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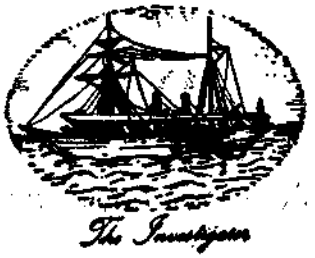

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STUDIES ON MATURITY STAGES AND SPAWNING PERIODICITY OF *CRASSOSTREA MADRASENSIS* (PRESTON) AT TUTICORIN BAY

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ABSTRACT

Studies undertaken during 1976 on the gonadal maturity of the backwater oyster *Crassostrea madrasensis* at Tuticorin revealed a biannual spawning periodicity. March-April and August-September were found to be the peak periods of spawning. A broad correlation has been observed between diurnal temperature difference and spawning of oyster.

INTRODUCTION

THE PRESENCE of a sizeable population of edible oyster *Crassostrea madrasensis* in the natural bed at Karapad tidal creek opening into Tuticorin Bay of the Gulf of Mannar and the suitable environmental factors in the area favoured the establishment of an experimental oyster farm. Monitoring of the course of reproductive activity of the oyster in the natural bed was taken up as to determine the right time when spat collectors are to be set up. Since oyster reproduction is considerably influenced by environmental factors, observations on temperature, salinity, dissolved oxygen and pH were made. The results of this study were immensely useful in organising oyster spat collection on a large-scale.

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MATERIAL AND METHODS

A random sample of 50 oysters was collected once in every fortnight from January to December 1976. The stage of maturity was determined by examination of fresh smears of gonad. Histological sections of gonad tissue were prepared and examined.

Water temperature was recorded twice a day at 6 A.M. and 3 P.M. which invariably represented the minimum and maximum temperature of the day. Salinity, dissolved oxygen and pH of the water were recorded once in a week.

OBSERVATIONS

The percentage composition of oysters in different maturity stages (females), indeterminates and males is shown in Fig. 1. For this study the maturing and ripe stages are treated together under 'ripening stage' and partially spent and nearly spent stages as 'spent stage'. The indeterminables and males have been considered as such.

Indeterminable stage

Oysters with gonads in this stage were dominant during July, registering 67% (Fig. 1).

Fairly high percentages were also observed during May-June. In August this condition dropped to 34% and rose only during November and continued to increase till February. A decline in the percentage was noticed from February and the lowest was recorded during April (23%).

Female

(*a*) *Ripening stage :* Although the female oysters showed maturing and ripe stages of gonads almost throughout the year, a biannual maximum was quite apparent during February-April (34-40%) and August-September (29-35%). In the first phase highest percentage was registered during March and in the second during September. During May it decreased to 26% and in the months of June and July it got further reduced to 6% and 7% respectively. From October onwards the percentage of ripening females showed a progressive decline till January (16%).

(*b*) *Spent stage :* Oysters in spent stage were at an extremely low level in the month of July (2%). The poor occurrence of spawners during the preceding month might be the probable cause for this feature. Ensuing the second spawning during October and November, the percentage of this stage increased to 28 in December.

Males

Relatively high percentages of males were observed during the months of April, June, August, September and October (30-38% of samples). The males were relatively more in number in the second half of the year than in the first.

Environmental conditions

Data on temperature, salinity, dissolved oxygen and pH are given in Table 1. There were no marked fluctuations in salinity, dissolved oxygen or in pH. While observing the diurnal

TABLE 1. *Hydrological data of the study area during* 1976. *Monthly averages of daily temperatures (min. at* 6 *a.m. and max. at* 3 *p.m.) and differences are given*

Temp. °C Minimum	Temp. °C Maximum	Variation in daily temp. °C	Salinity ‰	Oxygen ml/litre	pH
23.8	28.2	4.4	35.09	3.92	8.06
23.5	28.4	4.9	35.17	3.75	8.22
26.2	30.8	4.6	36.00	4.14	8.02
27.9	32.6	4.7	36.40	3.61	8.12
27.2	31.7	4.5	36.60	3.78	8.08
27.4	30.5	3.1	35.80	3.96	8.05
25.3	28.2	2.9	37.48	4.05	8.18
25.2	28.5	3.3	36.93	4.09	8.23
25.9	30.1	4.2	36.95	3.97	8.40
27.6	30.4	3.5	36.80	3.98	8.39
27.6	30.4	2.8	34.07	4.14	7.98
25.8	29.3	3.8	31.70	5.04	8.01

variations of the water temperature it was found that during certain months the mean values of the diurnal variations remained high (Fig. 1).

Discussion

Many workers are of the opinion that under natural conditions, gonad development and spawning of oysters are well defined seasonal phenomena (Korringa, 1941 ; Loosanoff and Davis, 1952 ; Butler, 1958 ; Rao, 1956 ; Durve, 1965). Loosanoff and Davis (1952) observed that the period required for maturation of gametes in oyster is a function of time and temperature. He had demonstrated that 50% of the oysters developed mature gametes at temperaturs of 15.0°C, 20.0°C, and 25.0°C in 26.5 days, 7.9 days and 5.4 days respectively. Butler (1955) observed that the spawning and setting of oyster larvae in the natural conditions in all years, first occurred only after there had been a minimum temperature increase of 5°C in the proceeding 30 days period.

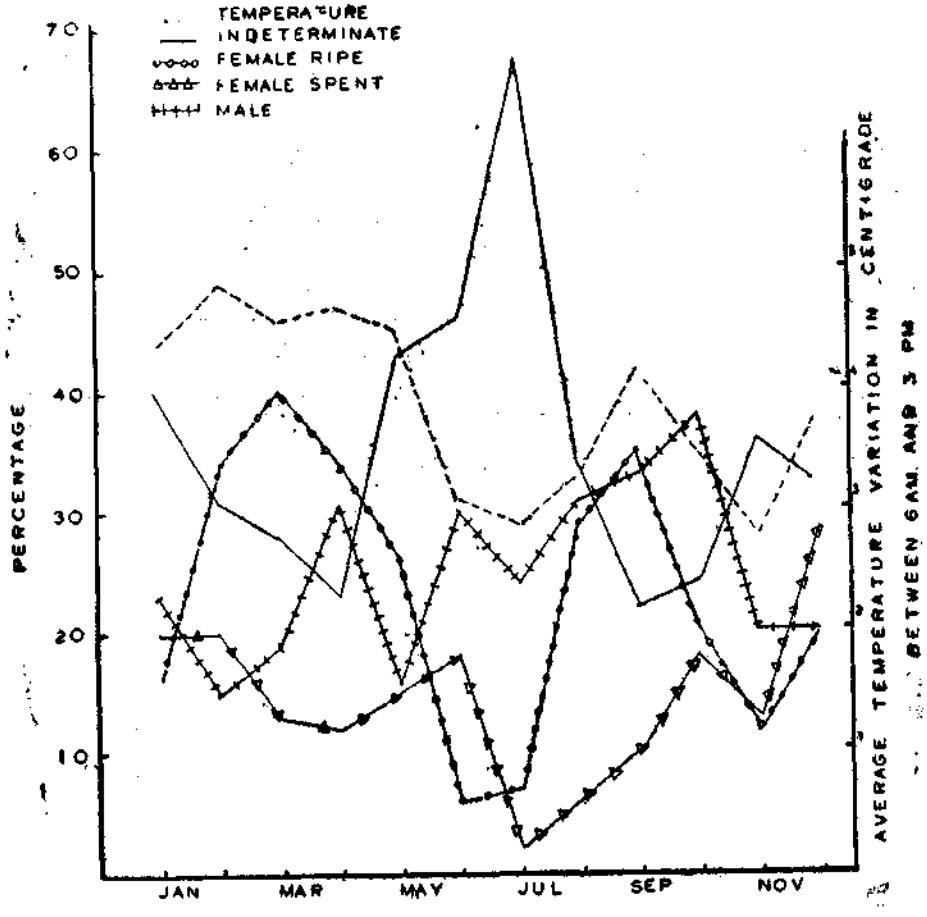

Fig. 1. Percentage composition of *Crassostrea madrasensis* in different maturity stages (females) indeterminates and males. Monthly averages of daily temperature difference between maximum and minimum (data from Table 1) are given.

The monthly averages of the diurnal variations in the minimum and maximum temperature were observed to have well defined relation to the development of gonads, spawning and

the setting of spat. The highest value observed during February initiates the maturation of the oysters and the spawning continues till the month of May. The drop in temperature values during the months of June and July showed a corresponding decline in the spawning activity of the oysters. During the month of September this value of temperature increased showing a rise in the spawning population (Fig. 1).

Experiments on oyster spat collection in Karapad Creek (Thangavelu and Sundaram, 1983) confirm the observations. They observed that the spat collection tiles laid from July 1977 to June 1978 have been shown two distinct periods of spat settlement. The rate of spat settlement during August, September and October 1977 were 15, 34 and 7 spat per tile respectively and from November to February 1978 the settlement was almost nil. During March, April and May of 1978 the rate of settlement were found to be 8, 26 and 4 tiles respectively.

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