually affected whenever the salinity values were high *i.e.*, in April-June 1978 and June-August 1979.

The present investigations also show that the adult oyster exhibits remarkable tolerance to lower values of salinity. However, mortality

of oysters was noted whenever muddy water flows persistently in the bed area for a week or more. This may be due to clogging of the gills. Further it was noted that oyster spat of less than 20 mm are highly susceptible to lower values of salinity. There were instances of total mortality of the spat when values of salinity come down usually during October and November.

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