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48. EXPERIMENTAL STUDIES ON THE PATTERN OF SPATFALL OF THE GREEN MUSSEL, *PERNA VIRIDIS* AT ENNORE, MADRAS

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ABSTRACT

The green mussel, *Perna viridis* spawns throughout the year at Ennore near Madras. This assures continuous availability of mussel seed at frequent intervals almost throughout the year. The length at first maturity is 16 mm (age: about 16 months). Experiments conducted to understand the spatfall pattern at Ennore reveal that, on average, 112 spat/month settle in an area of 56.25cm^2 of granite stone collector. The maximum settlement of 669 spat/month has been recorded during June. The effects of biotic and abiotic factors on settlement pattern of spat are discussed.

INTRODUCTION

For successful implementation of mussel culture programme, a knowledge on the availability of spat in the vicinity of culture area is of foremost importance. The need for experimental studies on mussel availability has been emphasised repeatedly by many authors (Alagarswami 1980; Nayar and Mahadevan 1980; Silas 1980); In Kovalam (near Madras), the Central Marine Fisheries Research Institute has demonstrated that there is considerable scope for culture of mussels on rafts. The present investigation was undertaken to understand the mussel spat recruitment pattern in Ennore (also near Madras) and to ascertain the availability of mussel spat for culture practices in this area.

MATERIAL AND METHODS

Ennore, a coastal village, 15 km north of Madras (13° 14' N and 80° 20' E) was selected as the study area. For experimental purpose, the concrete platform extending about 250 m into the sea was used for suspending the test panels.

Four kinds of test panels namely weather-proof-roofing tiles, wooden planks, concrete plates and granite stones of various sizes were experimented with. Among these, the granite stone panel measuring 53 cm x 38 cm x 7.5 cm was selected since it withstood even harsh environmental conditions. Two 50 mm diameter holes were made on top and bottom of the panel. Iron chain of 9 mm thickness was passed through the holes. The chain from the upper hole was tied to the platform pillar and the chain passing through the lower hole was shackled with a 35 kg, five pronged iron anchor which minimized the swinging action of the panel.

The test panel was suspended from the platform in July 1981. On completion of every four week immersion, the organisms that settled on the two sides of the panel were scraped off in an area of 7.5 cm x 7.5 cm and counted. The scraped off area on completion of first 4 week immersion period was designated as Area I (Fig 1, A1). The panel with the rest of the unscraped

FIG. 1

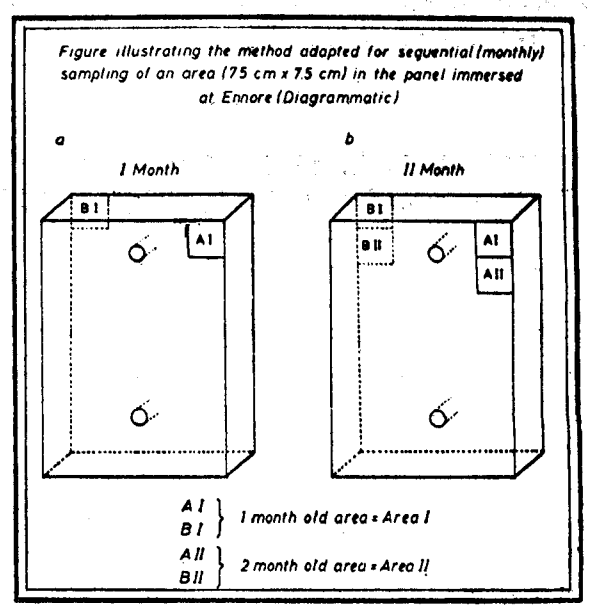

Fig. 1 The Experimental Panel

organisms was again suspended in the sea water. After a period of another four week the panel was lifted up and all the organisms that had settled in Area I as well as an adjacent new area of 7 5 cm x 7.5 cm were scraped off and counted (Area II). This gave data on the fresh settlement of organisms in 4 weeks time on a previously settled and scraped off area as well as on settlement during a 8 week of undisturbed period. This sampling was continued up to March 1983.

Based on the numerical abundance of mussel that had settled in a given area (56.25 cm^2), the intensity of spat recruitment was classified into the following four categories: 1. Intensive spatfall: When the settlement intensity exceeded 300 individual mussel spats in an area of 56.25 cm^2, it was taken to denote as intensive spatfall. 2. Moderate spatfall : Mussel spat density ranging from 101 to 300 was considered as moderate spatfall. 3. Poor spatfall; Mussel spat numbering between 20 to 100 was taken as poor spatfall. 4. Very poor spatfall: This category included spat settlement of 19 or less number in 56.25 cm^2 area.

During this period, the surface water temperature ranged from 25.4°C to 29.2°C and salinity varied from 25.5 ppt to 34.4 ppt. The dissolved oxygen ranged from 3.8 to 5.2 ml/l.

RESULTS

Mussels settle on a given substratum during the pediveliger larval stage when the shell length is 2 mm (Bayne 1976). These young mussels are generally termed as spats. Dare (1973) used the term 'spat' to specify young *Mytilus edulis* of 10 mm in length. In the present paper, the term 'spat' is used to denote mussels measuring <14 mm in length. A cut off at 15mm was felt necessary because, in *P. viridis* of Madras coast, the onset of maturity was noticed in mussels of 15 mm length. Young mussel took about one month from the time of settlement, to attain a length of 14 mm.

Table 1 illustrates the monthly variation in mussel spat settlement. Intensive spatfall was observed during June and early October 1982, the density being 659 and 631 respectively In September 1981, September 1982, March 1982

TABLE 1. *Monthly variation in mussel spat settlement on experimental panel (56.25 cm^2 area) at Ennore.*

Year & Month	No. of spat
August '81	34
September	115
October I	22
October II	3
November	6
December	Nil
January '82	Nil
February	90
March	282
April	11
May	5
June	659
July	33
August	12
September	244
October I	631
October II	9
November	73
December	10
January '83	19
February	15
March	199

and March 1983, moderate spatfall ranging from 115 to 282 individuals was recorded. Poor spatfall with a range of 22 to 90 spats was recorded during August 1981, February 1982, July 1982, November 1982 and early October 1981. Very poor spatfall was noticed in the remaining months. In these months, the spat recruitment was from nil to 19 mussels per 56 25 cm^2 area.

DISCUSSION

The average spatfall during the present investigation is 112 spat/month in 56.25 cm^2 area on a granite stone panel. This observation is comparable with the results recorded by earlier workers. On an average, in one sq. cm. area 1.4 mussel spat at Kovalam (Selvaraj 1984), 1.5 at Vizhinjam (Appukuttan *et al.* 1980) and 2.34 between Shertalai and Cochin (Nair *et al* 1975) have been reported. However, along the

Brazilian coast, Fernandes and Seed (1982) recorded a high mussel spat density of 117/cm². In the present study, the maximum spat density/ cm² was 11.7.

TABLE 2. *Average mussel spat settlement/cm² area*

	Ennore	Kovalam	vizhi-njam	Sherta-lai to Cochin
Average (No/cm²)	2.0	1.4	1.5	2 34
Maximum (No/cm²)	11.7	14.56	1	2.20
(month)	Jun '82	Oct '82	—	—
Minimum (No/cm²)	0.05	0 0	21.5	2.48
(month)	Late Oct 1981	Apr '81 Nov '81 Apr '82 May '82	—	—

Environmental factors may play a vital role in mussel spat settlement. Investigations on spawning period and occurrence of mussel larvae in plankton revealed that during September 1981, for instance, 68% of mussels were found to be in spawning condition and high planktonic larvae count of 236 was recorded in 20 l sea water. However, a meagre 22 and 8 mussel spat settled in the panel in October 1981. The occurrence of low level in spatfall may be due to the turbulent sea condition coupled with severe underwater currents that prevailed during north-east monsoon in October. It is possible that the currents transported the larvae away from the coastal zone (Easterson and Mahadevan 1980; Silas 1980). Other abiotic factors such as salinity and dissolved oxygen (Harger 1970) and wave action (Harger 1969) are also known to influence the spat abundance.

Favourable conditions for successful spawning and spat settlement may provide abequate mussel seed for culture operation on a commercial scale. It is suggested that the peak spatfall during June may be utilized for raft culture operation so that marketable size mussel could be harvested before the onset of north-east monsoon in Madras coast.

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